

Presented by AYA
\& the School of Sacred Geometry
P. O. Box 3714

Sedona, AZ 86340

## SG301.Ia Golden Cosmos:

 Planets, Stars \& CosmologyOnline Module SG 301 (Advanced I)

www.SchoolOf SacredGeometryorg phi@)schoolofacredgeometryorg www starwheels.com


## INTRODUCTION (a-d)

1. Structures \& Models of Ancient Cosmologies
1.1.1 Anthropocosmic Cosmology (1-2)
1.2 The Universe as Vibratory Resonance
1.3 The Universe as a Cosmic Human
1.4 The Universe as the Great Mother
1.5 The Universe as the Great Chain of Being 1.6 The Universe as Wonder \& Awe
1.7 The Universe as Pure Consciousness 1.8.1 Cosmological Symbols - The Primal Egg 1.8.2 The World Tree Symbol
1.8.3 The Cosmic Mountain Symbol
1.8.4 The Cosmic Ladder Symbol
1.9.1 Vortical Structure in Ancient Cosmologies 1.9.2 Vortex Models of Ancient Cosmologies 1.10.1 Nested Hierarchy - Western Models 1.10.2 Nested Hierarchy - Buddhist Cosmology 1.10.3 The Bhu-Mandala in Vedic Cosmology 1.10.4 Jain Cosmological Diagrams
1.11.1 Cyclic Re-occurrence in Ancient Cosmologies 1.11.2 Space/Time Cycles in Vedic Cosmology
1.12.1 Kepler's Grand Vision (1-2)
1.12.2 Kepler Revisited and Validated
2. The Traditions of Astrology.
2.1 The Tradition of Astrology
2.2 Tropical or Sidereal? (1-3)
2.3 A Symbolic Archetypal System
2.4 The Traditional 7 Planets (1-3)
2.5 The Planetary Glyphs
2.6 The Zodiacal Glyphs (1-2)
2.7 The Planet-Zodiac Interpretations
2.8 The Virgo Supercluster
2.9 Pointing to the Galactic Center
2.10 The Astrological Aspects
2.11 The Traditional Planets (1-3)
3. Current Explorations in Cosmology
3.1 The Vastness of the Universe
3.2 Where Are We? (1-8)
3.3 The Fine Tuning of the Universe (1-2)
3.4 The Living Sun (1-3)
3.5 The Galactic Dance

## SG301.Ib Golden Cosmos: Planets, Stars \& Cosmology

3.6 Dark Matter and Energy
3.7 WMAP1 - An Anisotropic Universe (1-3) 3.8.1 Mega-Structures - The Cosmic Axis (1-2) 3.8.3 Mega-Structures - The Great Wall 3.8.4 Mega-Structures - The Great Attractor 3.9 The Largest Cosmic Structures \& Voids 3.10 The Cosmic Web
3.11 A New Cosmological Model - BioCentrism
4. System Harmony in the Solar Family
4.1 Planetary Platonics (1-6)
4.2 Solar System Spiral Dances
4.3 Titius-Bode Law \& Revision
4.4 What is Planetary Resonance?
4.5 PHI in Average Planet Distances
4.6 Molchanov Quantization
4.7 Tennenbaum - A Cascade of 5 Pentagons
4.8 Martineau - Solar "Coincidences"
4.9 Merrick - Harmonic Interference 4.10 Cousto - Planetary Tones
4.11 Dan Ward - PHI resonances
4.12 Spira Solaris - John N. Harris (1-3)
4.13. Signatures of the Spheres - H. Warm (1-6)
5. Planetary Partner Dances
5.1 Geometries of Harmonics (1-3)
5.2 Dances of Orbital Periodicities (1-2)
5.3 Sun, Moon \& Earth: 18, 19 \& PHI
5.4 Earth - Moon (1-3)
5.5 The Moon-less Earth: a Hypothesis
5.6 Dances of Mercury (1-2)
5.7 Earth - Venus (1-2)
5.8 Terraforming Futures: Mars \& Venus
5.9 Orbital Dances of Mars
5.10 A Triadic Dance: Venus, Earth \& Mars 5.11 The Three Solar Gods: Jup., Sat. \& Nep.
5.12 Jupiter \& Saturn (1-2)
5.13 Enters Neptune
5.14 Enters Uranus (1-2)
5.15 Satellites of Jupiter
5.16 Neptune - Pluto Resonance 5.17 Near and Proto Resonances 5.18 Eris, Haumea \& TNO's

## 6. Star \& Galactic Choreographies

6.1 Celestial Spirals
6.2 Solar System \& Milky Way (1-2) 6.3 The Great year (1-3) 6.4 Who Are the Stars? (1-2) 6.5 The Interstellar Medium 6.6 The Search for a Great Center 6.7 Binary Star \& Precession 6.8 Cosmic Characters (1-3) 6.9 The Sun-Sirius Resonance (1-2) 6.10 The Pleiades resonance 6.11 The Milky Way
6.12 The Local Super Galactic Dance (1-2)
6.13 The Global Dance: Superclusters 6.14 The Cosmic Dance of Shiva
7. A Golden Holo-Fractal Cosmos
7.1 Fractal Scaling of the Cosmos (1-3)
7.2 Micro-Macro Fractal Gallery (1-2)
7.3 A Cosmos of Holo-In-Formation
7.4 Cosmic Geometry (1-3)
7.5 Inclusive Oneness
7.6 Celestial Grids of Light (1-2)
7.7 Celestial navigation in Birds 7.8 Quantum Cosmology
7.9 Harmonic Cosmology (1-2)
7.10 A Higher-Dimensional Live Universe
7.11 Who is the Universe? (1-2)
7.12 Is There a Mother Universe?

CONCLUSION (a-c)

## SG301.Ic Golden Cosmos: Planets, Stars \& Cosmology



We have acknowledged image credits (with hyperlinks) to the best of our ability.

Kindly contact us for omissions or corrections.
phi@schoolofsacredgeometry.org
© Aya, Aya Productions \& StarWheel Foundation.

## SG301.Id Golden Cosmos - Intro

In addition to gathering astronomical observations, ancient cosmologies, the world over, were pursuing purpose. They were looking for significant geometrical \& numerical patterns, listening to musical harmonic resonances, seeing subtle \& metaphysical threads of interconnection, explaining the cosmogony and origin of the universe and ceremonially propitiating this larger context of human life we call the starry sky or heaven. It was a holistic, organic and all-encompassing worldview guiding humans all the way down to the details of daily life. Humans were provided with a home and were reminded that they never actually left their home. Both science \& mysticism joined forces to offer a spherical, harmonious, cyclical and multi-dimensional picture of life, destiny and the cosmos.
"Cosmos", in ancient Greek, means "ornament": the universe was perceived as an orderly system of Harmony \& Beauty. Similarly, the Buddhist tradition used the metaphor of Indra's Jewels: the structure of the universe was described as a precious necklace of gemstones worn by the Divine Being and the whole of creation was seen as a holographic piece of jewelry, a place of perfect esthetic beauty with multiple facets reflecting each other and all facets re-radiating their original light. "In every particle of dust, there are innumerable Buddhas", says the Samantabhadra Sutra [ SG101.1].

Cosmology (Numbers in Space \& Time) was the conclusive study of the Quadrivium (Four Ways) curriculum of Western classical education. As an extension of Mathematics (Numbers), Geometry (Numbers in Space) and Music (Numbers in Time), Cosmology was the royal crown of the Four Ways or Liberal Arts.

Current official science, in its materialistic limitation, is denying (and embarrassed by) the subtle \& poetic strands of purpose, interconnectedness, beauty and simple joy that are woven in the web of life, nature \& consciousness and are intimately known and cherished by every human in their "inner heart". Current cosmology \& astronomy are the expressions of this soon-to-be-obsolete mechanistic, reductionist prevalent model of contemporary science: they describe the universe as a storyboard of war, conflict and chaos where humans are random, isolated aggregates - not realizing that by doing so they are projecting their own inner confusion of humans alienated from their "home" and trying to find a false identity in the technological control of nature \& the political take-over of each other. The ancient cosmology of light communing with a love-embracing cosmos has been momentarily replaced by the fear $\&$ anxiety of a chaotic $\&$ frightening cosmos filled with dark energy \& black holes and originating in an unexplained big-bang explosion. Official science's dogmas, parading as truth, have significantly lowered the happiness levels of several generations.

However, the boy's club science dominated by the "survival of the fittest" is being rapidly replaced by an emerging science (a "new paradigm") that is rediscovering cooperation as an evolutionary drive, quantum oneness throughout the barriers of space-time and mind separation, fractal resonance beyond sizes and scales, the zero-point field as a pre-material common ground of energy and life-force diffusion, and the (golden) spiral vortex as a model of optimum growth. The universe is becoming fun \& beautiful again as we are starting to hear the hum of its giant orchestration and listen again to its finely-tuned symphonies. Maybe for the first time in their life-time, many people are awakening to see life and the universe as a garden of co-creation overflowing with exquisite blossoms and, moreover, are enjoying to walk this earth as a multi-level university of conscious learning \& playing.

This is the cosmos of Sacred Geometry, reflecting an emerging cosmic science harking back to the ancient cosmology and yet adding to it the benefits of an entirely new evolutionary cycle of consciousness, in ways that promise a synthesis and higher-level attainment of expanded collective consciousness. This is the cosmology we are entering in this SG301: leaning on the unified knowledge hinted by the ancients and yet exploring and appreciating, with scientific exactness, the extraordinarily precise attunement of bliss, beauty \& harmony revealed by the cosmos in this unique moment of human awareness. We live within the universe but, ultimately, the universe lives within us - such is the Cosmology of Sacred Geometry.

Progressively recovering our ancient inheritance long overdue, we are beginning to play again in the universal and magical Garden of Life.

Science is becoming a yoga,
Sacred Geometry a Celebration of Oneness, and the Universe turns out to be a Golden Cosmos. Welcome Home!

## SG301 Chapter 1. Structures \& Models of Ancient Cosmologies



T The Vision of Ezekiel. German woodcut, 16th century.

Since the beginnings of humankind, the nightly dome of the starry sky has provided a magical sense of belonging to a much larger whole as well as giving us a glimpse of infinity and its mysteries.

Ancient cosmologies \& cosmogonies were holistic worldviews, cyclical cosmo-visions encompassing all aspects of physical, mental and spiritual life. They were cradling their people in a larger embrace of destiny, both familiar and safe, although ineluctable, through ceremonies, lifestyles, languages, beliefs, stories of origins and visual arts \& symbols, in direct attunement with the rhythms of nature and celestial happenings. They were not of the mind but engaged the emotional intelligence, the heart and the soul.

These cosmologies were providing a context of belongingness: everyone had their place \& role in a bigger, benevolent and yet unfathomably mysterious, picture. In ancient cultures, none was excluded from the Sacred Play of Life. Cosmologies were the scripts. Everyone \& everything was interconnected. And, whether daily life was generously loving or disastrously frightening, there was a lot more going on than the mere appearance of things.

In this initial chapter, we are focusing on basic aspects and models of ancient cosmologies:

- Anthropocosmic worldview
- Vortex structure
- Nested Hierarchy
- Cyclical structure
- Music of the Spheres


## SG301.1.1.1 The Anthropocosmic Nature of Ancient Cosmologies (1)

The ancient mystical traditions of the "Micro-Cosm / Macro-Cosm" hold that the human being is not just a mere constituent of the universe, some insignificant, accidental or statistical component. A Human being was not conceived of as a disposable fragment, but was understood as a fractal, an integral aspect of the whole. Not just a part, but the living expression of the whole. This is the ancient view of the "Anthropocosm", a wisdom of and for the Universal Human: the being who is awakening beyond space-time forms, the One who never really begins and never really ends. The Anthropocosm celebrates a wholistic entity bridging the infinitely large \& the infinitely small and integrating them harmoniously. The Human being is then realized as the carrier of a holographic seed: the conscious seed of infinity, an information-energy holding the potential of resonance with the Cosmic Source.

This geometry of fractal harmonic ratios (that remain constant throughout dimensional transformations) constitutes the "Jacob's Ladder" by which human beings stay in the "universal flow" and partake of both the source and the manifested creation. The Anthropocosm is both the seed and the fruit.

The wisdom of the Anthropocosm, still alive in the Vedic conception of the vastupurusha mandala (the temple in the image of Cosmic Man), has been recently revived by Schwaller de Lubicz in his monumental work "The Temple of Man" which he describes as "an outline of the doctrine of the anthropocosm, a guide to the way of thinking of the sages".

A human being is a micro-cosm compared to a galaxy but a macro-cosm compared to an atom in his/her body. The domain of human life was the meso-cosm, the place of balance, mediation \& integration between the Macro and Micro. All ancient cosmologies are founded on this principle of fractal resonance between ABOVE \& BELOW.

$\uparrow$ Web image (unknown).

Ancient Anthropocosmic cosmologies are not just mere mind-based "descriptions". Going much deeper, they provide for embodied humans a context of spiritual purpose beyond the impermanency of space-time: they are a way to realize the interconnectedness of the Cosmos. They posit the immanence of the Divine Source.

They are the wisdom teachings prior to religions, cutting through the dualistic temptations of physical perception and aiming at recreating Oneness within the global human awareness. Better than just Above \& Below, this esoteric wisdom is actually pointing to Outside \& Inside, ultimately stating:
"There is nothing to discover outside of ourselves... Know Yourself... Go within into the universe that you are..."


个 The Vastu Purusha mandala is a template used by sacred Hindu architecture to create buildings fractally self-similar to the anthropo-cosmos.

$\uparrow \Rightarrow$ Nataraja (Shiva), as the Cosmic Dancer vibrates the thread of consciousness (Brahma sutra) throughout the Vastu Purusha (universal mandala).


## SG301.1.1.2 The Anthropocosmic Nature of Ancient Cosmologies (2)

In the ancient viewpoint, the same sacred frequencies of colors, tones and geometric ratios were woven within all of creation as a living web. The universe sings the same song and breathes the same breath. Any change in the Whole is immediately resonated into the lesser wholes and vice versa: the flower swaying in the breeze is kissing a star.

In the Hindu tradition, it all happens inside, as intimately as a dream: Brahman, the Divine Being, is creating the universe out of a desire to meet himself. The entire universe is cyclically born out of the Creative womb of the Ultimate Dreamer as a concert of self-referring sacred sounds: Nada Brahma.

Nowadays, the principle of Cosmic Harmony is echoed in the concept and technology of holography where each "lesser whole" in encoded with the luminous geometric programs necessary to recreate itself. And the many versions of the "Anthropic Principle" (hotly debated in scientific circles as an ego game of intellect) are somehow reintroducing self-awareness and consciousness as a creative power.

> Anthropocosmic cosmologies teach that each being is encrypted with the universal harmonic order.

"All is number". (Pythagoras)
"Man contains in himself all numbers, measures, weights, motions and elements."
(Agrippa von Nettesheim. 1486-1535)
"The World and Man are One. They are one constellation, one influence, one breath, one harmony, one time, one metal, one fruit." (Paracelsus. 1493-1541)
"O man, look at Man! For Man has in himself Heavens \& Earth". (Hildegard of Bingen. 1098-1179)
"Man is a living whole in which there are atoms as alive as he is, forming his matter, his organic components, which reveal all the functional aspects of the Universe... Man is the Cosmos itself. A harmonic relationship must exist between Cosmic Man - who also contains the stellar world and this incarnate man called Microcosm... There is a projection of the universe within the human body." (Schwaller de Lubicz. The Temple of Man. 1957 / 1998.)
"We may be like microbes living in a cosmic host." (Web comment)
"My brain is only a receiver. In the Universe there is a core from which we obtain knowledge, strength, inspiration. I have not penetrated into the secrets of this core, but I know it exists." (Nikola Tesla. 1856-1943)

$\uparrow$ Universal Man.
Hildegard of Bingen. 13th c.
Z Zodiacal man. 15th c.


$\uparrow$ In this cosmogram by Robert Fludd, we get a sense of the inter-connectivity of the universal levels through the agencies of God, the celestial hierarchies, Mother Nature and the "Ape of Art" or human creativity in accordance to nature. (1617). [\$SG102.5]


个 The traditional Western view: "As Above, so Below" - the macrocosm co-responds to the microcosm.

## SG301.1.2 The Universe as Vibratory Resonance

Ancient cultures had an intuitive "holographic" understanding of the universe as inter-active and inneractive: there were resonant wave connections or "correspondences" between all its aspects. All wisdom teachings portray a multi-dimensional yet unified cosmos described as the web of consciousness.
"In physics, resonance is the tendency of a system to oscillate with greater amplitude at some preferred frequencies than at others. At these resonance frequencies, even small periodic driving forces can produce large amplitude oscillations, because the
system stores vibrational energy". (Wikipedia). The flapping of a butterfly's wing in Asia influence the weather in America. Flowers \& stars co-create each other. Hence the cosmic power of a simple thought, intention, prayer or ceremony.

In an interactive, holographic understanding of the cosmos, any part reflects the whole thru intermediary, harmoniously proportioned levels, all contributing to a music-like "unison" or immediate, non-dual ground of being transcending (and unifying) local space \& time.

$\uparrow$ The Buddhist teachings use the "holographic" metaphor of Indra's net [\$SG101.1]

$\uparrow$ Universal interaction in the Egyptian cosmos.
(Internet. Unknown artist.)


个 The shape of Universe as per Jain cosmology, in the form of a Cosmic Man. Picture taken from 1517th CE art from Jain temple in Gujarat.

$\uparrow$ The universe as a music monochord based on the human body. Robert Fludd. 1621.


SG301.1.3 The Universe as
a Cosmic Human

$\uparrow$ Lokapurusha, the Cosmic Human in the Hindu tradition.

The Breath of the Universe. Ancient Hindu civilizations portrayed the universe as a gigantic, intelligent being called "Brahman". Brahman's nature is described as transpersonal, personal and impersonal. All life cycles depend on its "breathing" process which is the "expansion-contraction" pulse of the universe.

According to the Puranas (Vedic histories), there have been innumerable creations in the course of cyclical time. The basic unit of Vedic time is the Day of Brahma, which lasts 4.32 billion years. [432 is an archetypal or canonic number: $6 \times 72=18 \times 24=432$ SG202.1]. The Day of Brahma (also called a kalpa) is followed by a Night of Brahma, also lasting 4.32 billion years. The cycle of days and nights of Brahma goes on for Brahma's lifetime of 100 years ( 36,000 nights), equivalent to 311.04 trillion of our human years. During the day of Brahma, life, including human life, is manifest.
During the night of Brahma, life is not manifested (the universe "collapses").


く个二 The $\mathbf{1 0 , 0 0 0}$ faces of the Cosmic Mother．

## SG301.1.5 The Universe as the Great Chain of Being

The concept of a harmonious universe inhabited by the Great Chain of Being has been at the core of the world cultures. Theirs was a universe filled with an omnipresent, invisible \& subtle spirit presence; a universe packed with company to get acquainted with. This was the bedrock of all ancient cultures. It is not until the 18th century, in the West, that this view shifted decisively to the earthly, material and tangible "reality" of the universe. And then Westerners started to conceive of being separate from the universe and "loneliness" crept in as an inner, Western-based disease...

In the world-view of Antiquity, the Middle-Ages and the Renaissance, the universe was pictured as an orderly hierarchy, all-embracing and coherently perfect. This hierarchy of existence or states of being was called the Great Chain of Being and stretched from Earth to Heaven, in a continuum of conscious presence. Hence the world-wide appearance of the Cosmic Ladder archetype allowing Jacob and all mystics \& shamans to travel back $\&$ forth between the inner and the outer realms of life and consciousness.

The "super-essential" musical harmony of the cosmos was understood by all ancient cosmologies, from the Nada Brahma (Sound of the Universe), Shabda yoga of Sound and musical gandharvas of the Vedic/Hindu tradition to the Gregorian Chant and musical angels of the Christian West.

As explained in SG201, musical chords are sound frequency expressions of Sacred Geometry Phi-based ratios, the octave (unison), fifth and fourth being the most harmonious sound ratios. The natural physics of sound, expressed by the series of overtones, is similarly based on the fractal "octaving" of these 3 basic chords.

The conception of the Great Chain of Being implies a musical analogy as this orderly arrangement of the universe was considered to unify all its parts, from the fish swimming in the depths of the oceans to the top-most archangel, in the most harmonious concord or resonant oneness.

The "great theme" of the Chain of Being was expressing the relationship between humans and the Divine as a series of musical chords that could actually be subtly perceived as the Music of the Spheres. [-SG201.3]

This universal music, scaling up and down the levels of creation, was bridging 3 main octaves: the material octave (elemental and corporeal), the celestial or middle octave and the super-celestial or spiritual octave.


个 "Jacob's Ladder".

$\uparrow$ Buddhist tradition:
a "Field of Refuge" showing
the hierarchy
of spiritual lineage.
¢ Christian tradition: Earthly Paradise by Nicolas de Lyre. This painting depicts the kingdoms of creation, the elements, the planets \& stars and the celestial hierarchies.
The "above" part is the canopy generating the "below" part as the continuum of creation.

## SG301.1.6 The Universe as Wonder \& Awe



## SG301.1.7 The Universe as Pure Consciousness

## SG301.1.8.1 Cosmological Symbols The Primal Egg



个 Vishnu within the Cosmic Egg. 19th c.


T Egyptian tradition. The Sun Ra rising over the mount of creation.

$\uparrow$ The Orphic egg.


个 The Shivalingam, symbol of the Cosmic Egg (Brahmanda).

## See SG303 for

 contemporary Egg traditions: Easter eggs, Ukrainian Pysanky, DarumaSan...The Primal Egg (World Egg / Cosmic Egg) is a perennial symbol found in the creation myths \& stories of many cultures and civilizations. The Primal Egg is the beginning of the universe. Oftentimes some primordial being comes into existence by "hatching" from the Primal Egg.

- India. The Cosmic Egg rises to the surface of the primeval waters where it is incubated by Hamsa (Divine Breath) and splits into Dyaus (Heaven / gold) and Prithivi (Earth / silver). The First Man (Anthropocosmic Man) is hatched from an egg; this is Purusha, the Father of all beings or Prajapati, the Lord of all creatures. The Sanskrit term for the Primal Egg is Brahmanda (brahm = cosmos / expanding, anda = egg). The Rig Veda (RV 10.121) uses a similar name for the source of the universe: Hiranyagarbha (hiranya = gold + garbha = womb), the One born out of the Golden Egg or Brahma.
- Greece. The Orphic Egg in the Ancient Greek Orphic tradition is the Cosmic Egg of Chronos (Time) and Ananke (Necessity) from which hatched the primordial hermaphroditic deity Phanes / Protogonus who in turn created the other gods. The egg is often depicted with a serpent wound around it. Leto hatched the Sun (Apollo) and Monn (Artemis) from an egg.
- Egypt. The world arose from the waters as a mound of dirt, which was deified as Hathor. Ra (the Sun) was contained within an egg laid upon this mound by a celestial bird.
- China. The universe began as an egg. The god Pangu, born inside the egg, broke it into two halves: the upper half became the sky, while the lower half became the earth.
- Japan. The Shinto primal egg splits into Heaven and Earth.
- Tibet. "The 5 clements came from a "huge egg".
- Dogons. World egg stories.
- Finland. In the Kalevala, the Finnish national epic, there is a myth of the world being created from the fragments of an egg laid by a celestial bird.

\& Alchemy tradition.
The "Oeuf
Philosophal",
symbol of the
primordial matter.


## SG301.1.8.2 The World Tree Symbol

In many traditions and mythologies, the World Tree is represented as a colossal tree which supports the heavens, thereby connecting the heavens, the terrestrial world, and, through its roots, the underworld. The World Tree is associated with the Tree of Life and is a symbol of the axis of the universe (axis mundi in Latin) which connects different realities or dimensions of the universe.

§ Mayan World tree. Temple of the Foliated Cross, Palenque.

$\rightarrow$ Buddhist
cosmic tree. Link



世个 Yggdrasil, the World Tree in Norse mythology.

The ancients recognized that there is only one permanent aspect of the universe: change. Yet change occurred within an ordered and oriented world, a cosmos. It was a world with a center, an horizon line and a pyramid-like mountain anchored at the center.

Every culture had their own Sacred Mountain, their own visible symbol of the cosmic hub holding the universal mandala. The Mountain-Center of the universe was where the original creation had taken place and continues to take place. It is where the order and beauty of life are blueprinted. It is the place where Heaven and Earth flowed into each other and where the world was renewed by celestial power. Around the Cosmic Mountain, cities \& temples were built, ceremonies were performed and rulers were enthroned. The Cosmic Mountain shared an aura of beneficial influence sustaining people, animals and gardens through the infusion of spirit life force. The Cosmic Mountain cultures were harmonized with the universe.

In the words of E. C. Krupp: "Places like this had power because they matched and reflected the structure of the cosmos itself. In them, the entire universe was miniaturized through symbol. The universe and the shrine (mountain) shared a homologous relationship: each element of the shrine mimics - through placement, function and meaning - a corresponding aspect of the universe itself. Invested then with cosmic symbolism, such shrines (mountains) were sacred venues, places where it was believed that the magical power of the universe could be encountered and tapped." (Link)

## SG301.1.8.3 The Cosmic Mountain


$\uparrow$ Mount Kailash (Transhimalaya) is considered a stairway to heaven in the Buddhist, Jain, Hindu and Bön traditions. The circumambulation ( 52 km ) is a holy pilgrimage. Mount Kailash is believed to be the abode of Shiva.



个 Mount Fuji, Japan, is considered an incarnation of several deities.


个 Upward mobility. Mesoamerican pyramids were topped by ceremonial platforms, as a mid-way place of encounter. They lifted their users closer to the sky and, to do so, were equipped with stairways. The steppyramid combines the symbols of the Cosmic 16 Mountain and the Cosmic Ladder.


个 Miniature of Jacob＇s dream of the ladder． Rutland Psalter，c． 1260.


T The ladder in and out of the kiva，the sacred underground chamber of initiation for the American Pueblo people．

Traditionally，the ladder has been regarded as the symbol of a progressive ascent to the spiritual realms．The ladder is a bridge between earth and heaven and a keyboard of frequency levels．
－In a bas－relief from the third dynasty of Ur （dated around 2070 to 1960 BC），there appears a ladder with seven rungs that has been interpreted to mean a journey from a lower to a higher state of consciousnes．
－In the Bible，Jacob＇s vision of a ladder offers a symbol of cosmic harmony．
－A philosopher named John Klimakos，also known as＂John of the Ladder，＂laid the foundation for this concept，deeply rooted in neo－ Platonism and Egyptian theology．
－Images of the ladder are widely found in medieval and Renaissance art because the cosmos was thought of as interlocking celestial
hierarchies（the＂Great Chain of Being＂－which expresses the harmony and order of the cosmos）．


个＂Lady Alchemy＂．Central portal，Paris cathedral．The ladder with 9 rungs represents the 9 steps of the alchemical transformation． The scepter is a symbol of（inner）royalty． The open book is visible knowledge；the closed book is invisible（spiritual）knowledge．

## SG301．1．8．4 The Cosmic Ladder Symbol



个 William Blake＇s＂Jacob＇s Ladder＂．The angels who are descending and ascending Jacob＇s ladder from and to heaven represent the soul＇s ability to rise or fall．The steps of this mystical ladder represent the universe＇s scale of divine harmony．

－The Tower of Babe was a man－made attempt at a 3D cosmic ladder．


$\uparrow$ Taoist diagram
of the Supreme
Absolute. 1623.


个 Swastika, a Hindu cosmological symbol.

SG301.1.9.1 Vortical Structure in Ancient Cosmologies

$\leftarrow$ The
Churning of
the Milky
Ocean (the
vast expanse of consciousness).

Wall relief at Angkor Vat. Vishnu becomes the cosmic turtle in order to support the universal vortex.

$\uparrow$ Rope, tortoise and churning are clearly indicated in the Maya codex Tro-Cortesianus.
The glyph for "sun" is gliding along the rope.

$\uparrow$ "Uniting the two lands". (Pharaoh Sesostris I statue). On an archetypal level, this can be the Egyptian version of cosmic vortex processes.

The Churning of the Milky Ocean - a vortex operation [Kshir (milk) sagar (ocean) mantham (churning)]

This is the Vedic story of creation in the first world age. In order to curdle the lost elixir of immortality out of the milky waters of primeval time, the gods (devas) and demons (asuras) collaborated to churn butter out of the Cosmic Mountain (Mandara). Coiling the monstrous serpent Vasuki around the massive peak, the two teams engaged in a gigantic tug-of-war with the snaky rope in order to swivel the mountain back and forth and to emulsify the sea. As the Mountain began to sink, Vishnu submerged himself underwater and, transformed into the cosmic tortoise Kurma, was able to support the Cosmic Mountain.
The gods $\&$ demons kept on whipping up the ocean and, in time, sacred things emerged from the clotting waters: the sun, the moon, the goddess of fortune, the tree of celestial paradise, the conch of victory... and much more... such as the elixir of eternal life (amrita).

The story is about the establishment of a central Cosmic Axis (such as it is rediscovered by WMAP) and its engagement through a vortical alternation (contraction \& expansion). We are shown here the selfsustaining, open sourced system operating on the macro-cosmic scale and also attainable on the meso-human scale (yoga and shakti enlightenment).

## SG301.1.9.2 Vortex Models of Ancient Cosmologies



1. Hebrew Cosmos. The light of Heaven connects the 3 Heavens, the Earth and the Sheol (underworld). Link
$\downarrow$ Tibetan Cosmos. A double vortex. Link.


$\uparrow$ The Inca Cosmos. At the center is the human body acting as an axis for the power of life. Link



T The Mayan Cosmos features 13 skies. In the world's center there is the tree of Life as a means of communication between the various spheres.


T The Navajo Cosmos is an organic growth, based on kinship. At the center is the "place of emergence".

## SG301.1.10.1 Nested

## Hierarchy in Western Cosmologies

Ancient cosmologies envisioned a top-down (nested) universal hierarchy.
Current cosmology is tentatively using the concept of fractality and its self-similarity.
$\rightarrow$ Cosmographical diagram. Earth surrounded by the elements, the spheres, the signs of the zodiac and phases of the moon, with the four seasons in the corners.

The Catalan Atlas, 14th century

$\uparrow$ Earth at the center of the Spheres. Gossuin de Metz, 13th c.


个 Ptolemaic orbits forming an armillary sphere. Andreas Cellarius, Harmonia Macrocosmica, 1661.

$\uparrow$ Dante's conception of the universe.

Note about bottom-up hierarchy in current cosmology.
Cosmologists study a model of hierarchical structure formation in which structures are created from the bottom up: smaller objects form first, while the largest objects (such as superclusters), are still assembling. (Wikipedia)

In the Buddhist cosmology, the universe consists of many worlds (lok $\bar{a})$ or "planes" stacked one upon each other in layers. Each world corresponds to a mental state or state of awareness. A world is not so much a location but is made of the beings who compose it as it is sustained by their karma and defined by a change in mental state.

The Buddhist cosmology is divided into thirty-one planes of existence and the planes into three realms, or dhâtus, each corresponding to a different type of mentality:

- Ārūpyadhātu. The Ārūpyadhātu (Arūpaloka) or "Formless realm" would have no place in a purely physical cosmology, as none of the beings inhabiting it has either shape or location; and correspondingly, the realm has no location either. This realm belongs to those devas who attained and remained in the Four Formless Absorptions of the arūpadhyānas in a previous life, and now enjoys the fruits of the good karma of that accomplishment.
- Rūpadhātu. The Rūpadhātu or "Form realm" is, as the name implies, the first of the physical realms; its inhabitants all have a location and bodies of a sort, though those bodies are composed of a subtle substance which is of itself invisible to the inhabitants of the Kāmadhātu. According to the Janavasabha Sutta, when a brahma (a being from the Brahma-world of the Rūpadhātu) wishes to visit a deva of the Trāyastriṃ́a heaven (in the Kāmadhātu), he has to assume a "grosser form" in order to be visible to them. The beings of the Form realm are not subject to the extremes of pleasure and pain, or governed by desires for things pleasing to the senses, as the beings of the Kāmadhātu are. The bodies of Form realm beings do not have sexual distinctions.
- Kāmadhātu. The beings born in the Kāmadhātu differ in degree of happiness, but they are all, other than arhats and Buddhas, under the domination of Māra and are bound by sensual desire, which causes them suffering.

As well as a model of universal origins and destruction, Buddhist cosmology also functions as a model of the mind, with its thoughts coming into existence based on preceding thoughts, and being transformed into other thoughts and other states.

## SG301.1.10.2 Nested Hierarchy - Eastern <br> Cosmologies - Buddhism



## SG301.1.10.3 Nested Hierarchy Vedic Cosmology

The Bhägavata Purana or Srimad-Bhagavatam is widely recognized as the best known and most influential of the Puranas (a from of oral Vedic transmitted knowledge), and is sometimes referred to as the "Fifth Veda". The Book 5 (Fifth Canto) of the Bhagavatam mentions the Bharat empire (a pre-historical empire of harmony \& prosperity) and engages in a description of the universe, the sun and its course, the moon and the planets, the regions below the earth, and the hells. The cosmology and astronomy are provided in geographical \& mythological terms and thus differ widely from the more technical Jyotisha Shastras (astronomical siddhantas).

In his book Vedic Cosmography and Astronomy, Richard L. Thompson suggests that the cosmos as described in the Puranic literature is higher-dimensional and transcendental: it cannot be fully represented within 3-D space \& by 3-D concepts. Puranic cosmology is a portfolio of educational tools that present many mutually compatible aspects of one humanly indescribable complete whole. As stated by Thompson: "The most fundamental feature of the Vedic idea of space is that many more things can be brought together in this space than the geometric rules of 3-D space allow." The Bhagavatam seems to conflict with 3-D reason only because it describes a cosmos perceived by beings with higher-dimensional powers of vision - whereas the astronomical shiddhantas describe the cosmos as perceived by earth-bound vision. [Note: higher-dimensional access between separate locations (non-locality \& entanglement) is a key feature of quantum physics.]

The Vedic literature describes the material cosmos as an unlimited ocean situated within a small part of the unlimited spiritual world. Within this ocean there are many universes (brahmandas) like spherical bubbles of foam grouped in clusters. The inhabited sphere of each of these universe is described in the Bhagavatam as the Bhu-Mandala. The Bhu-Mandala is not to be taken literally but multi-dimensionally - it actually represents at least four different models with one composite holographic symbol-map:

- A polar projection of the map of the earth globe.
- A map of the solar system.
- A topographical map of South-Central Asia.
- A map of the celestial realms of the demigods.

Puranic cosmology is essentially transcendental: the 3-D continuum of ordinary human experience is a small aspect of a higher reality and the globe of the earth is a limited projection of a more encompassing whole. This is a cosmology for yogis seeking to know themselves: they are the true cosmonauts who learned how to navigate the quantum highways \& byways of the cosmos by means of spiritual siddhis (psychic senses).

While natural astronomical phenomena were studied and computed for practical reasons, Vedic cosmology prioritizes the existence of higher realms, both material \& spiritual and stresses that they are populated by a hierarchy of super-human beings. Thus, it was not a question of discovering \& copyrighting the "Grand Theory Of Everything" but rather a quest to embrace the humble understanding that the most important aspects of reality can only be obtained by communicating with higher beings and ultimately by communing with the original Source Being. Thus, explains Thompson, "the Vedic culture is dominated by the idea of receiving knowledge from a chain of authorities who are passing it on from a higher source." [See supra The Great Chain of Beingl
$\Rightarrow$ View \#3:
The inverted cone of Mount Sumeru (axis of the world) at the center of the Bhu-Mandala. On its summit lies Brahmapuri and the residences of the $\mathbf{8}$ demigods. Bharata-varsa (the field of human activities) lies between Mt Sumeru and the foot of the Himalayas (described as being 80,000 miles high).


个 Plane of the Bhu-Mandala. View \#1 showing the 5 outer dvipas (islands). The dot at the center are the next 2 dvipas (expanded in View \#2 below).


个 View \#2: The central two dvipas with Jambudvipa appearing at center.

SG301.1.10.4 Nested Hierarchy - Jain Cosmological Diagrams



T Map of $2 \& 1 / 2$ continents of the Middle World (Madhya Loka). Gujarat, 1810 CE .

世 The Jain doctrine postulates an eternal and ever-existing world which works on universal natural laws. The universe has a firm and an unalterable shape which is measured in the Jain texts by means of a very large unit called Rajju.

The whole world is said to be filled with living beings. Apart from the apex which is the adobe of liberated beings, the universe is divided into three parts:

- Urdhva Loka - the realms of the gods or heavens
- Madhya Loka - the realms of the humans, animals and plants.
- Adho Loka - the realms of the hellish beings or the infernal regions.


## SG301.1.11.1 Cyclic Re-occurrence in Ancient Cosmologies

Hindu/Vedic cosmology: Cyclical or oscillating, infinite in time. One cycle of existence is around 311 trillion years and the life of one universe around 8 billion years. This Universal cycle is preceded by an infinite number of universes and to be followed by another infinite number of universes. The 4 Yugas, based on the Great Year (precession of equinoxes), define a cyclical understanding of the ages of human history: Satya (Golden), Treta (Silver), Dwapara (Bronze) and Kali (Iron).

Jain Cosmology: Cyclical or oscillating, eternal and finite. Jain cosmology considers the loka, or universe, as an uncreated entity, existing since infinity, the shape of the universe as similar to a man standing with legs apart and arm resting on his waist. This Universe, according to Jainism, is broad at the top, narrow at the middle and once again becomes broad at the bottom (Note: similar to a double cone.)

Buddhist cosmology: Buddhist temporal cosmology describes how the universe comes into being and is dissolved. Like other Indian cosmologies, it assumes an infinite span of time and is cyclical. This does not mean that the same events occur in identical form with each cycle, but merely that, as with the cycles of day and night or summer and winter, certain natural events occur over and over to give some structure to time. The basic unit of time measurement is the mahäkalpa or "Great Eon". The length of this time in human years is never defined exactly, but it is meant to be very long, to be measured in billions of years if not longer. A mahākalpa is divided into four kalpas or "eons", each distinguished from the others by the stage of evolution of the universe during that kalpa. The four kalpas are:

- Vivartakalpa "Eon of evolution" - during this kalpa the universe comes into existence.
- Vivartasthāyikalpa "Eon of evolution-duration" - during this kalpa the universe remains in existence in a steady state.
- Sam vartakalpa "Eon of dissolution" - during this kalpa the universe dissolves. - Sapı vartasthāyikalpa "Eon of dissolution-duration" - during this kalpa the universe remains in a state of emptiness.
Note: Each one of these kalpas is divided into twenty antarakalpas, each of about the same length.

Tibetan cosmology: Just as the individual sentient being is born, dies, and is reborn, so too does the universe transmigrate. As in Hinduism, any cosmological system is seen to come into being, exist for billions of years (a kalpa), then dissolve, before coming into existence again. However, one fundamental difference between the Tibetan and Hindu cyclical universe is the cause of the cycle. In Hinduism, the cause is a trio of deities (Brahma, Vishnu, and Shiva) while in Tibetan Buddhism the cause is considered to be natural and not supernatural or transcendental. In the Abhidharma system, mere potentiality exists between times of dissolution and creation, as all particles of the five elements disappear. In the Kalachakra system, socalled space particles are the link between cycles.

$\Rightarrow$ One complete cycle of the Jain Kalachakra (Wheel of time). The time frames are seemingly enormous: $\mathbf{2 0 , 0 0 0}$ trillion Sagaropamas (a unit of $\mathbf{1 0 , 0 0 0}$ trillion Palyopamas or "innumerable years"). The cycle divides into two half-rotations of evolutionary meaning:

- Utsarpinī - ascending time cycle. Period of progressive prosperity and happiness where the time spans and ages are increasing.
- Avasarpin̄ - the descending time cycle. Period of increasing sorrow and immorality with decline in time-spans.

Note: the Jain Wheel of Time is quite similar to the knowledge of the Precession of the Equinoxes (a cycle of about 26,000 years or $1^{\circ}$ every 72 years, during which the positions of stars will slowly change). The precession cycle (also called Great Year or Platonic Year) has been interpreted by astrology as divided into 12 astrological ages, each with its corresponding archetypal / symbolic zodiacal meanings. [See infra].


## SG301.1.11.2 Space/Time Cycles in Vedic Cosmology



Vedic cosmology is a complex subject... Here are some points of interest:

- The cosmos undergoes a cyclical dance of creation-destruction (Day \& Night of Brahma) with a period of rest in between (pralaya). Brahma (a manifestation of Brahman, the Creator) breathes the universe in and out.
- The cosmos is a multi-verse: it comprises many "innumerable" universes. Each one is contained in a spherical shell encompassing related sub-shells.
- The cosmos is higher-dimensional \& stems from transcendental realities. Spherical topologies are the projection of higher-dimensional geometries.
- The cosmos is a nested structure. Each universe is contained in a spherical shell encompassing related sub-shells. The diagram on the left is a model of the many embedded layers of one universe.
- The time scales described are large. For instance one Day of Brahma (equal to one Night) lasts 4,320, 000,000 years. The duration of Brahma's life being 100 years, we end up with a whopping period of $311,040,000,000,000$ years ( 311 trillion, 40 billion). For comparison, the current estimated age of the universe is 14 billion years. Brahma's Day is itself divided into 1,000 cycles regrouped in the well-known 4 Yugas (ages). [For details see SG202.6].
- The space scales are commensurate with the time scales. Very large figures for the size of the cosmos are commonly presented in the Jyotisha shastras (astronomical scriptures). For instance, the circumference of this universe is computed as $18,712,080,864,000,000$ yoganas ( 1 yogana $\sim 12.8$ kilometers) - therefore the diameter of this universe $=\mathbf{5 , 9 5 6 , 2 4 0 , 3 3 0 , 0 8 1 , 7 2 8}$ (yoganas) $\mathrm{x} \sim 12.8=76,239,876,225,046,130$ kilometers (for comparison the current estimate of the diameter of the universe is $90,000,000,000 \mathrm{LY}$ or $8,600,000,000,000,000,000,000,000$ kilometers ( $8.6 \times 10^{20}$ ), way larger than the Vedic figure).

The astronomical Siddhantas are the empirical ("scientific") texts of the Vedic knowledge. They were composed in more recent times and are not purported to be the transmission of higher beings (demigods). Moreover they are in good alignment with current Western astronomy. The astronomical siddhantas have historical connections with the astronomical knowledge of the Alexandrian Greeks. Some scholars argue that they are therefore derived from Greek sources - however, they also may have preceded them and be the surviving remnants of an even earlier global cosmology. There is evidence, based on traditional Vedic astrology, that the astronomical calculations of the siddhantas were developed many thousands of years ago.

In SG102.5, we mentioned the original insight of Johannes Kepler (1571-1630) as described in his Mysterium Cosmographicum (1596): the solar system is built upon a nesting geometry by which the 5 Platonic solids are fitted between the spheres of the planets (see Kepler's famous illustration below). While the model does not exactly fit, Kepler's seminal insight (explaining the number \& properties of the planets by the symmetry functions of the Platonic Solids) opened the way to understand the harmonic geometry of the solar system, or, in recent scientific terms, that the rotational energy of the sun is distributed throughout the solar system in a quantized way, according to the Golden Ratio.

In SG201.3, we described Kepler's later attempt, in his Harmonices Mundi (1619), to demonstrate his thesis by using musical laws and music theory. He realized that comparison of pairs of orbital data (aphelion and perihelion) displayed simple proportions that are well-known musical intervals. These musical ratios were found to fit the Overtone Series (discovered by Mersenne after Kepler's time).

In 2001, a monumental work was published in Germany by Harmut Warm, a German engineer: Die Signature der Sphären. Warm, in my view, is the Kepler of the 21st century, the scientist-philosopher we were waiting for. Warm is the man who validated, based on scientific data and mathematical calculation procedures just made available with the event of fast computers, Kepler's ground breaking insight. In his book (translated in English in 2010 and entitled The Signature of the Celestial Spheres), Warm shows, with many exquisitely precise graphics, the extraordinary beauty and harmony of the geometrical forms that result when the movements of several planets are computed in relation to one another. These choreographic dances of the planets are found to correspond accurately with simple geometric figures and musical intervals, thus proving, 400 years later, the original insights of Kepler (and Plato before him) and giving a new life to the ancient concept of the "Harmony of the Spheres".


$\uparrow$ Harmonices Mundi.
J. Kepler. 1619

$\uparrow$ Planetary harmonies after Kepler. From top: Saturn, Jupiter, Mars, Earth, Venus, Mercury. (H. Warm. Signature. p. 48).

Realizing that his initial model (Platonic Solids) was not very accurate but still passionate about his insight, Kepler, now greatly aided by the precise data he inherited from Tycho Brahe, set out to discover his 3 Planetary Laws and to experiment with calculations that could prove the presence of harmony in the script of the visible heavens.

Discarding orbital periods and distances, Kepler focused on comparing the ratios of the perihelion (point closest to the Sun) and aphelion (farthest point). He found a high degree of harmony.

Note: the excellent data used by Kepler differ only minimally with the best data we have today.


1. Planet at aphelion 2. Planet at perihelion 3. Sun.

|  | Kepler's <br> value | Today's <br> value | Interval | Musical term |
| :--- | :--- | :--- | :--- | :---: |
| Ju pe/Sa ap | 3.113 | 3.057 | 3 | Fifth (* 2) |
| Ju ap/Sa pe | 2.000 | 2.018 | 2 | Octave |
| Ma pe/Ju ap | 8.448 | 8.404 | 8 | Octave ( 4 ) |
| Ma ap/Ju pe | 4.770 | 4.763 | 4.8 | Min. third (* 4) |
| Ea pe/Ma ap | 2.337 | 2.335 | 2.4 | Min. chird (* 2$)$ |
| Ea ap/Ma pe | 1.501 | 1.502 | 1.5 | Fifth |
| Ve pe/Ea ap | 1.711 | 1.703 | 1.667 | Major sixth |
| Ve ap/Ea pe | 1.547 | 1.551 | 1.6 | Minor sixth |
| Me pe/Ve ap | 4.049 | 4.015 | 4 | Octave ${ }^{\star}$ 2) |
| Me ap/Ve pe | 1.680 | 1.696 | 1.667 | Major sixth |

个 Differences between Kepler's harmonies and the actual values. (H. Warm. Signature. p. 48).

SG301.1.12.2 Kepler's Grand Vision (2) Music

$\uparrow$ Pages from Harmonices Mundi (Book 5) showing the musical intervals attributed to the planets, according to Kepler's calculations.


T The songs of the planets, after Kepler.

Revisiting the question that was Kepler's single-minded passion i.e. the harmonic organization of the solar system, Harmut Warm devoted his mathematical and engineering skills, supported by the latest astronomical data and statistical methods, to reveal in beautiful graphics the hitherto hidden harmony of the solar system.

Warm's pioneering insight was to use the semi-minor axis of the planetary ellipses in calculating the relationships. This breakthrough yields the most accurate results in terms of harmonic \& musical intervals. Note the high degree of "fit".

Table 4.3 Velocities ( $\mathrm{km} / \mathrm{sec}$ )

|  | Mean | At <br> perihelion | At <br> aphelion | At distance <br> b | Mean of <br> (2) and (3) | Deviation <br> (5):(4) |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $(1)$ | (2) | (3) | (4) | (5) | $(6)$ |
| Mercury | 47.8721 | 58.9759 | 38.8590 | 48.9062 | 48.9175 | 1.00023027 |
| Venus | 35.0207 | 35.2597 | 34.7833 | 35.0215 | 35.0215 | 1.00000002 |
| Earth | 29.7847 | 30.2836 | 29.2943 | 29.7889 | 29.7890 | 1.00000292 |
| Mars | 24.1293 | 26.4980 | 21.9722 | 24.2350 | 24.2351 | 1.00000462 |
| Jupiter | 13.0642 | 13.7103 | 12.4482 | 13.0794 | 13.0792 | 1.00001412 |
| Saturn | 9.6430 | 10.2005 | 9.1284 | 9.6579 | 9.6644 | 1.00067279 |
| Uranus | 6.7990 | 7.1238 | 6.4976 | 6.8062 | 6.8107 | 1.00065379 |
| Neptune | 5.4319 | 5.4738 | 5.3977 | 5.4321 | 5.4358 | 1.00067738 |
| Pluto | 4.7400 | 6.1131 | 3.6775 | 4.8917 | 4.8953 | 1.00073626 |

$\uparrow^{\text {"v }} \mathbf{v}$ at $\mathbf{b "}^{\text {is the velocity at the distance of the semi-minor axis b from the Sun. }}$
"Now, 18 months after the first light, 3 months after the true day, but a very few days after the pure Sun of that wonderful study began to shine, nothing restrains me. It is my pleasure to yield to the inspired frenzy, it is my pleasure to taunt mortal men with the candid acknowledgement that I am sterling the golden vessels of the Egyptians to build a tabernacle to my god from them, far, far away from the boundaries of Egypt." (Johannes Kepler in Harmonices Mundi, p. 391. Transl. E. J. Aiton. 1997).

Harmut Warms comments: "Kepler wrote these words shortly after his discovery of what later came to be called his Third Planetary Law... The golden vessels are the ideas deeply anchored in humanity which say that the cosmos is ordered harmoniously in a manner that can only have originated in the work of a divine force."

## SG301.1.13 Kepler Re-visited \& Validated

"At a certain point in time each planet in its revolution around the Sun has exactly the distance of its semi-minor axis b from the central star. The velocity of the planet at this point almost precisely equals the arithmetical mean of the extreme velocities (which occur at aphelion and perihelion, i.e. at the farthest and the nearest points of a planet on its elliptical orbit around the Sun). If we put the velocity at the distances of the semi-minor axes (velocities "at b") and that at aphelion into correlation, we find a highly significant correspondence with musical intervals". Says Warm:
"We can state that, at the formation of our planetary system, there must have been an influence, or force, which, with a probability of at least $\mathbf{9 9 . 9} \%$ led to an arrangement of orbital velocities that corresponds to the numerical relationships of musical-harmonic intervals."


Intervals of velocities, related to Mercury "at b" as keynote (=c), transposed into a single octave. Musical intervals are marked as horizontal lines. http://keplerstern.com/Music of_spheres/music_of spheres.html

SG301 Chapter 2. The Traditions of Astrology


SG301.2.1. The
Traditions of Astrology

Contrary to current belief, Astrology not a one-dimensional science or technology that can be understood (or debunked) linearly. Astrology is rooted in the psyche of humanity as an all-encompassing body of metaphysical wisdom and symbolic knowledge whose purpose is to provide insights into the deeper issues of life and consciousness. It could be called a perennial craft, just like healing: it is, in fact, a cosmological form of healing using the medicine of the cosmos itself.


个 Messahalla (woodcut, 1504). Masha'allah ibn Atharī was an 8th c. Persian Jewish astrologer and astronomer from the city of Basra (Iraq) who became the leading astrologer of his times. The Arabic phrase "ma sha`a allah" means acceptance of what God has ordained in terms of good or ill fortune. Latin translators named him Messahalla. The crater Messala on the Moon is named after him.

Messahalla wrote over 20 works on "astral sympathies" otherwise known as astrology, which became authoritative in later centuries at first in the Middle East, and then in the West when horoscopic astrology was transmitted back to Europe in the beginning of the 12th century.

The universe displays grand scales of dancing medicine and we, as dancers called to a full consciousness of cocreation, have formulated a variety of healing systems to transmute fear \& separation into trust and oneness. Astrology gives humanity ways to re-orient itself within the vaster dimensions of the cosmos and to immerse itself in the larger universal dances. Astrology has pioneered ways to "enter into the Dance of Life".

While the techniques of astrology can be criticized (see infra the controversy tropical / sidereal) or updated, the basic assumptions of astrology, throughout the ages, have been deeply nurtured and validated in the human consciousness. These traditional assumptions are now actually converging with the newly discovered assumptions of cutting edge science: quantum instant entanglement beyond space/time, resonance of fractal cascades, mini/mega cycles within cycles, micro \& macro self-similarity, grids of harmonic order, universal oneness... The cosmic science of harmonic order that is underlying astrology may now be made more accessible.

The 7 classical planets are those easily seen with the naked eye, and were thus known to ancient astrologers: the Sun, Moon, Mercury, Venus, Mars, Jupiter and Saturn. Sometimes, the Sun and Moon were referred to as "the lights" or the "luminaries". Ceres and Uranus can also just be seen with the naked eye, though no ancient culture appears to have taken note of them.

The astrological descriptions attached to the 7 classical planets have been preserved since ancient times. They are archetypes providing insights into the personal \& collective destiny of humanity. Astrologers call the 7 classical planets "the 7 personal and transpersonal planets", because they are said to represent the basic human drives. The personal planets are: the Sun, Moon, Mercury, Venus and Mars. The transpersonal planets are: Jupiter and Saturn - they represent a transition from the inner personal planets to the outer modern, impersonal planets. The outer modern planets (Uranus, Neptune and Pluto) are often called the transcendental planets.

The Zodiac is another symbolic system of reference designed as a frame of reference for humanity, with regards to the larger universe (both physical and spiritual).


Traditional horoscope,
using a square grid.


## SG301.2.2.1 The Context of Astrology (1) Tropical or Sidereal?

There is a major controversy about astrology that opposes scientists and traditionalists: it is the question of the type of Zodiac used. Astrologers use two main zodiac systems: the tropical and sidereal. In addition, there is a constellational zodiac.

- The Tropical Zodiac, used by Western astrologers since at least 100 BC , consists of 12 equal signs of 30 degrees each. Each degree is divided into 60 minutes and each minute into 60 seconds. This allows for a very precise calculation of the position of any planet. The signs of the Tropical Zodiac never corresponded to the material constellations because the constellations are highly irregular, none of which is 30 degrees in length and because of the precession of the equinoxes. The precession of the equinoxes is a slow movement of the fixed stars and the constellations due to spinning of the Earth on its axis (see infra). This causes a change in Tropical Zodiacal longitude of approximately one degree every 72 years. The Tropical Zodiac is oriented to the Seasons. The Sun enters the 1st degree of the sign Aries on the Spring Equinox, when days and nights are equal. The Sun enters Cancer on Midsummer's Day, the Summer Solstice, the longest day of the year. The Sun enters Libra on the Autumnal Equinox, when again days and nights are equal. The Sun enters Capricorn on the Winter Solstice, when the days are shortest. Much of the meaning attributed to the signs comes from this seasonal orientation.
- The Sidereal Zodiac is used by the traditional Vedic astrologers of India. It also had its origin in the constellations of the ecliptic. The Sidereal Zodiac is also composed of 12 signs of 30 degrees each. However, rather than being oriented to the Seasons, Aries, the start point of the Sidereal Zodiac is oriented to the fixed stars. The ayanamsa, the difference between the Tropical and Sidereal Zodiac is controversial in Vedic astrology and there is not a consensus on the proper starting point for the Sidereal Zodiac.
- The Constellational (or astronomical) Zodiac is a modern invention and is a Zodiac that corresponds to the physical constellations. Many adherents insist that there are 13 rather than 12 signs/constellations in the Constellational Zodiac, adding Ophiuchus. The signs of the Constellational Zodiac are highly irregular in size and there is also a controversy over the exact boundaries of each sign.

For scientists, the use of the Tropical zodiac is a complete non-sense. However they fail to realize that astrologies using the tropical zodiac are not necessarily the kind of linearly causative science that is now called "science". Astrology is a knowledge and a metaphysical understanding, larger than modern science, although dearly needing updating with the new discoveries of cutting-edge quantum physics and cosmology.

The attraction of the Tropical Zodiac to ancient astrologers resides in several factors: its orderliness and regularity, its orientation to the Seasons and its overall principle of symbolic inter-connectedness. The modern world view is that nothing exists except provable matter and energy and the basic assumption is a reductionist materialism. Regarding astrology, the contemporary scientific view is that the influence of the stars and planets must, by necessity, be exerted by matter or energy emanating from the stars and planets themselves. Therefore the focus on the exact actual physical position of the material stars and constellations is peremptory. If one is a scientist schooled in the current academic paradigm then the Constellational Zodiac is the only logical choice and the only possibility.

The traditional world view saw reality as containing both the material and the spiritual, both interacting within a vaster matrix of cosmic oneness and universal order. Material reality was of less perfection than the spiritual reality which was the only true, foundational reality. Material things were entangled in evolution (creation, change \& destruction): they were subjected to the laws of time and space, while the spiritual principles were more permanent, if not eternal. The lack of regularity in the Constellational Zodiac shows its essential imperfection, while the orderly regularity of the Tropical Zodiac was a much better reflection of the spiritual realities supporting material existence. Ancient astrologers used astrology to look through and beyond matter in order to glimpse the hidden true spiritual patterns \& grids (sacred geometry) of universal reality.

In the traditional view, the Cosmos is one great unified being living and pulsing through a series of spiritual correspondences and sympathies, beyond time and space. The use of the regular Tropical Zodiac and its ordered astrological system is then congruent and entirely logical. To accept the Constellational Zodiac simply on the basis of its correspondence to the material/physical stars is to give a primary preponderance to the physical. Astrology is based on spiritual causality, not on a physical form of material or energetic causality. If astrology works, it can only work through spiritual, higher-dimensional causality. Using a material/energetic methodology to discredit the Tropical Zodiac, makes no sense because it does not address astrology at the level where it functions: a meta-physical, cosmic quantum level.

Tropical and sidereal astrology both have unique uses in astrology. The tropical system is focused on the earth-centered physical nature of our lives and thus is a great tool for describing our physical or ego-individuation nature. As a complement, the sidereal system is celestially centered, providing windows into the higher dimensional self. By incorporating both systems (as well as the constellational approach) into astrological research we can get a far broader and more well-rounded view of

SG301.2.2.2 The Tradition of Astrology (2) Tropical or Sidereal?

$\leftarrow$ Chart (by Nick Anthony Fiorenza) showing the progressive discrepancies between tropical, sidereal and astronomical zodiac wheels.

There are various ways of questioning \& encountering the cosmos depending on one's own level of consciousness.

Historical note: contrary to modern assertions about the lack of knowledge of ancient astrologers, we now know that Hellenistic astrologers in the West and Vedic astrologers in India were well aware of the fact that the Tropical Zodiac did not correspond to the physical/material stars and constellations.

This is made clear by looking at the various lists of fixed stars and their Zodiacal longitude which astrologers knew changed over time due to precession.

The choice of the Tropical Zodiac was made in full awareness and despite the fact that it did not correspond to the material/physical stars and constellations.

SG301.2.2.3 The Tradition of Astrology (3) Tropical or Sidereal?


## SG301.2.3 A Symbolic Archetypal System


"Astrology is a mirror of the life of Man in the Universe.

Since the first men became conscious it has existed as a symbol system which has proven startingly central."
"Astrology is an archetypal system for integrating the individual with the universe... using a series of symbols to create an identification between man and the universe."
(A. T. Mann. The Round Art, 1979).

> Throughout times \& cultures,
> Astrology has functioned as:
> • a time-keeping device \& calendar
> • a language of the gods
> • a non-linear bridge to the universe
> - a basis for the cosmology of religions
> - a repository of celestial images
> • an early encompassing wisdom
> - the play of numbers in time \& space
> - a diagnostic \& healing tool in medicine
> • an instrument of self-individuation
> - a framework of personal \& group decision • the origin of all the mantic arts

## SG301.2.4.1 The Traditional Seven Planets (1) Days, Colors \& Metals

The Sequence of the 7 Planets.
For the earth's observer (geocentric perspective), there were traditionally 7 visibly moving heavenly bodies ("spheres"). They were traditionally arranged around a CLOCKWISE HEPTAGON, in order of their apparent speed against the fixed stars. From a heliocentric perspective this sequence also indicates the relative distance of the planets from the center of their orbits, i.e., the distance of the planets from the Sun (with the Sun switching places with the Earth in the sequence) and the distance of the Moon from the Earth.

The 7 Days of the Week.
Each heavenly sphere was assigned to a day of the week, following the pattern of a
HEPTAGRAM, with diagonals connecting every three vertices (7 has a remainder of 3 when divided into 24).

In many languages, the names of the days of the week are connected to the 7 planets: - English: Sunday-Sun, Monday-Moon, Tuesday-Mars, Wednesday-Mercury, ThursdayJupiter, Friday-Venus, Saturday-Saturn.

- French: Lundi-Lune, Mardi-Mars, Mercredi-Mercure, Jeudi-Jupiter, Vendredi-Venus, Samedi-Saturne. "Dimanche" (Sunday) comes from Latin Dies Dominicus (day of the Lord).

The 7 Colors of the Rainbow.
A COUNTER-CLOCKWISE HEPTAGON maps the 7 colors of the rainbow, thus adding color frequencies to the qualities \& associations of the days (and the planetary hours - see next page).

The 7 Metals of Alchemy. An OPEN HEPTAGRAM (with diagonals connecting every two vertices) gives the order of the 7 metals of antiquity - which happens to be the modern order for their atomic number \& weight:

Mars - Iron (Fe) 26 / 55.84 Venus - Copper (Cu) 29 / 63.54 Moon - Silver (Ag) 47 / 107.87 Jupiter - Tin (Sn) 50 / 118.71 Sun - Gold (Au) 79 / 196.97 Mercury - Mercury (Hg) 80 / 200.59 Saturn - Lead (Pb) 82 / 207.2

$\uparrow$ The Open Heptagram of the 7 Metals.


T Clockwise Heptagon of the 7 planets. This ancient "Chaldean order" runs clockwise, starting with the Moon, and indicates the progression of relative orbital velocities: the Moon appears to move the fastest, followed by Mercury, Venus etc... It also shows the relative distance of the planets from the sun (with a switch for earth).


个 Star Heptagram of the Week (blue arrows) \& Counter-Clockwise Heptagon of the Colors (red arrows).

## SG301.2.4.2 The Traditional Seven Planets (2) Sun Hours

| Planetary Hours of the Day |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Hour Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |  |
| 1 | Sun | Moon | Mars | Mercury | Jupiter | Venus | Saturn |
| 2 | Venus | Saturn | Sun | Moon | Mars | Mercury Jupiter |  |
| 3 | Mercury Jupiter | Venus | Saturn | Sun | Moon | Mars |  |
| 4 | Moon | Mars | Mercury Jupiter | Venus | Saturn | Sun |  |
| 5 | Saturn | Sun | Moon | Mars | Mercury | Jupiter | Venus |
| 6 | Jupiter | Venus | Saturn | Sun | Moon | Mars | Mercury |
| 7 | Mars | Mercury Jupiter | Venus | Saturn | Sun | Moon |  |
| 8 | Sun | Moon | Mars | Mercury | Jupiter | Venus | Saturn |
| 9 | Venus | Saturn | Sun | Moon | Mars | Mercury Jupiter |  |
| 10 | Mercury Jupiter | Venus | Saturn | Sun | Moon | Mars |  |
| 11 | Moon | Mars | Mercury Jupiter | Venus | Saturn | Sun |  |
| 12 | Saturn | Sun | Moon | Mars | Mercury | Jupiter | Venus |

Planetary Hours of the Night
Hours Sunday Monday Tuesday Wednesday Thursday Friday Saturday
1 Jupiter Venus Saturn Sun Moon Mars Mercury
Mars Mercury Jupiter Venus Saturn Sun Moon
3 Sun Moon Mars Mercury Jupiter Venus Saturn
Venus Saturn Sun Moon Mars Mercury Jupiter Mercury Jupiter Venus Saturn Sun Moon Mars Moon Mars Mercury Jupiter Venus Saturn Sun
Saturn Sun Moon Mars Mercury Jupiter Venus Jupiter Venus Saturn Sun Moon Mars Mercury Mars Mercury Jupiter Venus Saturn Sun Moon 10 Sun Moon Mars Mercury Jupiter Venus Saturn Venus Saturn Sun Moon Mars Mercury Jupiter

While everyone knows that a white prism will decompose light into the rainbow colors, few people realize that the intensity of the sun radiation is not uniform but changes from hour to hour: at a certain moment of the day, the maximum intensity is in the red, then goes into the orange etc... up to the violet - and the cycle starts again, the specific moments of sunrise and sunset being particularly rich in all-spectrum energies (as explored by the yogic practice of "sun gazing"). Simply due to the change of the angle formed by the sun and the meridian, the intervals are equal in a single day but change from day to day and season to season.

We are now used to a uniform time keeping system (equal 24 hours of 60 minutes each, day in \& day out, night or day, winter or summer). It is a logical system designed to make social life more efficient and easily computable, in the same way that the musical notes have been tempered by modern "equi-temperament" (each note defined by the 12 th root of 2 representing the frequency ratio of a semitone) to make musical pieces easily transposable across scales $\&$ instruments. But what has been lost in the exchange is the "energy attunement" to each unique moment (in terms of time) and to each unique note or chord (in term of music). The modern "equi-temporal" streamlining of time \& music has covered up the exquisite specificity of the cosmic moment and the harmonic richness of just intonation music. A bridge of interconnectedness was removed and our perception of a universe of subtle intervallic relationships was progressively atrophied. Now that the collective consciousness is opening again to the energy subtleties of time and space and the cosmic quantum field underlying both, it is relevant to be reminded of ancient traditional ways designed to keep human consciousness finely attuned to the ever-changing cosmos.

Traditionally, the planetary days are divided into 24 hours: the first hour of the day begins at sunrise and the last hour of the day ends at sunrise of the next planetary day. The period that extends from sunrise to sunset (daylight) is divided into $\mathbf{1 2}$ hours and the period extending from sunset to sunrise of the next day (night time) is also divided into 12 hours. Accordingly, as the duration of daylight and darkness varies except at the Spring and Autumn Equinoxes, on a particular planetary day the length of the hours of the day will differ from the length of the hours of the night. This is why William Lilly, the renowned English astrologer of the 17th century, called time the "unequal hours".

In the traditional "time-is-energy" keeping system, the intervals of solar radiation intensity shifts were called "Sun Hours" or "Magical Hours" and were associated with the Heptad (the archetypal number 7 expressed in the heptagon and heptagram of the 7 planets, metals, colors, days...).

Knowledge of the magical Sun Hours allows for fine-tuning the time harmonics of color radiation and planet / metal influences in healing, gardening, talisman making, event planning and, generally speaking, a ife based on the awareness of resonant interconnectedness.

The Planetary Hours. (www.renaissanceastrology.com)

## How to Determine a Magical Hour:

- Look up in the Ephemeris Tables the Sun's rising (heliacal) and setting times for the day. Compute the length of the day in minutes.
- Divide by 12 to find the length of an average "magical hour" for that day. In the same way, find the duration of the night magical hour.
- Refer to the Heptagon diagram. If the day is a Tuesday, then the first hour will be ruled by Mars and its spectral colors "red". The second day will be ruled by the Sun and "orange" etc...
- Or go to Lunarium (a planetary hour calculator).

$\leftarrow$ Snow White and the Seven Dwarfs.

Oftentimes, fairy tales and mythological stories are multilayered.

The Seven Dwarfs embody a frequency progression culminating in an awakening (cf the 7 chakras).

## SG301.2.4.3 The Traditional Seven Planets (3) Sun Hours (2)

According to the traditional understanding, the choice of which planetary hour will be best for your planned action is a matter of knowing which planet most favorably corresponds with your intent for that action. Here is a brief list of the energies of each of the planets. Because intents can be complex and each planet has many correspondences, careful study is usually recommended. Still, many activities can be matched with this simple summary:

Hour of the Sun: for career success, employment, promotion, making presentations, public speaking, improving social status, approaching authority figures, improving health.

Hour of the Moon: for doing things that are likely to change or are not intended to be permanent or binding, for increased intuition or imagination, for all domestic activities.

Hour of Mercury: for abstract thinking, mental alertness, speaking, signing papers, sending significant mail, fixing computer problems, or in general, for any activity related to communication, provided you are in the frame of mind to be logical and rational.

Hour of Venus: for social occasions, love, courtship, marriage, improving appearance, for financial investments, to reconcile, to mediate a dispute, to achieve calm after stress, to work for peace.

Hour of Mars: good for activities that require muscular exertion, boldness, courage and active enterprise, when your feelings are in check. Caution is needed if you are angry or stressed, and especially if a relationship is involved, for Mars can be confrontational.

Hour of Jupiter: for success in just about any activity you can imagine and for beginning anything important. The only downside would be where a tendency to over-indulgence or excess is a factor.

$\uparrow 15$ th c . astrological woodcut with the 7 planets.

Hour of Saturn: for getting organized, plowing through tedious work, breaking unwanted habits, accepting/dealing with responsibilities. Contemplation/meditation especially if you find yourself tired and needing a respite from activity.
$\rightarrow$ Here are a few examples of how planetary hours might be traditionally used in daily planning:

- Schedule an appointment with your doctor for the hour of Sun.
- Plan a dinner party in the hour of Moon. Try out a new recipe.
- Install and learn a new computer program in the hour of Mercury.
- Schedule an appointment for a new hairstyle for the hour of Venus.
- Do your daily exercise workout in the hour of Mars.
- Call a friend or business associate to ask for a favor during the hour of Jupiter.
- Clear your desk of that piled up paperwork during the hour of Saturn. Get it done!
- Ask your boss for a raise in the hour of the Sun.
- Shop for ideas for redecorating your home during the hour of the Moon.
- Send an important piece of mail in the hour of Mercury.
- Meet with a friend in the hour of Venus to reconcile a disagreement between you.
- Tackle that heavy clean-up job in the hour of Mars.
- Open a new business or launch a new enterprise within your business in the hour of Jupiter. - Consult with an elder about how best to resolve a problem in the hour of Saturn.
$\downarrow$ The planets within the body



## SG301.2.5 The Planetary Glyphs

The astrological symbols are an iconic language rich in geometry and archetypal meaning. There has been and still are quite a few variations in the planet symbols - the Wikipedia current standard is shown below. Then, planet symbols are perceived as just signs amidst a profusion of other signs.
We favor, as richer in meaning, the traditional script that unifies geometry, symbolism and planetary glyphs. It is based on the 4 primal shapes: dot, circle, half-circle \& cross and their symbolism of source, spirit, soul and matter. The planets combine these aspects of all life in various proportions and the traditional glyphs display a coherent cosmology.

- Dot - symbol of the original seed-source. The visible point representing the un-manifested center-of-all, the Bindu (Sanskrit).
- Circle - symbol of spirit and wholeness. The Sacred Circle of all traditions, be it the Medicine Wheel, the Mandala, the Stupa or the StarWheel. It is the circumscribed place within which the power of spirit is felt.
- Half-Circle or Crescent - symbol of the soul.

4 Cross - symbol of manifestation and physical matter.


The planets in geometric symbolism: - Sun - The seed-source of spirit or focused (concentrated) spirit.

- Moon - Half [reflection] of the circle of spirit. Going back \& forth from whole to crescent. - Earth - Cross of matter within the sacred circle of spirit.
- Venus - Circle of spirit above matter.
- Mars - The complement of Venus: cross of matter over the circle of spirit.
- Mercury - Mediates between Sun-Moon pair and Venus-Mars pair. Spirit Circle bridging soul crescent above and cross of matter below. - Jupiter - Soul crescent expanded over cross. - Saturn - The complement: the cross of matter expanded over the crescent of soul.
- Uranus - Higher Octave of Mercury. Cross of matter polarized \& contained by the double pressure of the soul.
- Neptune - Higher octave of Venus. Matter and soul inter-penetrating to form the trinity (trident) spirit-matter-soul.
- Pluto - Higher octave of Mars. Spirit is free above matter/soul and forms a dancing body.


个 The traditional geometric symbolism of the planetary glyphs.

Astrological symbols \& Alchemy:
In alchemy, each classical planet (Moon, Mercury, Venus, Sun, Mars, Jupiter, and Saturn) was associated with one of the seven metals known to the classical world (silver, mercury / quicksilver, copper, gold, iron, tin and lead respectively). As a result the alchemical glyphs for the metal and associated planet coincide.

SG301.2.6.1 The Zodiacal Glyphs (1)

| Name | Meaning | Symbol | Image | Glyph Meaning |
| :---: | :---: | :---: | :---: | :---: |
| Aries | Ram | $r$ | $\gamma$ | Face \& horns of ram |
| Taurus | Bull | ૪ | ૪ | Face \& horns of bull |
| Gemini | Twins | II | II | Dual companionship |
| Cancer | Crab | ช | ¢ | Crab's claws |
| Leo | Lion | $\Omega$ | $\delta$ | Script form "Lambda" |
| Virgo | Virgin | m | mb | First letters Parthenos (= Virgin) |
| Libra | Scale | $\Omega$ | $\Omega$ | Scales |
| Scorpio | Scorpion | m. | $m$ | Stinger of scorpion |
| Sagittarius | Archer | * | $\chi^{7}$ | Arrow of centaur |
| Capricorn[26] | Sea-goat or mountain goat | no | yo | Face \& horns of goat |
|  |  |  | $\overline{6}$ | Tail of fish |
| Aquarius | Waterbearer | \# | m | Water waves |
| Pisces | Fish | * | )( | Two fish bound together |

The Zodiac ("circle of animals", in Greek) is a circle of twelve $30^{\circ}$ divisions of celestial longitude centered upon the ecliptic, the apparent path of the Sun across the celestial sphere over the course of the year. Historically, these $\mathbf{1 2}$ divisions are called signs. Essentially, the zodiac is a celestial coordinate system (more specifically an ecliptic coordinate system) which takes the ecliptic as the origin of latitude, and the position of the Sun at vernal equinox as the origin of longitude.

Whereas the planetary glyphs are geometric icons, the zodiacal glyphs are pictographic. They are stylizations of: 6 animals (Ram - Bull - Crab - Lion - Scorpion - Fish), a hybrid animal (Capricorn), a human-animal (Centaur), a human couple (Twins), a woman (Virgo), a man pouring the waters of life (Aquarius), and an instrument of just measure (Balance). They have been derived from human cultural \& mythological projections upon the constellations forming the Zodiac.

The zodiacal signs are an abstraction from the physical constellations associated with them, not only because of their drifting apart due to the precession of equinoxes but also because the physical constellations take up varying widths of the ecliptic, so the Sun is not in each constellation for the same amount of time. Thus, Virgo takes up five times as much ecliptic longitude as Scorpius. Due to the constellation boundaries being redefined in 1930 by the International Astronomical Union, the path of the ecliptic now officially passes through 13 constellations: the 12 traditional 'zodiac constellations' plus Ophiuchus, an anciently recognized constellation, catalogued along with many others in Ptolemy's Almagest.


The division of the ecliptic into the zodiacal signs originates in Babylonian ("Chaldean") astronomy during the first half of the 1st millennium BC. The classical zodiac is a modification of a star catalogue compiled around 1000 BC . Some of the constellations can be traced even further back, to Bronze Age (Old Babylonian) sources, including Gemini "The Twins", and Cancer "The Crab". (Wikipedia).


个 Path taken by the point of vernal equinox along the ecliptic over the past 6000 years.

- The Zodiac. The Earth in its orbit around the Sun causes the Sun to appear on the celestial sphere moving over the ecliptic (red), which is

SG301.2.6.2 The Zodiacal Glyphs (2) A Gallery

The Zodiac signs have been a source of art for millennia.


个 Wheel of the zodiac: this 6th century mosaic
pavement in a synagogue incorporates Greek-


个 Egypt: Dendera zodiac with original colors
(reconstructed).
Wikipedia
$\leftarrow$ Cover of the
2015 Jim
Maynard's
Astrology calendar.
\& France: Angers Cathedral South Rose Window of Christ (centre) with elders (bottom half) and Zodiac (top half). Mid 15th c.

SG301.2.7 The Planet-Zodiac Interpretations

| mma | -m | -m | cose | 20m | mas | man | mens | zema | som | ${ }^{\text {ma}}$ | ${ }_{\text {mo }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| sm' | $\bigcirc$ | sum | Natim | \% | man | smo | s.mex | Leo | Q | $\triangle$ | + |
| Nom | D | \% | simmen | knom | \%"m | cman | ymmem | cmer | ๘ | $\nabla$ |  |
| Namem | ర¢ | manm | nems | mma | 5 | "**" | dmasm | Comili | II | A | ~ |
| vam | ¢ | vam | mamas | noma | \% | \% | ¢mamixic | tumu | ૪ | 吅 | + |
| vax | O' | Now | "m | Hem | vesal | Nuest | , edsum | Anse | $r$ | $\triangle$ |  |
| Case | ? | cam | nemm | \% | mome | smat | mamm | vipe | m | ® | ~ |
| mintar | 4 | mant | \%m | am" | wrat | \% | Nrum | semit | $\times$ | $\triangle$ | $\sim$ |
| smun | 5 | smen | кxom | sum | vinu | \% | Simurn | cove | no | จ |  |
| Lrme | ¢\% | camm | ormam | "w | ${ }^{\text {and }}$ | vans | suramm | Mam. | m | A |  |
| sprue | $\Psi$ | mome | peatam | , \%im | 等 | vame | comem | ras | * | $\nabla$ | ~ |
| nuo | EP | mom | Hasa | mix | Smanem | kamp | condummu | sompo | m | $\nabla$ | + |
| Cuion | K | coum | criom | masm | mimit | mem | cmeamim | Lema | $\Omega$ | A | - |

## SG301.2.8 The Virgo <br> Supercluster



个 Virgo as depicted in Urania's Mirror, a set of cards published in London c.1825. (Wikipedia).



The ancients personified Virgo in a part of the sky that, interestingly, contains a huge amount of nearby galaxies, called the Virgo supercluster. This supercluster stretches over 80 million light-years, covering almost half of the area of the sky. The local cluster of galaxies, of which our own galaxy is a member, is part of this supercluster. The dense hub, or "Virgo Cloud", contains about 3,000 of the supercluster's more than $\mathbf{1 0 , 0 0 0}$ galaxies.

Paul LaViolette, in his Beyond the Big Bang (1995), makes this comment: "It is quite astounding to find that the Virgin is gesturing with her right hand precisely toward this supercluster hub. In fact the stone pillar, which according to ancient legend supports her right hand, happens to coincide with the supercluster's central polar axis, and her hands are positioned in such a way that hey lie along the supergalactic plane or equatorial plane that extends along the supercluster's long dimension. Thus the Virgo constellation reenacts the Isis myth using the supercluster metaphor: with her right hand she indicates the supercluster's center, and with her left hand she seeds thousands of galaxies outward along the supercluster's equatorial plane. Quite appropriately, the stream of galaxies forming this equatorial plane passes directly across Virgo's womb."
"To effectively map out the faint galaxies making up the entire supercluster, and to recognize that these spiral 'nebulae' are actually islands of stars lying millions of light-years outside of our galaxy, is by itself a major breakthrough in scientific thinking. Modern astronomers did not come to this realization until after the turn of the 20th century." (Paul LaViolette).

Fertility/Mother Goddess associations of Virgo: • Egypt: royal goddess Isis, the Mother of Creation; the grain she scattered formed the Milky Way.

- Babylonia: Ishtar, Queen of the stars. • India: Kanya, the Maiden and Mother of Krishna. • Peru: the Earth Mother. • Greece: Persephone, Daughter of the Harvest goddess Demeter; also Rhea, daughter of Sky and Earth and mother of Zeus. Rhea is portrayed with her right hand resting on a stone pillar, while her left hand held a sheaf of wheat (the star Spica). • Rome: Proserpina, daughter of Ceres, goddess of the Harvest.


## SG301.2.9 Pointing to the Galactic Center

Two of the zodiac glyphs, adjacent to each other, incorporate arrows, the universal symbol for direction / location: Sagittarius and Scorpio. Scorpio's arrow is the scorpion's stinger and Sagittarius the Archer is shooting his arrow.

Interestingly, the arrows are pointing to that unique point in the sky around which all stars in our galaxy appear to revolve, the center of the Milky Way galaxy. Two arrows pointing to the Galactic center, is this a mere coincidence?

Paul A. LaViolette, a cosmic minded scientist, makes the case (Beyond the Big Bang, 1995) that astrology encodes a creation cosmology akin to his subquantum kinetics. He states that "mounting evidence suggests that centers of galaxies are sites where matter is continuously created. (...) Galactic cores not only generate matter and energy at very high rates but at times can violently erupt, spewing out intense volleys of cosmic ray particles and EM radiation. (...)

$\uparrow$ Sky map of the zodiac constellations. Note Sagittarius \& Scorpio pointing to the Galactic center.
"Astrology presents a highly evolved physics describing the creation of our universe. In particular it points to the Galactic center as the site where the first particle of matter arose and indicates that the galaxy as a whole was formed through a process of central creation and radial dispersion of matter. Virgo's sweeping gesture to the 1000 's of galaxies in our immediate supercluster suggests that other galaxies form through a similar process." (Paul A. LaViolette. Beyond the Big Bang. p. 219)
"One ancient Greek myth states that Sagittarius is aiming his arrow at the heart of the Scorpion, which is the red giant star Antares (one of the 4 'Royal Stars'). At present time, Sagittarius's arrow points out a trajectory that misses Antares by $5^{\circ}$ of arc. The stars that form this arrow (Gamma and Delta Sagittarii), however, slowly change their position over time, such that the arrow would have been much better aimed inn ancient times. In fact, it was aimed precisely on target around 13,865 BCE. Its flight toward Antares would then have brought it within $0.35 \%$ of the galactic center (i.e. $3 / 4$ of the moon diameter). This target date may mark an era when the Galactic center was unusually active and hence visible through the thick clouds of dust that now obscure it. (...)
The Archer's penetration of the Scorpio's heart may represent the transformation of Scorpio into its higher form, the Eagle (constellation Aquila = the eagle). Sagitta's orientation gives the impression that this is the same arrow that Sagittarius shot through the Galactic center, here flying outward from the center along the galactic plane." (Paul A. LaViolette. Ibid. p. 217).


Positions of Aquila and Sagitta in relation to Scorpio and Sagittarius.

## SG301.2.10 The Astrological Aspects

In a birth chart, traditional astrology looks at various angles of relationship between the planets. These angular geometries, called aspects, are divided into major / minor ones and flowing / challenging ones. The major aspects are: conjunction, opposition, trine, square, quintile and sextile: they result from the division of the circle of $360^{\circ}$ by the first whole integers 1-2-3-4-5-6. The major aspects are also called Ptolemaic aspects since they were defined and used by Ptolemy in the 1st c., AD. These intervals also appear in the basic musical ratios and their Sacred Geometry. [ $\langle$ SG201]. All these aspects have traditional meanings, modulated of course by the nature of the planetary bodies and the zodiacal signs "ruling" them.

The classic "flowing" \& auspicious aspects are: conjunction, trine, sextile and semi-sextile they are based upon the dance of Unity \& Triad, expressed as triangle and hexagon. The "challenging" and educational aspects are the opposition and the square - they are based on the Dyad (Two), expressed as the polarized line and the square. The penta-symmetries of the quintile, semi-quintile and bi-quintile point to the presence of Five-ness (the Golden Ratio) [see below] and the archetypal number resonance of the "Cosmic Tribe of 72"[ SG202].


Teometry of aspects in a natal chart. Note, in this example, the predominance of trines.
The aspectual diagrams speak a visual language of harmony or disharmony. They are like individualized yantras.

What is Harmonic Astrology? "Harmonics" bring back the role of archetypal numbers in the astrological understanding of the formative forces at play in the human character and destiny. Harmonics have always been used in Hindu (Vedic) astrology but their systematic use in western astrology is a new development (pioneered by John Addey). Harmonic astrology draws a number of separate "harmonic figures" for a single birth chart. Each figure focuses on one particular number-aspect: first harmonic (H1), fifth harmonic (H5) etc... In drawing a harmonic chart, the circle is divided into a number of equal segments and each segment is treated as if it was a whole circle. Example: in a H5 chart, the angular distances between the segments are multiplied by 5 , thus bringing up additional "harmonics" of the primary aspects.

Harmonic diagrams are a way to extract and map out the nature of Oneness, Two-ness, Tri-ness in a birth chart, as pure or mixed influences. Also aspects considered minor in traditional astrology are given extra attention: for instance, $\mathbf{H} 9$ (the ninth harmonic) and the nature of nine-ness (the Ennead).

Harmonic Astrology opens up a new understanding of the dance, in a person's life, of dynamic Sacred Geometry and the musical intervals playing out the personal and collective orchestration of life \& consciousness.

What about PHI aspects? It would be interesting \& instructive to look for specific Golden Ratio aspects in planetary configurations and transits - specially since we now have the pioneering research of Hartmut Warm validating the initial intuition of Kepler about the music-like harmony of the solar system [see infra Chapter 3].
We could assess an attunement to patterns/flows of "Phi-ness" through a reading of the Phi harmonics. The Growth Angle ( $137.5^{\circ}$ or $360^{\circ}$ / phi'), as a major "golden" aspect, may prove quite meaningful.


The geometry of astrological aspects.

## SG301.2.11.1 The Traditional Planets (1)

Rather than lengthy explanations about the meanings \& associations traditionally assigned to the classical 7 "wanderers" (Sun, Moon, Mercury, Venus, Mars, Jupiter \& Saturn), we are showing here a visual gallery (bi-folio and close-ups) of the 7 planets: the illuminations of the codex De Sphaera, dated 1450-60. They speak of beauty and belongingness to a universe of interactive harmony. [See Wikipedia <Classical Planets> / <Astrological Symbols>]

## De Sphaera (Estense

Library in Modena, Italy), is unanimously regarded as the most beautiful astrological book of the Italian Renaissance.

De Sphaera was illuminated, it is believed, by the refined artist of the Lombard school, Cristoforo de Predis, who was born deaf and dumb. The de Predis family hosted Leonardo da Vinci when he visited Milan for the commission Virgin of the Rocks, and Leonardo met Cristoforo on that occasion. Leonardo later wrote about what can be learned from dumb people in his treatise on painting Codex Urbinas.

De Sphaera offers 15 fully illuminated pages of great richness and is an elegant testimony of the reputation enjoyed by the "faith in the stars" in the most powerful and refined courts of the time.

De Sphaera shows, on each bi-folio, the interactions between astrological signs \& planets and human occupations \& behaviors.

I. agemefa nence dul fino ardose

Accerre 1 cho: gannli onre un cintare Et danse of alaglx felte per amose T. maduce col fuate uagleggene :-

Bi-folio For Venus


45

SG301.2.11.2 The Traditional Planets (2)


$\uparrow \downarrow$ The Sun ("Sol") \& Leo


个 "Luna", the Moon.


个 Bi-folio for Sol

$\uparrow$ Detail of "Sol" showing the regal aspect of Leo.

SG301.2.11.3 The Traditional
Planets (3)


S amrio bnomma madt et rea pratace象ultoadern er burundt ar allofm
 F) afton er soppier fimide meddom:
$\uparrow$ Saturn is "ruled" by Aquarius and Capricorn. The illumination shows scenes of games \& crimes.

\& Mars, the belligerent
("bellicoso")
is ruled by Aries-the-Ram
and Scorpio.

## SG301 Chapter 3. Current Explorations in Cosmology



T The Hubble Extreme Deep Field (XDF) was completed in September 2012 and shows the farthest galaxies ever photographed by humans. Every speck of light in the photo is an individual galaxy, some of them as old as $\mathbf{1 3 . 2}$ billion years. (See next page for more data).

The acceleration of current explorations of the universe is returning data that render completely obsolete all previous astronomical \& cosmological theories
\& understanding.
It looks like contemporary science is progressively rediscovering properties of the cosmos that were well known by ancient sacred cultures:

- Vastness (cf time/space scales of Hindu \& Jain cosmologies).
- Nestedness \& Self-similarity
- Fine Tuning for Life
- Axial Mega-Structures
- A background Cosmic Web
- The primacy of

Consciousness...

## A cosmology

of multi-dimensional consciousness, self-vortexing from a source of infinite harmonic love...
... is being re-birthed on planet Earth.

## SG301.3.1 The Vastness of the Universe

- 1785: William Hershel demonstrated the disk shape of stellar systems (nebulae).
- 1920s: Discovery of the nature of galaxies as distinct from other nebulae.
- 2012: The observable universe is estimated to contain more than 200 billion galaxies.

$\uparrow$ Visualization of the 93 billion light year - or 28 billion parsec - three-dimensional observable universe.

The scale is such that the fine grains represent collections of large numbers of superclusters. The Virgo Supercluster home of Milky Way - is marked at the center, but is too small to be seen in the image.

## Comments on the Extreme Deep Field (Preceding page image)

Astronomers have assembled a new, improved portrait of mankind's deepest-ever view of the universe. Called the eXtreme Deep Field (XDF), the image was assembled by combining 10 years of NASA Hubble Space Telescope photographs taken of a patch of sky at the center of the original Hubble Ultra Deep Field. The XDF is a small fraction of the angular diameter of the full moon.

The Hubble Ultra Deep Field is an image of a small area of space in the constellation Fornax, created using Hubble Space Telescope data from 2003 and 2004. By collecting faint light over many hours of observation, it revealed thousands of galaxies, both nearby and very distant, making it the deepest image of the universe ever taken at that time.

The new full-color XDF image is even more sensitive, and contains about 5,500 galaxies even within its smaller field of view. The faintest galaxies are one ten-billionth the brightness of what the human eye can see. Magnificent spiral galaxies similar in shape to our Milky Way and the neighboring Andromeda galaxy appear in this image, as do the large, fuzzy red galaxies where the formation of new stars has ceased. These red galaxies are the remnants of dramatic collisions between galaxies and are in their declining years. Peppered across the field are tiny, faint, more distant galaxies that were like the seedlings from which today's magnificent galaxies grew.

The history of galaxies is laid out in this one remarkable image. Hubble pointed at a tiny patch of southern sky in repeat visits (made over the past decade) for a total of 50 days, with an exposure time of 2 million seconds. The XDF is the deepest representation of the sky ever obtained and reveals the faintest and most distant galaxies ever seen. The universe is 13.7 billion years old, and the XDF reveals galaxies that span back 13.2 billion years in time.

The early universe was a time of dramatic birth for galaxies containing brilliant blue stars extraordinarily brighter than our sun. The light from those past events is just arriving at Earth now, and so the XDF is a "time tunnel into the distant past." The youngest galaxy found in the XDF existed just 450 million years after the universe's birth in the big bang.

Before Hubble was launched in 1990, astronomers could barely see normal galaxies to 7 billion light-years away, about halfway across the universe. Observations with telescopes on the ground were not able to establish how galaxies formed and evolved in the early universe. Hubble gave astronomers their first view of the actual forms and shapes of galaxies when they were young. This provided compelling, direct visual evidence that the universe is truly changing as it ages. Like watching individual frames of a motion picture, the Hubble deep surveys reveal the emergence of structure in the infant universe and the subsequent dynamic stages of galaxy evolution. The infrared vision of NASA's planned James Webb Space Telescope will be aimed at the XDF. The Webb telescope will find even fainter galaxies that existed when the universe was just a few hundred million years old. (Wikipedia).

Currently, astronomical science is peeking at the universe through 8 orders of magnitude, represented by this series of Wikipedia maps showing successively:

- the Earth
- the Solar System
- the Solar Interstellar Neighborhood
- the Milky Way
- the Local Galactic Group
- the Virgo Supercluster
- the Local Superclusters
- the Observable Universe


Fractal zoom \#1.
Departure case: Earth, the home planet of humans.

## SG301.3.2.1 Where Are We? (1)



个 The Urantia cosmology also presents 8 orders of magnitude (Local Super-clusters = Super-universe) but nested around a Central Universe, like a Grand Mandala.

## Solar System



SG301.3.2.2
Where Are
We? (2)

Fractal zoom \#2. Our Community Village: the Sun-Sol System.

## Solar Interstellar Neighborhood

## SG301.3.2.3



Fractal zoom \#3. More distant Villages: other Sun-Stars Systems.

## Milky Way Galaxy



## Local Galactic Group



Fractal zoom \#5. Our Beautiful Region: the Local Galactic Group.

## Virgo Supercluster



Fractal zoom \#6. The Nation we were born into: the Virgo Supercluster.

## Local Superclusters



SG301.3.2.7
Where Are
We? (7)

Fractal zoom \#7. The
Continent we live on: the Local Superclusters.

## Observable Universe



## SG301.3.2.8 Where Are We? (8)

Fractal zoom \#8.
Our vast big world: the Observable Universe.

## Friendly note:

Why stop here?
The above 8 zooms are only glimpses into the vast harmony of "this" outer universe which may just be an atom in a super-universe.

We are at the very beginning of our journey back home - as we start to look within into the universe of consciousness that we are and as we dare to open our hearts to the source of all harmony.

## SG301.3.3.1 Fine Tuning of the Universe (1) Physical Constants

The new quantum understanding of reality is not the only argument against the old paradigm/model of reality. There is also the puzzling fact of the finetuning of the cosmos. Many fundamental traits, forces, and physical constants make it appear as if everything about the physical state of the universe were tailor-made for life. In other words, the universe seems to have been extraordinarily fine-tuned for the generation of Life from the very beginning. Some researchers call this revelation the Goldilocks Principle, because the cosmos is not "too this" or "too that" but rather Just Right For Life.

> At the moment there are only four explanations for this mystery:

- One is simply to argue for incredible coincidence. - Another is to say, God did it, which can be an act of faith or an inner revelatory experience but cannot be proven objectively. • The third explanation invokes a concept called the anthropic principle, first articulated by Brandon Carter in 1973 and later taken on by John Wheeler. This principle holds that we must find the right conditions for life in our universe, because if such life did not exist, we would not be here to find those conditions. Some cosmologists have tried to wed the anthropic principle with the recent theories that suggest our universe is just one of a vast multitude of universes, each with its own physical laws. Through sheer numbers, then, it would not be surprising that one of these universes would have the right qualities for life. This is really a mind game, a purely intellectual approach.
- The final option is bio-cosmism, a variety of biocentric explanations (such as proposed by Robert Lanza and Carl J. Calleman - see infra), which hold that the universe is created by life and for life - and not the other way around. In other words, the universe has a purpose and this purpose is to generate life.


## The Fine Tuning of the Physical Constants of the Universe <br> (A summary of Just Six Numbers by Martin Rees. 2000.)

As explained by Martin Rees, just 6 numbers, extraordinarily fine-tuned, determine the essential features of the physical cosmos:

1. " $N$ " (relative strength of gravity and electromagnetism) $=10^{\mathbf{3 6}}$. If N had less zeroes, no creatures could grow larger than an insect.
2. " $\mathcal{\text { " }}$ (strong force that causes attraction between different protons and neutrons in the nuclei of atoms - also called "nuclear efficiency") $=.007$. If $\varepsilon$ were .006 or .008 , we could not exist. $\varepsilon$ makes possible nuclear fusion in stars and so controls the power from the sun.
3. " $\Omega$ " (ratio of the rate of expansion of the universe to the force of gravity). The value is still uncertain (due to the mounting evidence of dark matter), but it has been calculated that if the early rate of expansion had been 1 part in a trillion less, the universe would have collapsed on itself long time ago.
4. " $\lambda$ " (a new force discovered in 1998, a cosmic 'anti-gravity' which controls the expansion of the universe). If $\lambda$ was larger, its effects would have stopped galaxies \& stars from forming.
 the universe would be inert; if Q were larger, it would be a violent place, dominated by black holes.
5. "D" (number of spatial dimensions in our world) $=3$. Life couldn't exist if $D$ were two or four.
[^0]
## SG301.3.3.2 Fine Tuning (2) Harmonic Constants


$\uparrow$ Interconnections between the microscales (left) and the macroscales (right) (Just Six Numbers. Martin Rees. p. 6)
"(Human bodies) are made up of between $10^{28}$ and $10^{29}$ atoms. This human scale is poised midway between the masses of the atoms and the stars. It would take roughly as many human bodies to make up the mass of the Sun as there are atoms in each one of us. ... We straddle the cosmos and the microworld - intermediate in size between the Sun ( 1 billion meters in diameter) and a molecule (1 billionth of a meter)." (Martin Rees).

Science now recognizes that there is an intimate connection between the cosmos and the quantum. [ SG203.6 The Haramein-Rausher Scale - see infra]. The very image of the ouroboros chosen by cosmologist Martin Rees points to a new understanding of the 'universal oneness' or 'unity of all things' referred to by many ancient cultures.
"The ouroboros often symbolizes self-reflexivity or cyclicality, especially in the sense of something constantly re-creating itself... It can also represent the idea of primordial unity related to something existing in or persisting from the beginning." Wikipedia.

The physical constants of the universe have so far resisted correlation within some unified grand theory. Could it be because we do not have all the necessary elements yet? We seem to be led to a re-discovery of universal constants that are not just physical quantities but have energetic, harmonic, "meta-physical" qualities.

No Theory of Everything can possibly come out of a science assuming, from the outset, that the laws of nature have come into existence by accident: an inference of "accident" will perpetuate a context of disconnection; an inference of purpose will facilitate access to unification. We "see" from the level we are at... and science is no exception.

Some of the new re-discoveries cluster around the recent understanding of fractals, global scaling, harmonics (including Phi harmonics), scale-invariant resonance between systems, entanglement, super-coherence, hierarchical nestedness... and probably much more, as the human consciousness is still barely opening... We will survey more of the "Golden Fractal Cosmos" and its holo-fractality in the last chapter.

## The Equi-position of Life

As noted by Martin Rees (left) and others, there is a puzzling fact: biological life forms fall right in the equi-position between the Planck-scale and the cosmological-scale. There are 30 orders of magnitude on either side of the living biological system, meaning that there is an entire universe within the living organism at the same magnitude as that outside the living biological entity. Poised at this equi-position, living biological systems are the key intermediary in the communication of information between these extreme scales.

Now considering this holonomic fractal model, there are living processes all the way from the harmonic oscillations of the quantum vacuum to the large-scale Universe, and given that all physical processes are the result of underlying information transmission, permutation, and encoding, there is an intelligence engendered within all physical processes.

When considering the intricate and intimate matrix that extends through all scales and space-time dimensions, the synergetic effect of these information transduction processes (with life literally central to them) could potentially engender a unified intelligence, perhaps great enough to reach back across that space-time manifold to orchestrate the design and emergence of biological life - an expression of living systems that would ultimately display higher-order sentience by that design.

(2)

Hierarchy
of size magnitudes

## SG301.3.4.1 The Dance of the Living Sun (1) Cycles

The closest star we can observe is our own Sun. The sun turns out to be much more than a simple "furnace": as we probe it deeper $\&$ in more subtle ways, the sun displays all the features of a living system, of an organism. The sun plays the complex role of a "stargate" in a multi-dimensional, entangled, purposeful universe. This page images some of the sun's cycles.

Four major climate cycles affect the Earth: 1. The 11-year solar cycles; 2. The 100,000-year Ice Age cycles. The Ice Age glaciation cycles occur in much longer timeframes than the 11-year solar resonance cycles, though the dynamics involved are similar. The 100,000-year glaciation cycles reflect the larger size of our galaxy in comparison with the solar heliosphere, but structurally both reflect the same principles of dynamics. 3. The long cycle of 62 million years in duration. 4. The very long, 145 million years, cycle.


20-fold UV-intensity variations over the span of the 11-year solar cycles


Our 100,000-year galactic resonance cycles


## SG301.3.4.2 The Dance of the Living Sun (2) Oscillations

"Helioseismology is not the study of solar seismic activity but the study of solar waves and the propagation of wave oscillations, particularly acoustic pressure waves. The name is derived from the similar practice of studying terrestrial seismic waves to determine the composition of the Earth's interior. The science can be compared to asteroseismology, which studies the propagation of sound waves in stars.

Solar pressure waves are believed to be generated by the turbulence in the convection zone near the surface of the sun. Certain frequencies are amplified by constructive interference. In other words, the turbulence "rings" the sun like a bell. The acoustic waves are transmitted to the outer photosphere of the sun, which is where the light, generated through absorption of radiant energy from nuclear fusion at the centre of the sun, leaves the surface. These oscillations are detectable on almost any time series of solar images, but are best observed by measuring the Doppler shift of photospheric absorption lines.

Changes in the propagation of oscillation waves through the Sun reveal inner structures and allow astrophysicists to develop extremely detailed profiles of the interior conditions of the Sun." (Wikipedia).

The sun's oscillations create beautiful power spectra \& harmonics.

$\Rightarrow$ In 1996, the MDI (Michelson Doppler Imager) aboard NASA's SOHO (Solar \& Heliospheric Observatory) gathered images (such as the one at right) by charting the slight Doppler shifts in light emitted from the Sun as it undulates.
This image shows mode frequencies up to 10 milliHz and $\mathrm{I}=1000$.

Just feel it: this is a window into the light we receive from the Sun...
\& A computer-generated image showing the pattern of a p-mode solar acoustic oscillation both in the interior and on the surface of the sun. Note that the increase in the speed of sound as waves approach the center of the sun causes a corresponding increase in the acoustic wavelength.

## SG301.3.4.3 Living Sun (3) The Heliospheric Current Sheet

As the Sun rotates, its magnetic field twists into a "Parker spiral" (named after its discoverer Eugene Parker), a form of logarithmic spiral. Parker's spiral magnetic field is divided in two by a thin current sheet known as the "interplanetary current sheet" or "heliospheric current sheet". The current sheet is tilted (because of an offset between the Sun's rotational and magnetic axes) and warped (because of a quadrupole moment in the solar magnetic field) and thus has a wavy, "ballerina skirt"-like structure as it extends into interplanetary space. Because the Earth is located sometimes above and sometimes below the rotating current sheet, it experiences regular, periodic changes in the polarity of the IMF. These periods of alternating positive (away from the Sun) and negative (toward the Sun) polarity are known as magnetic sectors.

We live inside a constantly moving spiral of "solar wind" which has its cycles (it rotates along with the Sun with a period of about 25 days), its polarities (the peaks and troughs of the skirt pass through the Earth's magnetosphere, modifying it) and its qualities (as the solar system interacts with the Galactic Current Sheet)
$\downarrow$ The heliospheric current sheet is a 3-D form of the Parker spiral that results from the influence of the Sun's rotating magnetic field on the plasma in the interplanetary medium. See 5 planets (Mercury, Venus, Earth, Mars, and Jupiter) around the Parker spiral. (Wikipedia)


Wikipedia $\boldsymbol{>}$


$\uparrow$ This Wolfram demo shows the configuration of the interplanetary magnetic field (IMF) that originates in the Sun and is carried into space by the solar wind.
The plots are based on the Parker model of the solar wind.
(http://demonstrations.wolfram.com/TheInterplanetaryMagneticFieldParkerSpiral/)

## SG301.3.5 The Galactic Dance

As we learn more about the nature of our galaxy, we realize that it, too, is a complex system, entangled with lower $\&$ higher systems/dimensions of the universe. Wave rhythms, cycles, differential rotation of the stars, magnetic fields, invisible mass of 'dark matter' or new cosmic field...

- We know that streams of energy from stars travel in specific directions, either up or down the galactic arm in which they are embedded. Stars are polarized to other stars, either negative and positive, some receiving energy, some sending it out, all of which travels on the path of the magnetic field lines. Recent findings reveal we are "downstream" from Sirius in the part of the galactic arm our solar system resides in.
- Hannes Alfvén and Per Carlqvist speculate on the existence of a galactic current sheet, a counterpart of the heliospheric current sheet, with an estimated galactic current of 1017 to 1019 amperes, that might flow in the plane of symmetry of the galaxy.
- Animals are lateralized and so the cosmos seems to be. "The galaxy may be divided, polarized, into an upper and a lower domain, somehow similar to brain halves... The Desana shamans believe that the galaxy is a 'cosmic brain', separated into two hemispheres by the Milky Way." (Calleman. P. 177).


T Sine motion of the solar system in the galaxy. The solar system, as well as the vast majority of stars, displays a sinusoidal movement up and down through the equatorial plane of the galaxy. The sine wave period is approximately 62 million year long. During a galactic year (the duration of revolution of a star around the galactic center) of about 250 million years, the solar system completes approximately $\mathbf{4}$ cycles about the galactic midplane. Significant events in the earth evolution might be correlated with this wave motion. At the current time, our solar system is relatively close to this midplane, but is moving away toward the northern hemisphere of the galaxy. (Carl J. Calleman. The Purposeful Universe. 2009. p.174.)


个 Simulated image of the Milky Way. The Sun system is located about $2 / 3$ of the distance from the center to the periphery, on the inner edge of one of the spiral-shaped concentrations of gas and dust called the Orion Arm. The Sun system completes one revolution around the galactic center about every 250 million years.


个 Real image of the center of the Milky Way showing bright 63 clouds of dust and gas spiraling in/out. [Link]

## SG301.3.6 Dark Matter and Energy

The current Big Bang theory cannot explain several anomalies of galactic mechanics: 1. Critical matter density, For matter clumping, the Big Bang requires a critical density value of $\mathbf{3 H}$ atoms per cubic meter. However, an assessment of the amount of visible matter seen to compose galaxies indicates a universal density about 50 times less than the critical value.
2. Galactic coherence. It is not understood why the stars remain together in the organized structures of galaxies: their total masses are not, according to Newtonian mechanics, large enough to exert a sufficient gravitational power. Nor is the consistent spiral geometry to be explained by current astrophysics.
3. Supercluster complex structures. Newly discovered supercluster complexes and megastructures (such as the "Great Wall" - see infra), present a great difficulty for Big Bang scientists. Observations indicate that individual galaxies in these complexes do not move faster than about $1,000 \mathrm{~km} / \mathrm{s}$; at this speed, it would take more than 80 billion years for an initially homogeneous distribution of galaxies to aggregate into such large structures. (LaViolette. Link to Nature's article).
4. Speed of revolution in galactic context. Another anomaly is the following: why is it that the speed of revolving stars in a galaxy does not decrease more at higher distances from the galactic center (as we observe in the solar system)? Observation of the rates of stars in the galactic context shows that they are roughly independent of their distances from the center. In order for new stars with sufficient metallicity (thus allowing for life) to emerge, they need to revolve around the galactic center at a sufficient speed.

All of these inconsistencies lead to conjecture the existence of a "cosmic field" (hereafter 'CF') that provides a stronger attractive power than the visible mass of a galaxy. In fact, the table is turned around, as pointed out by Carl J. Calleman, and that "field" is what attracted / created the visible matter rather than the other way around.

The current official explanation is the theory of that the universe is filled with an invisible "Dark Matter". In the planar disc region of the Milky Way, the amount of dark matter would need to be 10 times as large as the visible matter in order to explain why the sun stays in its approximately $\mathbf{2 5 0}$ million year orbit around the center of the galaxy. In the large-scale perspective of the universe as a whole, the percentage of dark matter is now estimated to be between $\mathbf{8 5 \%}$ and $\mathbf{9 5} \%$ for $5 \%$ to $15 \%$ of visible matter.

Moreover, this dark matter / CF has been assumed to pervade the universe. "Visible matter is thought to be attracted to it and galaxies in fact be organized by it. At least in the Milky Way galaxy, this CF is assumed to have a spherical distribution, with its center right at the center of the galaxy's visible mass." (Calleman). In 2006, it was reported that an effect of dark matter's / CF is to distort objects similarly to a spherical lens. [Link]. The CF might be spherically distributed and act as a primordial organizational field or higherdimensional geometric template, overriding the 'lower system' of galactic mechanics.

"Dark matter" is invisible. Based on the effect of gravitational lensing, a ring of dark matter has been detected in this image of a galaxy cluster (CL0024+17) and has been represented in blue. (Wikipedia).

## Quote from NASA re: "dark energy" and "dark matter".

"More is unknown than is known. We know how much dark energy there is because we know how it affects the Universe's expansion. Other than that, it is a complete mystery. But it is an important mystery. It turns out that roughly $68 \%$ of the Universe is dark energy. Dark matter makes up about $27 \%$. The rest everything on Earth, everything ever observed with all of our instruments, all normal matter - adds up to less than $5 \%$ of the Universe. Come to think of it maybe it shouldn't be called 'normal' matter at all, since it is such a small fraction of the Universe." [Link]


## SG301.3.7.1 WMAP (1) - An Anisotropic Universe

Applications of modern physics to cosmology have been based on the so-called "Cosmological Principle". This principle assumes that the universe at the largest scale is homogeneous and isotropic (looks essentially the same in all directions).

The Wilkinson Microwave Anisotropy Probe (WMAP) is a spacecraft which measured differences in the temperature of the Big Bang's remnant radiant heat (Cosmic Microwave Background radiation or CMB) across the full sky.

The original timeline for WMAP gave it two years of observations. These were completed by September 2003. Mission extensions were granted in 2002, 2004, 2006, and 2008 giving the spacecraft a total of 9 observing years, which ended August 2010. Four WMAP data were released: 2003 (1-year), 2006 (2-years), 20-08 (5-years) and 2010 (7years).

The surprise discovery by the WMAP (and its successive data releases) is that the Big Bang afterglow displays anisotropies (irregularities) that are not explainable by the standard Big Bang model. These large scale geometric "structures" were inherent in the universe from its very inception as the WMAP data capture the temperature variation at the time of the Big Bang when the universe was 300,000 years (or $0.002 \%$ of its present age of $\mathbf{\sim 1 5}$ billion years). The discovery of these hitherto hidden cosmic patterns are the first tangible signs that the universe has always contained a potentially organized structure. We may just be coming full cycle and recognize again that the universe is purposeful and sourced in a supra intelligence that was always taken for granted in ancient times.

We will here single out hereafter 2 of the new discoveries of the WMAP mission, as well as 3 of the most intriguing of the emerging mega-structures of the universe.

Note: as always in science, data and their interpretations create controversies. So it is with the issue of these "vector anisotropies" (geometric \& directional anomalies).


- A million miles from Earth, the Wilkinson Microwave Anisotropy Probe observes deep space from near the second Lagrange point, L2.

In 2003, Max Tegmark and others, analyzing the data from WMAP, discovered large scale fluctuations in the CMB (Cosmic Background Radiation). They found polarized fields of temperature, looking like the panels of a basketball.

$\leftarrow$ The top left figure is the familiar temperature map of the microwave background. The next pictures show the current CMB work of breaking the map up into multipoles (simple functions each encoding structures on a particular scale). When added together, the multipoles give you the original map.

Reading the maps left to right, top to bottom, the first few multipoles are shown that add up to the large-scale structure of the CMB sky. In the real map, notice that there's a dark blue (cold) patch just right of the center. This sort of large-scale structure is reflected in the multipole plots; several of these low-order maps similarly have a cold peak at about this point.

Statistical analyses of the anisotropies in the CMB maps from COBE, WMAP and Planck have found a number of highly improbable alignments with the plane and direction of motion (kinetic vector) of our solar system. From a cosmological perspective, the probabilities that all these alignments could occur is estimated at $0.008 \%$ !

Specifically, the alignments are: (a) the quadrupole and octupole are close to one another; (b) they are orthogonal to the ecliptic plane; (c) the normals to the four planes defining the quadrupole (1) and octupole (3) are aligned with the dipole (direction of motion of the Earth) and with the equinox; (d) the ecliptic threads between a hot and a cold spot separating 3 strong extrema from 3 weak ones.

$\uparrow$ Quadrupole \& Octupole alignments within the Solar system. (Link)
(This is not a plot of the actual sky, it is the result of fitting spherical-harmonic-like functions to the data, which reveal hidden 'multipoles'.)


## SG301.3.7.3 WMAP (3) The "Cold Spot"

First discovered by NASA's Wilkinson Microwave Anisotropy Probe (WMAP) in 2004 and confirmed by ESA's Planck Satelitte, the Cold Spot is a region of the sky seen in microwaves which analysis found to be unusually large and cold relative to the expected properties of the cosmic microwave background radiation (CMB).
The radius of the "cold spot" subtends about $5^{\circ}$. It is centered in the southern hemisphere of the celestial sphere, in the direction of the constellation Eridanus. The "cold spot" is approximately 70 microKelvins colder than the average CMB temperature (approximately 2.7 Kelvin). Typically, the largest fluctuations of the primordial CMB temperature occur on angular scales of about $1^{\circ}$. Thus a cold region as large as the "cold spot" appears very unlikely, given generally accepted theoretical models.
Various alternative explanations exist, including a so-called Eridanus Supervoid or Great Void. This would be an extremely large region of the universe, now estimated to be roughly 1.8 billion lightyears across. If a comparable supervoid did exist, it would be one of the largest structures in the observable Universe. The large 'cold spot' forms part of what has been called the "AE" (Axis of Evil - also called by others the "Cosmic Axis") [See infra].

$\uparrow$ The Supervoid is completely empty of both normal and dark matter. It emits no detectable radiation or light of any kind. [Link]
$\leftarrow$ The Cold Spot area resides in the constellation Eridanus in the southern galactic hemisphere. The insets show the environment of this anomalous patch of the sky. [Link]

## SG301.3.8.1 Cosmic Mega-Structures (1) Cosmic Axis

When the initial and subsequent data releases from WMAP were analyzed mathematically, they seem to point to a "Preferred Cosmic Axis" or "Central Axis" (later dubbed the "Axis of Evil"). Here are some of the steps in this progressive discovery that the universe displays an organized structure:

- 2003. Tegmark \& others noticed the existence of "multipoles" defining the direction of an "axis" through the early universe.
- 2005. Kate Land and Joao Magueijo (Imperial College, London) noticed a curious pattern in the map of the cosmic microwave background (CMB) created by NASA's WMAP satellite. It seemed to show that some hot and cold spots in the CMB are not distributed randomly, as expected, but are aligned along what Magueijo dubbed the "Axis of Evil" (because it contradicts standard theory).
- 2005. Damien Hutsemekers of the (University of Liege, Belgium) analyzed the polarization of light from 355 quasars and found that as the quasars get near the axis, the polarization becomes more ordered than expected. Taken together, the polarization angles from the quasars seem to corkscrew around the 'axis'.
- 2007. Michael Longo (University of Michigan, Ann Arbor) analyzed 1660 spiral galaxies from the Sloan Digital Sky Survey and found that the axes of rotation of most galaxies appear to line up with the 'axis of evil'. He found that a line separating the preference for the two types of handedness (spiraling right / left) approximately lined up with the 'axis'. He concluded: "A well-defined axis for the universe on a scale of $\sim \mathbf{1 7 0}$ Mpc would mean a small, but significant, violation of the Cosmological Principle and of Lorentz symmetry and thus the underpinnings of special and general relativity." (Link).
- 2014. "Recent observations with the Planck telescope confirm the observation of a preferred cosmic axis" (Wikipedia > Cosmic Microwave Background). Planck was a space observatory operated by the European Space Agency (ESA) from 2009 to 2013, which mapped the anisotropies of the cosmic microwave background (CMB) at microwave and infra-red frequencies, with high sensitivity and small angular resolution. The mission substantially improved upon observations made by the NASA Wilkinson Microwave Anisotropy Probe (WMAP). Since two different instruments recorded the same anomaly, instrumental error appears to be ruled out.
- The axis that the Milky Way revolves around, as well as those of most other galaxies observed, was also found to be aligned with the Cosmic Axis.
"I am suggesting that the Central Axis is the fundamental space-time organizer of our universe. Its discovery may point out a way to recognize the universe as purposeful and endowed with a creative intelligence that, in ancient times, was taken for granted by most peoples on this planet.

If the handedness and spin of galaxies are direct;y related to the Central Axis of the universe, this means that the formation of galaxies may not just be a result of random fluctuations causing them to rotate. The spin of the galaxies would instead be related to that of the Central Axis and probably emerged in resonance with it. This would mean that all galaxies of the universe are connected to this Central Axis, and also possibly to one another, in a form of entanglement at the larger scale possible.

The core discovery however is that the existence of the Central Axis shows that there was structure in the universe from its very inception... This by itself allows for the development of cosmological models in which the universe is not pointless when it comes to how life, consciousness and intelligence have evolved."


Here is the revolutionary question put forth by Calleman:

Is the Axis of Evil (Central Axis of modern science) the 'Tree of Life' of the ancients?

Found in many traditions, the "Tree of Life" is said to be the organizational pattern of the cosmos.

## the universe

is designed
with
sacred geometry



个 Map showing the location of galaxies lying within $1 / 2$ billion light-years ("LY") of our galaxy, which is positioned at the center of the circle. The nearest supercluster complex, named the "CfA2 Great Wall", consists of an immense sheet of galaxies measuring about 600 million LY in length, 200 million LY in width, and 20 million LY in thickness.
(Geller and Huchra. From Paul La Violette. Beyond the Big Bang. P. 260)

SG301.3.8.3 Cosmic Mega-Structures (3) Great Walls


个 The CfA2 Great Wall is a cosmic "dissipative structure". A plot of the number of galaxies versus their distance from the Earth, in two opposite directions, exhibits a regular pattern. Regions of peak density are separated by approximately 470 million LY. (David Koo. From Paul La Violette. Beyond the Big Bang. P. 267)

- 1989. The Great Wall (also called Coma Wall), sometimes specifically referred to as the CfA2 Great Wall, is an immense galaxy filament. It is one of the largest known superstructures in the observable universe. This structure was discovered c. 1989 by a team of American astronomers (Margaret J. Geller and John Huchra) while analyzing data gathered by the Second CfA Redshift Survey of the Harvard-Smithsonian Center for Astrophysics (CfA). The CfA2 Great Wall is a galaxy wall, one of the three subtypes of galaxy filaments, the other two being galaxy sheets and supercluster complexes. The Great Wall's nearest point is about $\mathbf{3 0 0}$ million light years from Earth, while its furthest point is 550 million light years away, respectively. It consists of three massive galaxy superclusters. (Wikipedia).
- 2003. The Sloan Great Wall (SGW) is a cosmic structure formed by a giant wall of galaxies (a galaxy filament). Its discovery was announced from Princeton University on October 20, 2003 based on data from the Sloan Digital Sky Survey. The SGW measures 1.38 billion light-years $\left(1.30 \times 10^{25} \mathrm{~m}\right)$ in length, located approximately one billion light-years from Earth. It is approximately $1 / 60$ of the diameter of the observable universe, making it the fifth largest known object. (Wikipedia)

\& The Sloan Great Wall in a DTFE reconstruction of the inner parts of the 2dF Galaxy Redshift Survey. (Wikipedia)


## SG301.3.8.4 Cosmic Mega-Structures (4) Great Attractor



The Great Attractor is a gravity anomaly in intergalactic space within the vicinity of the Hydra-Centaurus Supercluster at the center of the Laniakea Supercluster that reveals the existence of a localized concentration of mass tens of thousands of times more massive than the Milky Way. This mass is observable by its effect on the motion of galaxies and their associated clusters over a region hundreds of millions of light-years across.

The first indications of a deviation from uniform expansion of the universe were reported in 1973 and again in 1978. The location of the Great Attractor was finally determined in 1986, and is situated at a distance of somewhere between 150 and 250 Mly (million light years or $47-79 \mathrm{Mpc}$ - the latter being the most recent estimate) from the Milky Way, in the direction of the constellations Triangulum Australe (The Southern Triangle) and Norma (The Carpenter's Square). While objects in that direction lie in the Zone of Avoidance (the part of the night sky obscured by the Milky Way galaxy) and are thus difficult to study with visible wavelengths, X-ray observations have revealed that the region of space is dominated by the Norma cluster (ACO 3627), a massive cluster of galaxies containing a preponderance of large, old galaxies, many of which are colliding with their neighbors and/or radiating large amounts of radio waves. In 2005, astronomers conducting an X-ray survey of part of the sky known as the Clusters in the Zone of Avoidance (CIZA) project reported that the Great Attractor was actually only one tenth the mass that scientists had originally estimated. The survey also confirmed earlier theories that the Milky Way galaxy is in fact being pulled towards a much more massive cluster of galaxies near the Shapley Supercluster, which lies beyond the Great Attractor.

## SG301.3.9 The Largest (Visible) Cosmic Structures \& Voids

Galaxies are organized in a manner resembling an enormous network - the cosmic web. This web has dense regions made up of galaxy clusters and groups (structures), sparsely populated regions devoid of galaxies (voids), as well as the filaments that link overdense regions.

| List of the largest cosmic structures |  |  |
| :---: | :---: | :---: |
| Structure name (year discovered) | Maximum dimension (in light years) | Notes * |
| Unnamed galaxy supercluster corresponding to the NQ2-NQ4 GRB overdensity | $\begin{aligned} & \text { 10,000,000,000 } \\ & {[2][3]} \end{aligned}$ | Discovered through gamma-ray burst mapping, and is the first structure to exceed 5 billion and 10 billion light years. |
| Huge-LQG (2012-2013) | $4,000,000,000{ }^{[4][5] \mid 6]}$ | Decoupling of 73 quasars. Largest known large quasar group and the first structure found to exceed 3 billion light years. However, it may be a possible false positive identification according to a July 2013 paper. ${ }^{[7]}$ |
| U1.11 LQG (2011) | 2,500,000,000 | Involves 38 quasars. Adjacent to the Clowes-Campusano LQG. |
| Clowes-Campusano LQG (1991) | 2,000,000,000 | Grouping of 34 quasars. Discovered by Roger Clowes (who also discovered the Huge-LQG) and Luis Campusano. |
| Sloan Great Wall (2003) | 1,370,000,000 | Discovered through the 2dF Galaxy Redshift Survey and the Sloan Digital Sky Survey. |
| (Theoretical limit) | 1,200,000,000 | Structures larger than this size are incompatible with the cosmological principle according to all estimates |
| Pisces-Cetus Supercluster Complex (1987) | 1,000,000,000 | Contains the Milky Way, and is the first galaxy filament to be discovered. (The first LQG was found earlier in 1982.) A new report in 2014 confirms the Milky Way as a member of Laniakea Supercluster. |
| CfA2 Great Wall (1989) | 750,000,000 | Also known as the Coma Wall |
| Laniakea Supercluster (2014) | 520,000,000 | Galaxy supercluster in which the Earth is located |
| Horologium Supercluster (2005) | 550,000,000 | Also known as Horologium-Reticulum Supercluster. |
| Komberg-Kravtsov-Lukash LQG 11 | 500,000,000 | Discovered by Komberg, Kravstov and Lukash ${ }^{(88] \mid 9]}$ |

〔 The Largest Cosmic STRUCTURES include: superclusters, galaxy filaments and large quasar groups (LQG's).

- The Zone of Avoidance, or the part of the sky in which the Milky Way is occupied, blocks out light to several structures, making their limits not conclusively identified.
- Some structures are far too distant to be seen even with the most powerful telescopes. Some factors are included to explain the structure (like gravitational lensing and redshift data).
- Some structures have no defined limits, or endpoints.

| List of the largest voids |  |  |
| :---: | :---: | :---: |
| Void name/designation | Maximum dimension (in light years) | Notes |
| Giant Void <br> Tully-11 void <br> Tully-10 void <br> Tully-9 void | $\begin{aligned} & 1,300,000,000 \\ & 880,000,000 \\ & 792,000,000 \\ & 746,000,000 \end{aligned}$ | Also called as Canes Venatici Supervoid <br> Catalogued by R. Brent Tully <br> Catalogued by R. Brent Tully <br> Catalogued by R. Brent Tully |
| B\&B Abell-20 void | 684,000,000 |  |
| B\&B Abell-9 void | 652,000,000 |  |
| Tully-7 void | 567,240,000 | Catalogued by R. Brent Tully |
| Tully-4 void | 564,000,000 | Catalogued by R. Brent Tully |
| Tully-6 void | 557,460,000 | Catalogued by R. Brent Tully |
| Tully-8 void | 554,200,000 | Catalogued by R. Brent Tully |
| B\&B Abell-21 void | 521,600,000 |  |
| B\&B Abell-28 void | 521,600,000 |  |
| Eridanus Supervoid | 489,000,000 <br> (most likely <br> value) | A recent analysis of the Wikinson Microwave Anisotropy Probe (WMAP) in 2007 has found an irregularity of the temperature fluctation of the cosmic microwave background within the vicinity of the constellation Eridanus with analysis found to be 70 microkelvins cooler than the average CMB temperature. One speculation is that a void could cause the cold spot, with the possible size on the left. However, it may be as large as 1 billion light years, close to the size of the Giant Void. |

\& VOIDS are immense spaces between galaxy filaments and other large-scale structures. Technically they are not structures but vast spaces which contain very few, or no galaxies. They are theorized to be caused by quantum fluctations during the early formation of the universe.
[The unit of measurement used is the light year or LY (distance traveled by light in one Julian year = approximately 9.46 trillion kilometers).]

## SG301.3.10 The Cosmic Web

- January 28, 2014. For the first time, astronomers have captured an image of the diffuse "cosmic web" of gas that stretches between galaxies.
"The structure, which contains most of the material in the universe, mirrors the distribution of elusive dark matter. By using the radiation from a distant quasar, the brightest objects in the universe, the international team of scientists captured the previously unseen threads stretching between galaxies."
- November 20, 2014. In their paper, published in the Astrophysical Journal, Darvish \& Mobasher present observations showing that thread-like "filaments" in the cosmic web played an important role in the cosmic evolution. "The filaments are like bridges connecting the denser regions in the cosmic web," Darvish explained. "Imagine threads woven into the web."

What greatly assisted the researchers is a giant section of the cosmic web first revealed in two big cosmological surveys (COSMOS and HiZELS). They proceeded to explore data also from several telescopes (Hubble, VLT, UKIRT and Subaru). They then applied new computational methods to identify the filaments, which, in turn, helped them study the role of the cosmic web.

They found that galaxies residing in the cosmic web/filaments have a much higher chance of actively forming stars. "We were surprised by the crucial role the filaments play in galaxy formation and evolution," Mobasher said. "Star formation is enhanced in them. The filaments likely increase the chance of gravitational interaction between galaxies, which, in turn, results in this star-formation enhancement. There is evidence in our local universe that this process in filaments also continues to occur at the present time." [Link]

Galaxies sit within halos of dark matter. Filaments of the missing material stretch between the universe. Thanks to gravity, ordinary matter follows its distribution, so filaments of ionized gas should echo the placement of dark matter. The researchers estimated that more than 10 times the amount of normal diffuse gas exists in the nebula than predicted.
'We think there may be more gas contained in the small, dense clumps within the cosmic web than is seen in our models,' Cantalupo said. [Link]

$\uparrow$ Computer simulations suggest that matter in the universe exists in a "cosmic web" that stretches between the nodes made up of galaxies. The insert shows a 10-million-light-year segment from a simulation that includes both gas and dark matter. Credit: Anatoly Klypin and Joel Primack; insert: S. Cantalupo. [Link]

## Earlier discovery (November 5, 2009).

Astronomers have for the first time seen part of the "cosmic web" of galaxies that holds together the known universe, some seven billion light-years from Earth. Viewed through two of the world's most powerful telescopes (in Chile and Japan), the discovery "is the first observation of such a prominent galaxy structure in the distant universe, providing further insight into the cosmic web and how it formed," according to a statement by the European Southern Observatory (ESO). The assembly of galaxies form filaments "millions of light years long and constitute the skeleton of the universe," it says.

## SG301.3.11. A New Cosmological Model Cosmic BioCentrism

"The farther we peer into space, the more we realize that the nature of the universe cannot be understood fully by inspecting spiral galaxies or watching distant supernovas. It lies deeper. It involves our very selves..." (Lanza)

Biocentrism is a theory proposed in 2007 by American MD Robert Lanza, stem-cell pioneer and renegade scientist. In Lanza's view, life and biology are central to being, reality, and the cosmos: life creates the universe rather than the other way around. Biocentrism asserts that current theories of the physical world do not work, and can never be made to work, until they fully account for life and consciousness. [www.robertlanzabiocentrism.com]

300 years ago, the Irish empiricist George Berkeley contributed a particularly prescient observation: the only thing we can perceive are our perceptions. In other words, consciousness is the matrix through which the cosmos is apprehended. Color, sound, temperature, and the like exist only as perceptions in our head, not as absolute essences. In the broadest sense, we cannot be sure of an outside universe at all...

For centuries, scientists continued to build physical models based on the assumption of a separate universe "Out There" into which we have each individually arrived. These models presume the existence of one essential reality that prevails with us or without us. Yet since the 1920s, quantum physics experiments have routinely shown the opposite: results do depend on whether anyone is observing. Robert Lanza is sending a waking call: "Instead of assuming a reality that predates life and even creates it, a biocentric approach of reality sees that life, and particularly consciousness, create the universe, and the universe could not exist without us." (Robert Lanza. Link.)

## The 7 principles of BioCentrism

1. What we perceive as reality is a process that involves our consciousness. An "external" reality, if it existed, would by definition have to exist in space. But this is meaningless, because space and time are not absolute realities but rather tools of the human and animal mind.
2. Our external and internal perceptions are inextricably intertwined. They are different sides of the same coin and cannot be divorced from one another.
3. The behavior of subatomic particles, indeed all particles and objects, is inextricably linked to the presence of an observer. Without the presence of a conscious observer, they at best exist in an undetermined state of probability waves.
4. Without consciousness, "matter" dwells in an undetermined state of probability. Any universe that could have preceded consciousness only existed in a probability state.
5. The structure of the universe is explainable only through biocentrism. The universe is fine-tuned for life, which makes perfect sense as life creates the universe, not the other way around. The "universe" is simply the complete spatiotemporal logic of the self.
6. Time does not have a real existence outside of animal-sense perception. It is the process by which we perceive changes in the universe.
7. Space, like time, is not an object or a thing. Space is another form of our animal understanding and does not have an independent reality. We carry space and time around with us like turtles carry shells. Thus, there is no absolute selfexisting matrix in which physical events occur independent of life.

I downloaded a digital copy of [Biocentrism] in the privacy of my home, where no one could observe my buying or reading such a 'New Agey' sort of cosmology book.

Now, mind you, my motivation was not all that pure. It was my intention to read the book so I could more effectively refute it like a dedicated physicist was expected to. I consider myself to be firmly and exclusively entrenched in the cosmology camp embodied by the likes of Stephen Hawking, Lisa Randall, Brain Greene, and Edward Witten. After all, you know what Julius Caesar said: Keep your friends close and your enemies closer. I needed to know what the other camps were thinking so I could better defend my position. It became necessary to penetrate the biocentrism camp.

The book had the completely opposite effect on me. The views that Dr. Lanza presented in this book changed my thinking in ways from which there could never be retreat. Before I had actually finished reading the book, it was abundantly obvious to me that Dr. Lanza's writings provided me with the pieces of perspective that I had been desperately seeking. Everything I had learned and everything I thought I knew just exploded in my mind and, as possibilities first erupted and then settled down, a completely new understanding emerged. The information I had accumulated in my mind hadn't changed, but the way I viewed it did in a really big way."

From physicist Scott M. Tyson's book The Unobservable Universe.
"Biocentrism is consistent with the most ancient traditions of the world which say that consciousness conceives, governs, and becomes a physical world."
(Deepak Chopra).

## SG301 Chapter 4. System Harmony in the Solar Family



Until modern times, the Solar System was traditionally viewed as an ordered celestial home, inhabited by a familylike group of deified wandering bodies.

In more recent times, following up on Kepler's theories, there have been numerous models based upon the periodic movements of the solar system - all of which indicate that the solar system is a resonant structure - in the orbital and rotational periods of the planets, in their mean distances and rotational speeds, in the perihelion to aphelion ratios of their elliptical orbits and the semi-major and semi-minor axis ratios of the planetary orbits...

We review here some of these models, for information and inspiration. They all point to one direction: the planets resonate with each other and with their moons in physical, geometrical and harmonic ways that we are just starting to understand and document. Moreover these new models, based on a new sense of the fundamental oneness and purposefulness of the universe, offer multi-dimensional perspectives that greatly expand the still overly mechanistic picture presented by official astro-cosmology.

The sun is an oscillator (itself tuned to galactic rhythms) within a plasmic/quantum field and it generates complex harmonic wave frequencies creating matrices of entangled inter-connectivity - reminding us of Clotho (one of the 3 Moirai or Fates in Greek mythology) who weaved the metaphorical threads of human life.

We start with the 'wholeness' of planet Earth and the SG of the planetary grid and move on to review a variety of models and perspectives pointing to the highly resonant order of the Solar System. The remarkable work of Hartmut Warm, a Johannes Kepler of the 21st century, is introduced: he rediscovered, based on the most recent astronomical data, the ancient "Signature of the Celestial Spheres".

## SG301.4.1.1 Planetary Platonics (1) Earth Grid


\& Classical Icosa-dodeca Earth grid diagram.

$\Rightarrow$ Becker-Hagens
Hexakis
Icosahedron Projection. 1983.


In the 1970s, when the Earth was understood as a multi-level "whole system" and an actual living organism ("Gaia"), a trio of Russian researchers (Goncharov, Morozov \& Makarov) published a seminal paper suggesting that the Earth projects from within herself to the surface a dual geometric grid combining the two "parent" Platonic Solids: the Icosahedron (20 faces) \& the Dodecahedron (12 faces). [ $\$$ SG107]

This grid acts as the energy matrix or network lattice directing (waveguiding) the main planetary events, whether natural or cultural. The nodes and geometries of the Earth Grid correspond to significant features as correlated by data from fields as diverse as history, sacred sites locations, geology \& plate tectonics, magnetic anomalies, ornithology (paths of bird migrations), meteorology...

This research has since been greatly expanded upon worldwide and is an integral part of the new paradigm of science recognizing the Web of Life and its Sacred Geometric Harmony.

Moreover, this new view of the Earth as a "Geometric Crystal" and "Sacred Solid" seems to be a rediscovery if we refer to the Pythagorean vision as expounded by Plato who stated:

## "The Earth, viewed form above,

 resembles a ball sewn from twelve pieces of skin".

"Dymaxion" is one of Buckminster Fuller's two favorite names for the cuboctahedron (one of the 13 Archimedean Solids). The other name is vector equilibrium. In the book recording his many inventions, B. Fuller explains his motivations:
"My 1927 commitment to deal henceforth only with total planetary physical and metaphysical resources employed only in technology useful for all people around the surface of Spaceship earth called for a non-distorted map of the world upon which to identify the resources and the people." (B. Fuller. Inventions. 1983).

Patented in January 1946 [\#2,393,676] (one year before the invention of the "geodesic dome"), the Dymaxion Map is the first of a "United Nations" representation of the world whereby the non-Western countries \& continents are given their just comparative areas and presence. Here, Sacred Geometry and Planetary Design touch upon geo-politics \& global economics.

Later, B. Fuller came up with an icosa-mapped "Spaceship Earth" Millennium Edition and started to build large-scale versions for 3D global education. One such project was the series of "Geoscope" planetarium domes where people could see the earth from inside out as one being.

## SG301.4.1.2 Planetary Platonics (2) Dymaxion Map


$\uparrow$ Sitting at home. The "Earth School" for learning to

## SG301.4.1.3 Planetary Platonics (3) The Geoscope

After building a prototype Geoscope at Cornell University (1951), B. Fuller proceeded to develop more sophisticated models:

- a 50-feet diameter Geoscope was built at the Southern Illinois University. (See pics $\boldsymbol{>}$ ).
- From 1954 to 1956, Fuller and a group of Minnesota students completed a portion of the massive $\mathbf{2 0 0}$-feet diameter geodesic sphere which was to serve as the structure of an Earth Geoscope.
- During the same period, Fuller initiated a campaign advocating the construction of a 200-feet Earth Geoscope in New York City directly across the United Nations. As explained by L. S. Sieden in his "Buckminster Fuller's Universe: An Appreciation", Fuller's choice of the $\mathbf{2 0 0}$-feet dimension was not arbitrary: the new version of the Geoscope was specifically designed to display the entire Earth on a scale allowing people to identify with details as tiny as a small city and (with a magnifying glass) an individual house. Thus the average human could experience a body-based actual relationship between their homes - and therefore themselves - and the entire planet and thus develop a sense of belonging and co-creation.
- The UN Geoscope was to portray patterns of geological or historical events which occurred over long periods of time and could be displayed in a shortened flash view. Even more significantly, the Geoscope could be used to visually display continuously updated data about all aspects of Earth: current population, resource allocation, weather patterns, weaponry \& "livingry" deployment... could be revealed at a glance. Invisible patterns could be recognized and lead to unique new strategies.
- The UN Geoscope was to be erected on Roosevelt Island, East of the UN building. Its top would be at the same height as the top of the UN Secretariat (PHI-based) building. Thus the UN delegates, looking out their windows, would be constantly confronted by an ever-changing, animated view of the entire Earth and inspired to make responsible global decisions.
- Although the project was met with a favorable reception by the UN, the funding didn't follow. Geoscopes however are timely, now more than ever: the direct relationship between humans beings and Spaceship Earth is crucial to see the emergence of global projects of livingry - technology that supports LIFE.

$\uparrow \rightarrow$ The exterior \& interior view of the Geoscope at the Southern Illinois University.
(L. S. Sieden. Buckminster Fuller's Universe. 1989. Pp. 264-5)


$\uparrow$ Fuller's drawing of the UN Geoscope. (Critical Path, p. 178).

$\uparrow$ The Buckminster Fuller Institute is dedicated to effectively build Bucky Fuller's vision of the GeoScope with an unprecedented level of useradded functionality aptly named GeoPedia.


## SG301.4.1.4 Planetary Platonics (4) Tetrahedral Physics



- When standing with one apex at the South pole (or the North pole), the Tetra divides the Sphere into $1 / 3$ and $2 / 3$.
- When the Tetra is placed within a rotating sphere with one apex at the North or South pole, the other 3 apices will lie at $19^{\circ} .47$, i.e. about $19.5^{\circ}$ from the equator.
- The dance between the Tetra and the Sphere is basic to Buckminster Fuller's work (the "isotropic vector matrix"), as a mathematical blueprint for the universe.
- The 7 symmetry spin axes of the Tetra, as a primary field of form, have been correlated by Dan Winter to the 7 layers of the heart muscle and the 7 regions of the rainbow donut.
- The Tetrahedron is the only 3D volume whose corners (apices) are at the same distance from each other. There is no other volume with less than 4 corners.
- The Tetra has a special (inverse) relationship with the Sphere: the sphere packs the most volume in the least surface area, while the Tetra packs the least volume with the greatest surface area.
- When the diameter of the circle is 12, the ratio of the area of the sphere to the tetra is 2 to 1 . If a larger Tetrahedron has an inscribed sphere touching the centers of its 4 faces, then the characteristics of the super-scribed tetra are 3 times those of the tetra inscribed in the sphere. Its height is twice the diameter of the sphere.



## SG301.4.1.5 Planetary Platonics (5) Earth Tetra Grid

The Star-Tetrahedron / Sphere geometry on Earth, based on the North Pole as the upper vertex point, shows correlations with volcanic mountains at about $19.5^{\circ}$, in both hemispheres.

This geometry $\left(19.5^{\circ}\right)$ is also appearing throughout the solar system as a primary planetary grid structure.

## Energy upwelling at tetrahedral latitudes

$\left(19.5^{\circ}\right)$ in the solar system:
SUN: sunspot activity and region of peak temperature limited to $19.5^{\circ}$ North and South.
EARTH: largest cone volcano at $19.5^{\circ}$ (Mauna Kea, HI). VENUS: volcanic complexes Alpha and Beta Regio. MARS: Olympus Mons cone volcano at $19.5^{\circ}$ North. JUPITER: "Red Spot" vortex.
NEPTUNE: Voyager II discovered a vortex point at $19.5^{\circ}$.

\& Side view of the Earth Star-Tetra grid


## Google EarthGrid（Coordinates）

Select grid style：
－tetrahedron
－cube
O octahedron
－icosahedron
－dodecahedron
Obeckerhagens

Grid Alignment Coordinates：

（Right Click－＞Save／Download）

This script creates a Google Earth file．The file shows earth overlaid with one of the five platonic solids（or the Becker－ Hagens grid）with all vertices connected by lines．

Choose latitude and longitude for where one vertex chould be anchored（decimal degrees， negative value for W ＇or S ）． Choose the header coordinate in the same direction where another vertex should be located．

Then download the KML file and open with Google Earth． （Safari users，remove the ．TXT extension from the download before opening）
＊My Earth Grid Research
Earth Grid（Bearing）

SG301．4．1．6 Planetary Platonics （6）Earth Grid Google
$\leftarrow$ Current software gives the capability to display in 3D any of the main Earth grid geometry， with any set of coordinates as an anchor point．

## （EarthGrid Google Link）




世个个 A variety of grid configurations in EarthGrid Google．



个 Planetary choreography in the Sun System.

This wave diagram shows the movements of the inner planets over a period of 1 full Saturn cycle
(29.46 years).

## (Callum Coats.

Living Energies. 1996).

$\uparrow$ The scale of Harmonic Overtones. [ $\uparrow$ SG201]

## SG301.4.2 Solar System Spiral Dances

The planets in the solar system move in exquisite orbital patterns, dancing to the Music of the Cosmos. There is more mathematical and geometric harmony than we realize. And more music: the motion of the planets in time are akin to a harmonic diagram of musical overtones.


## SG301.4.3 The Titius-Bode's Law \& its Revision

The Titius-Bode law (named after Daniel Titius \& Johan E. Bode sometimes termed just Bode's law) is a formula, published in 1772, for the calculation of the the relation between the mean distances of the planets from the Sun. The formula suggests that, extending outward, each planet would be approximately twice as far from the Sun as the one before. Bode's law has the charm of being based on a series of small whole numbers. While it correctly anticipated the orbits of Ceres (in the asteroid belt) and Uranus, it has definite inaccuracies and failed as a predictor of Neptune's orbit. So, Bode's law is now discredited or just regarded as an approximate, non-generalizable, ad hoc hypothesis. Bode's law is expressed as: $r_{n}=0.4+0.3 * 2^{n}($ for $m=-\infty, 0,1,2 \ldots)$
"On the positive side, as noted by Harmut Warm, it is sufficiently accurate to express, in a language recognized by science, the fact that some hidden order is indeed woven into the solar system. Another way of describing this advantage is to say that theories expounded regarding the creation of the planetary system do have to take into account the fact that the orbital radii of the planets and the asteroid belt very roughly follow an exponential distance rule."

In the 20th century, Bode's law has been improved in a number of ways by using numbers other than 0.4 or 0.3 in the equation or by furnishing it with an extra periodic function in order to accommodate mathematically for a degree of oscillation of the numbers.
"So, if one depicts the series geometrically in a revised form by entering the distances (in any scale) logarithmically on the y axis against small numbers (Venus $=-1$ ) on the $\mathbf{x}$ axis, a mysterious oscillation arises. Neptune, by the way, fits very well into this modern version of the series."
(Harmut Warm. Signatures of the Celestial Spheres. p. 42)


§ Solar system diagram showing planetary spacing in whole numbers, when the SunNeptune distance is normalized to $\mathbf{1 0 0}$. The numbers listed are distinct from the Bode sequence, but can give an appreciation for the harmonic resonances. (Wikipedia).

| Planet | $\mathbf{k}$ | T-B rule distance (AU) | Real distance (AU) | \% error (using real distance as the accepted value) |
| :--- | :---: | :---: | :---: | :---: |
| Mercury | 0 | 0.4 | 0.39 | $2.56 \%$ |
| Venus | 1 | 0.7 | 0.72 | $2.78 \%$ |
| Earth | 2 | 1.0 | 1.00 | $0.00 \%$ |
| Mars | 4 | 1.6 | 1.52 | $5.26 \%$ |
| Ceres $^{1}$ | 8 | 2.8 | 2.77 | $1.08 \%$ |
| Jupiter | 16 | 5.2 | 5.20 | $0.00 \%$ |
| Saturn | 32 | 10.0 | 9.54 | $4.82 \%$ |
| Uranus | 64 | 19.6 | 19.2 | $2.08 \%$ |
| Neptune | 128 | 38.8 | 30.06 | $29.08 \%$ |
| Pluto ${ }^{2}$ | 256 | $77.2^{2}$ | 39.44 | $95.75 \%$ |

个 Distances of planets in the solar system, calculated from Bode's law and compared with the real ones. The correspondences range from very good (Jupiter) to inaccurate (Mars). (Wikipedia).

As noted by J. Harris: "The apparent lack of progress in coming to terms with the (harmonic) structure of the Solar System since the Titius-Bode era suggests that 'Bode's Law' was in all likelihood more of an impediment than a help, and a long-lived impediment at that." It, in fact, discredited, in the eyes of official science, the possibility of an order of harmonic / geometric ratios in the solar system.

The solar system oscillation. After H. Warm.

## SG301.4.4 What is Planetary Resonance?

An orbital resonance occurs when two orbiting bodies exert a regular, periodic gravitational influence on each other, usually due to their orbital periods being related by a ratio of two small integers. The physics principle behind orbital resonance is similar in concept to pushing a child on a swing, where the orbit and the swing both have a natural frequency, and the other body doing the "pushing" will act in periodic repetition to have a cumulative effect on the motion. Orbital resonances greatly enhance the mutual gravitational influence of the bodies, i.e., their ability to alter or constrain each other's orbits. In most cases, this results in an unstable interaction, in which the bodies exchange momentum and shift orbits until the resonance no longer exists. Under some circumstances, a resonant system can be stable and self-correcting, so that the bodies remain in resonance. Examples are the 1:2:4 resonance of Jupiter's moons Ganymede, Europa and Io, and the 2:3 resonance between Pluto and Neptune. Unstable resonances with Saturn's inner moons give rise to gaps in the rings of Saturn. The special case of 1:1 resonance (between bodies with similar orbital radii) causes large Solar System bodies to eject most other bodies sharing their orbits. There are several types of planetary resonance as described by gravity-based science:

- A mean-motion orbital resonance occurs when two bodies have periods of revolution that are a simple integer ratio of each other. Depending on the details, this can either stabilize or destabilize the orbit. Stabilization may occur when the two bodies move in such a synchronized fashion that they never closely approach. Examples of perfect mean-motion resonance in the solar system are: 2:3 Pluto-Neptune (also Orcus and other plutinos); 2:4 Tethys-Mimas (Saturn's moons); 1:2 Dione-Enceladus (Saturn's moons); 3:4 Hyperion-Titan (Saturn's moons); 1:2:4 Ganymede-Europa-Io (Jupiter's moons, ratio of orbits); 7:12 Haumea Neptune.
- A Laplace resonance is a three-body resonance with a 1:2:4 orbital period ratio (equivalent to a 4:2:1 ratio of orbits). The term arose because Pierre-Simon Laplace discovered that such a resonance governed the motions of Jupiter's moons Io, Europa, and Ganymede. It is now also often applied to other 3-body resonances with the same ratios.
- A Lindblad resonance drives spiral density waves both in galaxies (where stars are subject to forcing by the spiral arms themselves) and in Saturn's rings (where ring particles are subject to forcing by Saturn's moons).
- A secular resonance occurs when the precession of two orbits is synchronized (usually a precession of the perihelion or ascending node). A small body in secular resonance with a much larger one (e.g. a planet) will precess at the same rate as the large body. Over long times (a million years, or so) a secular resonance will change the eccentricity and inclination of the small body.
- A Kozai resonance occurs when the inclination and eccentricity of a perturbed orbit oscillate synchronously (increasing eccentricity while decreasing inclination and vice versa). This resonance applies only to bodies on highly inclined orbits; as a consequence, such orbits tend to be unstable, since the growing eccentricity would result in small pericenters, typically leading to a collision or (for large moons) destruction by tidal forces.
- A Near Mean Motion resonance is "dynamically insignificant" for astronomers who, because of the relative position shifts after each cycle, ascribe it to randomness. However they play a significant role in the larger harmonic picture of the solar system, as Harmut Warm has demonstrated.
- Non-gravitational resonance, electro-magnetic or vibrational resonance is a much larger concept of inter-connectivity, from quantum entanglement to higher-dimensional affinities \& love.

$\uparrow$ Depiction of Haumea's presumed 7:12 resonance with Neptune in a rotating frame, with Neptune (blue dot at lower right) held stationary. Haumea's shifting orbital alignment relative to Neptune periodically reverses (librates), preserving the resonance. (Wikipedia)

| (Ratio) and Bodies | Mismatch after one cycle ${ }^{\text {[a] }}$ | Randomization time ${ }^{[b]}$ | Probability ${ }^{[c]}$ |
| :---: | :---: | :---: | :---: |
| Planets |  |  |  |
| (9:23) Venus-Mercury | $4.0^{\circ}$ | 200 y | 0.19 |
| (8:13) Earth-Venus ${ }^{[34][35][d]}$ | $1.5^{\circ}$ | 1000 y | 0.065 |
| (243:395) Earth-Venus ${ }^{[34] \mid 36]}$ | $0.8^{\circ}$ | 50,000 y | 0.68 |
| (1:3) Mars-Venus <br> (1:2) Mars-Earth <br> (1:12) Jupiter-Earth ${ }^{[\text {[e] }}$ <br> (2:5) Saturn-Jupiter ${ }^{[1]}$ | $\begin{aligned} & 20.6^{\circ} \\ & 42.9^{\circ} \\ & 49.1^{\circ} \\ & 12.8^{\circ} \end{aligned}$ | $\begin{aligned} & 20 \mathrm{y} \\ & 8 \mathrm{y} \\ & 40 \mathrm{y} \\ & 800 \mathrm{y} \end{aligned}$ | $\begin{aligned} & 0.11 \\ & 0.24 \\ & 0.28 \\ & 0.13 \end{aligned}$ |
| (1:7) Uranus-Jupiter | $31.1{ }^{\circ}$ | 500 y | 0.18 |
| (7:20) Uranus-Saturn | $5.7{ }^{\circ}$ | 20,000 y | 0.20 |
| (5:28) Neptune-Saturn | $1.9{ }^{\circ}$ | 80,000 y | 0.052 |
| (1:2) Neptune-Uranus | $14.0{ }^{\circ}$ | 2000 y | 0.078 |

Remember: beyond physical gravitation, there is an entire universe of subtle resonant harmony we are entering as a global consciousness.

It is a remarkable fact that, using the standard mean orbital distances of each successive planet, and computing their relative distance, we come up with a relative average of Phi or 1.618...

Whereas looking at two planets does not necessarily brings up the harmonic ratio/relationship of Phi, looking at all the planets and taking the average of their relative distances reveals the prevalent harmonic tendency of the planets as a group. The same situation occurs when taking the measurements of two persons (toes to navel and full size): the ratio rarely computes to exact Phi; but, averaging the same ratio on a group of 10-20 people brings up a very close approximation of Phi. The fluctuation above and below the mean average recalls the fluctuation of the Fibonacci numbers above and below the exact Phi value. Phi is an ever moving process not always apparent on the surface of things but underlying their long term and sustainable dynamics.

Ceres, the first asteroid (discovered in 1801) and the largest ( 637 miles diameter $=1 / 3$ the total mass of all asteroids $=\mathbf{1 / 1 2}$ the size of the Earth), is inserted between Mars and Jupiter as the best representation of the asteroid belt at a planetary vibrational node (or "note" in the musical scale of the Solar System). Data: W. K. Hartmann, Astronomy, 1982.

| Name | Symbol | Distance (A. U.) | Relative Distance (A.U.) | Distance (Million Miles) | Relative Distance (Miles) | Period Revolution | Equatorial Diameter (Miles) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Mercury | ¢ | 0.387 | 1.000 | 36.0 | 1.000 | 88.0 days | 3,100 |
| Venus | ¢ | 0,723 | 1.868 | 67.2 | 1.866 | 224.7 d. | 7,700 |
| Earth | $\operatorname{HF}^{+}$ | 1.000 | 1.383 | 92.9 | 1.382 | 365.26 d . | 7,926 |
| Mars | $0^{\prime \prime}$ | 1.524 | 1.524 | 141.5 | 1.523 | 687.0 d . | 4,200 |
| Ceres | 7 | 2.77 | 1.817 | 257.1 | 1.816 | - | 637 |
| Jupiter | 4 | 5.203 | 1.878 | 483.4 | 1.880 | 11.86 years | 88,700 |
| Saturn | $\hbar$ | 9.539 | 1.833 | 886.0 | 1.832 | 29.46 y . | 75,100 |
| Uranus | * | 19.18 | 2.010 | 1782.0 | 2.011 | 84.01 y . | 29,200 |
| Neptune | $\Psi$ | 30.06 | 1.567 | 2792.0 | 1.566 | 164.8 y. | 27,700 |
| Pluto | \% | 39.44 | 1.312 | 3664.0 | 1.312 | 247.7 y . | 3,500 |
| TOTAL |  |  | 16.192 |  | 16.188 |  |  |
| AVERAGE |  |  | 1.6192 |  | 1.6188 |  |  |

$\uparrow$ The average of the mean orbital distances of each successive planet in relation to the preceding one approximates PHI or 1.618... (Data from the 1981 Webster Dictionary using A.U and million miles).
Note: The relative distance begins with Mercury = 1.000. "A.U." stands for Astronomical Unit (unit of length equal to the mean radius of the the Earth's orbit $\sim 93$ million miles).

SG301.4.5 Phi in Average Planetary Distances

| Planet | Mean <br> distance <br> in million <br> kilometers <br> per NASA | Relative <br> mean <br> distance <br> where <br> Mercury=1 |
| :--- | ---: | ---: |
| Mercury | 57.91 | 1.00000 |
| Venus | 108.21 | 1.86859 |
| Earth | 149.60 | 1.38250 |
| Mars | 227.92 | 1.52353 |
| Ceres | $1,433.53$ | 1.84123 |
| Jupiter | $2,872.46$ | 2.00377 |
| Saturn | $4,495.06$ | 1.56488 |
| Uranus | $5,869.66$ | 1.30580 |
| Neptune |  | 16.18736 |
| Pluto |  | 1.61874 |
| Total | 1.61803 |  |
| Average | $(0.00043)$ |  |
| Phi |  |  |
| Degree of variance |  | 1.88154 |
|  |  | 1020 |

$\uparrow$ Table of NASA data, using million kilometers. From the "Phi-nomenon site": /Igoldennumber.net/solarsys.htm

## SG301.4.6 Molchanov Quantivation of Planetary Orbits

The understanding of the resonance character of evolving mature oscillation systems applied to the resonance of the Solar System motion dynamics has led A. M. Molchanov to state that the mean motion of the $\mathbf{9}$ large planets is related approximately to 9 linear homogeneous equations.

In his seminal 1968 paper and his following 1969 response to critics, Molchanov shows that the dynamical quantization of the Solar System implies that the structure of the solar system is determined by a table of resonance relations. Analogous tables of integers determine the constitution of the systems of planetary satellites.

Following the lead of Molchanov, other scientists (mostly Russian), have expanded on the original model: Damgov \& Douboshinsky [Link], Rabinovich [Link], Kholodenko [Link]...

| Mean planet distances in the Solar System |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Planets in the Solar System | Data from direct astronomical measurements of planet distances from the Sun [343], A.U. | Titius-Bode Law $\begin{aligned} & (10.240) \\ & {[343], \text { A.U. }} \end{aligned}$ <br> $k \quad a_{k}$ |  | Computed planet distances using Eq. (10.239) of the "Oscillator-wave" model$i \quad \frac{a_{i}}{a_{E}}=\frac{j_{8, j}}{j_{8,5}}$ |  |
| Mercury | 0.39 | $-\infty$ | 0.4 | 1 | 0.392 |
| Venus | 0.72 | 0 | 0.7 | 3 | 0.723 |
| Earth | 1.00 | 1 | 1.0 | 5 | 1.000 |
| Mars | 1.52 | 2 | 1.6 | 9 | 1.530 |
| Asteroids | 2.78 | 3 | 2.8 | 19 | 2.824 |
| Jupiter | 5.2 | 4 | 5.2 | 37 | 5.132 |
| Saturn | 9.55 | 5 | 10.0 | 71 | 9.474 |
| Chiron | 13.71 |  |  | 104 | 13.689 |
| (Collewll's objects) |  |  |  |  |  |
| Uranus | 19.18 | 6 | 19.6 | 147 | 19.180 |
| Neptune | 30.03 | 7 | 38.8 | 232 | 30.035 |
| Pluto | 39.67 | 8 | 77.2 | 307 | 39.598 |


$\uparrow$ Quantization of the orbits of the planets. [Link]

$\uparrow$ The correspondence between and solar system is a powerful
LLink] micro-macro analogy which fuels quite a controversy. On one hand, it illustrates a cosmology of fractal harmonic / musical / sacred geometry / quantum universal resonance. On the other hand, orthodox scientists are adamant that "the solar system is NOT a Bohr atom". More on it infra...

## SG301.4.7 Tennenbaum - A Cascade of 5 Pentagons



世个
The 120-cell
polytope or "hyperdodecahedron".

Jonathan Tennenbaum presentation of the PHI ratios of cascading pentagons within the Solar System.
(New Discoveries on the Curvature of Space. 21st Century Science \& Technology. Sept-Oct 1988. p. 20-36.)
Inspired by the analogy of the register shift in the human voice and the "planetary register shift" of the asteroid belt, Tennenbaum also showed the direct relationship between the geometry of the Solar System and the geometry of the musical scale.

Follow the steps to the the golden mean proportions of the solar system:

- Inscribe a regular pentagon (\#1) in the orbit of Neptune.
- Draw the diagonals of this pentagon: a smaller pentagon (\#2) will be obtained, which exactly circumscribes the orbit of Saturn.
- Draw the next smaller pentagon (\#3): it circumscribes the circular outer limit of the asteroid belt.
- Draw the next smaller pentagon (\#4): it exactly circumscribes the orbit of the earth.
- Draw a final pentagon (\#5): it will fit between the aphelion and perihelion of Mercury.

The Solar System appears like a galactic DNA-like molecule, a larger DNA hyper-dodeca vortex.

## SG301.4.8 Martineau Solar "Coincidences"



Mercury - Venus Synodic dance after 770 days

In 2001, John Martineau, published his delightfully refreshing work "A Little Book of Coincidence" (Wooden Books, Walker \& Co.), a shortened version of his 1995 Book of Coincidences. The word "coincidence" of course is used, tongue-incheek, as a teaser: orthodox scientists are fond to dismiss as "coincidence" or "random chance" any mention of unusual pattern or connection that may hint at more science than they know.
"This book suggests there may be fundamental relationships between space, time, and life that have not yet been understood. These days we scan the skies listening for intelligent radio signals... Meanwhile, our closest neighbors are making the most exquisite patterns around us, in space and in time, and no scientists has yet explained why. Is it all just a coincidence or do the patterns perhaps explain the scientists?" (John Martineau, Introduction to A Little Book...)


Many diagrams from the original Book of Coincidence have been reproduced by Dan S. Ward in his article: The Book of Coincidence / Library of Halexandria. (Link)

Martineau's cosmos.
88

In a timely \& exciting synthesis, Richard Merrick, a pluri-disciplinary Renaissance man, has been re-creating \& pioneering anew the perennial understanding of the universe as a lattice of musical harmonics based on the Golden Ratio. "Everything in nature can de described as crystallized harmonics".
Found on www.interferencetheory.com, Merrick's presentation is a refreshing and unifying worldview that applies to all scales, from atomic resonance to cosmology, and offers a commonsense "cosmic science" alternative to the currently competing (and obsolete) dogmas of evolution. Merrick terms it "Harmonically Resonant Evolution".
A lot more on this universal Harmonic Resonance will be shared in SG308 (Science of Harmonics \& Consciousness of Harmony).


Nature is structured as a kind of quantum music.

(R. Merrick)

## SG301.4.9 Merrick - Harmonic

 Interference Lattice
$\uparrow$ Solar system Harmonic Lattice matrix. (R. Merrick).
"In harmonic terms, the solar system consists of nodes that resonated into rings within a spiraling disc of hot plasma - much like cymatic rings forming on the surface of a vibrated plate of sand. As waves rippled from the solar center out to the edge and back, harmonics resonated particles toward the calmest locations, gradually spiraling into rotating planetary systems.
Each $\Phi$-spaced ring in the lattice can be described as an orthogonal or 90 -degree location on a golden spiral. Since harmonic waves are most coherent and stable at right angles to one another, they would naturally entrain with a $\Phi$-spiral... The original solar spiral continues to this day as the Sun's heliospheric current sheet [see supra SG301...].
Just like the spirals of galaxies and other solar systems, counterbalancing spiral arms form as the pressure differential of gravity causes the space lattice to curve triggering the Coriolis effect, starting rotation and polarizing the solar disc. Orthogonal to this disc, a toroidal pattern forms into the solar wind. All of this occurs according to universal harmonic laws, setting the stage for life.
Evolution is first and foremost a matter of harmonic patterning in a containment field, regardless of whether the container is a body or structured space." (Link)

## SG301.4.10 Cousto - The Planetary Tones

A popular theory about the "planetary musical tones" has been advanced in 1978 by Hans Cousto and dubbed the Cosmic Octave. These notes arise when the reciprocal of the orbital periods in seconds is equated to a frequency and transposed into a "note" by means of octavation (the continuous division by 2 into the audible range of sound).

Example: the octave-tone of the rotation of Earth. Period: 1 day ( 24 hours $\mathbf{~} 60$ minutes .60 seconds $=86,400$ seconds). The frequency of the rotation of Earth around its own axis: $1: 86,400$ seconds $=0.000011574 \mathrm{~Hz}$ (cycle per second). This frequency multiple doubled into the middle of the audible range: $0.000011574 \mathrm{~Hz} \times 2^{24}=194.18 \mathrm{~Hz}$ ( $2^{24}$ means 24 -fold doubling).

Based on the law of octave, Cousto thus defines base tones for all planetary bodies, together with their associations of color, rhythm, chakra and effect. Tuning forks and a variety of musical instruments have been created to sound and share these planetary tones. But are they really accurate or just feeding a basic human need to feel connected with the planets?

The basic principle \& mathematics seem straightforward enough but, as noted by Hartmut Warm and others, firstly Cousto takes for granted the reference keynote of $A=432 \mathrm{~Hz}$, which is a cultural convention [-SG201]. In addition, Cousto used the values of the orbital periods - which Kepler himself had rejected long ago as unsuitable to point to the harmonic ratios of the solar system. Thirdly, a simple graph of the "planetary tones" compared to the musical ratios (below) does not show convincing resonance.


个 A set of "planetary" tuning forks.


"The question has to be asked, whether and how strongly the assumed planetary harmonies differ from a random distribution. Thus, in a series of numerical proportions, which can be derived from parameters such as distance, velocity etc..., you will always find several that come close to musical intervals like $2 / 1,3 / 2$ etc. To avoid a detailed mathematical discussion a simple graphic immediately illustrates the issue." (Hartmut Warm)
$\leftarrow$ This graph shows the frequencies - transposed into a single octave - that are derived from the reciprocal values of the revolution periods (the notes of a planetary scale according to Hans Cousto). The horizontal lines show the musical intervals, and it is obvious, that only $\mathbf{3}$ out of 9 planetary proportions come anywhere close to the musical ones. Even without further calculation we can see that there is no deviation from a random distribution. (H. Warm)

Dan Sewell Ward is another of the new breed of Galactic Renaissance Humans. Holding (there is not much else to do with them, as he says) degrees in Nuclear Physics \& Engineering, Dan has developed, within the larger framework of his visionary Halexandria Foundation, the encyclopedic online Library of Halexandria: www. ialexandria.org (see the site map for contents).

In his article "Harmony of the Spheres", Dan goes into the mathematical details of the "golden" relationships between planetary bodies...
"The planets and other bodies of our Solar System have profound interrelationships which go far beyond simple Newtonian gravitational analysis. These interdependencies include elements of electromagnetism, specific orbital geometries, quantum-style laws, and other intriguing characteristics. For example, viable theories of Quantum Physics (specifically: Superstrings, Zero-Point Energy, Vacuum Polarization, and Superconductivity) have now been shown to depend upon hyperdimensions (i.e. extra dimensions in addition to the traditional 3 dimensions of space and one dimension of time commonly thought of as comprising the space-time continuum). The components of the Solar System, as well as their combined effect, may also depend upon such hyperdimensions.

The planets of our solar system (as well as the satellites of these same planets and many of the other denizens of the deep space) have several unique mathematical relationships which are often ignored in astronomy textbooks. Such textbooks invariably include a discussion of Bode's Law -- a thoroughly discredited attempt to fit the distances from the sun to the planets into a coherent scheme. Bode's Law is a linear based rule (as opposed to cyclical) and ignores the variable distances of each of the planets as they circle the sun in elliptical patterns -- their actual distances varying significantly. And yet Bode's Law is still part of astronomy's tradition, while the really interesting stuff is ignored."

The really "interesting stuff" is compiled by Dan in a series of tables with commentaries. We show here $\boldsymbol{\rightarrow}$ Table \#3.

Dan Ward's conclusion:
"Slowly but surely it should be more and more apparent that these 'coincidences' can not be thought of as random events. Clearly, all of the planets (and an occasional comet) are profoundly connected via the Golden Mean, and in a sufficiently strong fashion that one must assume that physical forces are requiring some form of quantum limits to stable orbits."

## SG301.4.11 Ward - Phi Solar Resonances



T Dan Ward's Table \#3. Below are some of his comments about this table.

- Considering the Golden Mean connections in Table 3, along with the correlation of the orbital periods, the 3 outermost planets appear to be obeying some physical law in which they move in essential harmony with one another. The comet-in-a-planetary-orbit Chiron then connects these 3 (via Pluto) to Jupiter, with Jupiter subsequently passing the torch to Earth. In the process, Ceres (the largest-by-far asteroid) is also included in the equations. Even tiny Mercury, closest to the Sun (while Pluto is the furthermost), gets involved. In this regard, equation 7 in Table 3 needs some additional clarification, i.e., not only does a 5-pointed star connect Earth and Mercury's mean orbits, but it also connects their physical sizes (as given by their radii)! Orbital period and planetary size!
- As Martineau observed, not only does Earth have a Golden Mean connection to the planet furthermost from Earth in the direction of the Sun, but Earth also has a similar connection to Saturn, the visible planet furthermost from the Earth in the direction away from the Sun. In this case, Saturn's mean orbital distance and physical size are both approximately $\mathbf{4 \Phi}+\mathbf{3}$ times that of Earth. These observations, as shown by Martineau's 5 -pointed and 30-pointed stars, are important, and must not be dismissed as some random occurrence.
- It is important to note that equations 1 and 2 have in common ten $(5 \times 2)$ circle geometries, while equations 3 and 5 result from nested 5-sided pentagons. Equations 4 and 7 result from a 5-pointed star, and equation 6 results from two nested 5-pointed stars. The 5-pointed stars and pentagons also inevitably involve the ratio of $\cos 36^{\circ} / \sin 18^{\circ}$, which is equivalent to $\boldsymbol{\Phi}^{2}(\mathbf{0 . 0 0 0 0 0 1 4 \%}$ error). We might also observe that equation 7's ratio of the Earth/Mercury orbits (i.e. 2.5840), when squared, equals 6.6769. This is equivalent to ( $0.47 \%$ error): $3(\Phi+1 / \Phi)=3 \sqrt{ } 5$. Remember the intimate Golden Mean connection between $\Phi$ and/or $1 / \Phi$ and $\sqrt{ } 5$.
- Not shown in these Tables is the dodecahedron which relates Mercury and Earth - as well as

Venus and Mars - and the icosahedron relationship between Earth and Mars.

## SG301.4.12.1 Harris - Spira Solaris (1)

We are presenting in the following pages the remarkable investigation of the Solar System by John N. Harris. Following on the neglected solar system researches of American mathematician Benjamin Peirce (1809-1880), Harris found within the solar system exponential planetary frameworks based on Phi and the Phi series. This research is fully shared in the website www.spirasolaris.ca, with entries starting in 1997 and regularly updated to present time. All tables and comments in quotes are from the website of John N. Harris.

Considering the failure of the ad hoc "Bode's Law" and the lack of an overall explanation for the structure of the Solar System as a whole, John Harris set out to seek a wider and more pertinent approach to this quest - specifically an approach that: 1. avoids preconceptions and $a d$ hoc methodologies, and 2 . incorporates an increased planetary database beyond the mean heliocentric distances alone, using all the new contemporary data.
"It should also be emphasized that the Golden Ratio was not a pre-determined goal in the present series of essays. As the first three sections demonstrate, the investigation stems entirely from the rejection of Bode's "law" and the resulting need to develop a more workable approach to the structure of the Solar System. Simply stated, a mathematical problem concerning mean planetary periods results in the determination of a constant of linearity that somewhat surprisingly turns out (via the quadratic equation: $k 2-k-1$ $=0$ ) to be the Golden Ratio: Phi $=1.6180339887949$. Moreover, and also as a direct consequence of the applied methodology, the resulting exponential planetary framework and associated spiral is necessary based on the larger constant Phi $2=$ 2.6180339887949."
"The Solar System is Pheidian in Form and Phyflotactic in Nature"

| PLANETS | Fraction | B.Peirce | Sol.System | Ratios 1 | Ratios 2 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| NEPTUNE | $1 / 1$ |  | $\mathbf{1 6 4 . 6 2 4 2 3}$ | $\mathbf{1 6 4 . 8 8 3 6 6}$ | (Peirce 1857) |
| (Sol.System) |  |  |  |  |  |
| Synodic | $1 / 1$ | $\mathbf{1 6 4 . 6 2 4 2 3}$ | $\mathbf{1 7 1 . 5 3 8 9 9}$ | 1.00000000 | 0.96120222 |
| URANUS | $1 / 2$ | $\mathbf{8 2 . 3 1 2 1 1 5}$ | $\mathbf{8 4 . 0 7 2 7 4 6}$ | 2.00000000 | 2.04036380 |
| Synodic | $1 / 2$ | $\mathbf{4 1 . 1 5 6 0 5 7}$ | $\mathbf{4 5 . 3 3 4 0 1 6}$ | 2.00000000 | 1.85451795 |
| SATURN | $2 / 3$ | $\mathbf{2 7 . 4 3 7 3 7 2}$ | $\mathbf{2 9 . 4 5 2 5 2 0}$ | 1.50000000 | 1.53922368 |
| Synodic | $2 / 3$ | $\mathbf{1 8 . 2 9 1 5 8 1}$ | $\mathbf{1 9 . 8 8 1 3 2 4}$ | 1.50000000 | 1.48141640 |
| JUPITER | $3 / 5$ | $\mathbf{1 0 . 9 7 4 9 4 9}$ | $\mathbf{1 1 . 8 6 9 2 3 7}$ | 1.66666667 | 1.67502965 |
| Synodic | $3 / 5$ | $\mathbf{6 . 5 8 4 9 6 9 2}$ | 7.5126833 | 1.66666667 | 1.57989317 |
| CERES | $5 / 8$ | $\mathbf{4 . 1 1 5 6 0 5 7}$ | $\mathbf{4 . 6 0 0 6 7 0 0}$ | 1.60000000 | 1.63295419 |
| Synodic | $5 / 8$ | $\mathbf{2 . 5 7 2 2 5 3 6}$ | $\mathbf{3 . 1 8 1 2 8 1 5}$ | 1.60000000 | 1.44616878 |
| MARS | $8 / 13$ | $\mathbf{1 . 5 8 2 9 2 5 3}$ | $\mathbf{1 . 8 8 0 7 6 5 6}$ | 1.62500000 | 1.69148222 |
| Synodic | $8 / 13$ | $\mathbf{0 . 9 7 4 1 0 7 9}$ | $\mathbf{0 . 9 1 4 2 2 2 2}$ | 1.62500000 | 2.05723024 |
| VENUS | $13 / 21$ | 0.6030192 | $\mathbf{0 . 6 1 5 1 8 6 1}$ | 1.61538462 | 1.48609046 |
| (Synodic) | $13 / 21$ | $\mathbf{0 . 3 7 3 2 9 7 6}$ | 0.3957939 | 1.61538462 | 1.55430906 |
| MERCURY | $21 / 34$ | 0.2305661 | $\mathbf{0 . 2 4 0 8 4 2 5}$ | 1.61904762 | 1.64337269 |
|  |  |  | AVERAGES: | $\mathbf{1 . 6 1 6 6 5 3 5 8}$ | $\mathbf{1 . 6 1 7 3 7 5 3 2}$ |
| START: Mean Period of Neptune |  | $21 / 13 \mathbf{1 . 6 1 5 3 8 )}$ | $\mathbf{5 5 / 3 4} \mathbf{1 . 6 1 7 6 4 )}$ |  |  |

个 Spira Solaris - Table \#1: Benjamin Peirce's Phyllotactic Divisors
"Modern values for the mean sidereal periods and the calculated synodic periods for the planets are given in the Sol.System column. A second comparison lists the ratios for each step followed by the average values obtained from each column. As can be seen, the latter are close to Fibonacci ratios of $21 / 13$ and $55 / 34$ with resulting Pheidian ( $\Phi$-related) approximations of 1.61665353 and 1.61737532 respectively despite the variance in the individual ratios.

| PLANETS | Distance | Period | Velocity | Mass | Ang.M | (e) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| THE FOUR TERRESTRIAL PLANETS |  |  |  |  |  |  |
| MERCURY | 0.387099 | 0.240842 | 1.607271 | 0.055274 | 0.034390 | 0.20533 |
| VENUS | 0.723332 | 0.615186 | 1.175794 | 0.814997 | 0.693146 | 0.00677 |
| EARTH | 1 | 1 | 1 | 1 | 1 | 0.01671 |
| MARS | 1.523666 | 1.880766 | 0.810131 | 0.107447 | 0.132629 | 0.09340 |
| THE ASTERIOD BELT / Mars-Jupiter Mean / "Ceres" |  |  |  |  |  |  |
| THE FOUR GAS GIANTS |  |  |  |  |  |  |
| JUPITER | 5.203336 | 11.86924 | 0.438388 | 317.892 | 725.138 | 0.04849 |
| SATURN | 9.537070 | 29.45252 | 0.323812 | 95.1680 | 293.899 | 0.05551 |
| URANUS | 19.19126 | 84.07275 | 0.228270 | 14.5590 | 63.7798 | 0.04629 |
| NEPTUNE | 30.06896 | 164.8837 | 0.182365 | 17.2380 | 94.5249 | 0.00899 |

## T Spira Solaris - Table \#2: Planetary Data

"The starting point is the accepted division of the 9 planets into two primary groups (excluding Pluto for now): the 4 terrestrial planets and the 4 gas giants. The accepted values for the main parameters defining the various planets are listed: mean heliocentric distance (in Astronomical Units or "A.U."), period of revolution (in years), velocity, mass (including satellites \& atmospheres), angular momentum and eccentricity."

| N | Planets | Periods T, | X | Fn | Products | RZ Triple |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5 | Jupiter | 11.09017 | 3 |  | 33.27051 |  |
| 4 | Synodic S <br> Ceres | $\begin{aligned} & 6.854102 \\ & 4.236068 \end{aligned}$ | $\begin{aligned} & 5 \\ & 8 \end{aligned}$ | "34" | $\begin{aligned} & 34.27051 \\ & 33.88854 \end{aligned}$ | 3:5:8 |
| 3 | Ceres | 4.236068 | 5 |  | 21.18034 |  |
| 2 | Synodic S | 2.618034 | 8 | "21" | 20.94427 | 5:8:13 |
| I | Mars | 1.618034 | 13 |  | 21.03444 |  |
| 1 | Mars | 1.618034 | 8 |  | 12.94427 |  |
| 0 -1 | Synodic S | $\begin{aligned} & 1.000000 \\ & 0.618034 \end{aligned}$ | 13 21 | "13" | $\begin{aligned} & 13.00000 \\ & \mid 2.97871 \end{aligned}$ | 8:13:21 |
| -I | Venus | 0.618034 | 13 |  | 8.034442 |  |
| -2 | Synodic S | 0.381966 | 21 | "8" | 8.021286 | 13: 21:34 |
| -3 | Mercury | 0.236068 | 34 |  | 8.026311 |  |
| -3 | Mercury | 0.236068 | 21 |  | 4.957428 |  |
| -4 | Synodic S | 0.145898 | 34 | "5" | 4.960533 | 21:34:55 |
| -5 | Imo | 0.090170 | 55 |  | 4.959347 |  |
| -5 | Imo | 0.090170 | 34 |  | 3.065778 |  |
| -6 | Synodic S | 0.055728 | 55 | "3" | 3.065045 | 33: 55: 89 |
| -7 | Inner 2 | 0.034442 | 89 |  | 3.065325 |  |
| -7 | Inner 2 | 0.034442 | 55 |  | 1.894302 |  |
| -8 | Synodic S | 0.021286 | 89 | "2" | 1.894475 | 55:89:144 |
| -9 | Inner 3 | 0.013156 | 144 |  | 1.894409 |  |
| -9 | Inner 3 | 0.013156 | 89 |  | 1.170850 |  |
| -10 | Synodic S | 0.008131 | 144 | "I" | 1.170809 | 89:144:233 |
| -II | Inner 4 | 0.005025 | 233 |  | 1.170825 |  |
| -11 | Inner 4 | 0.005025 | 144 |  | 0.723600 |  |
| -12 | Synodic S | 0.003106 | 233 | "I" | 0.723609 | 144:233:377 |
| -13 | Inner 5 | 0.001919 | 377 |  | 0.723606 |  |
| Synodic Periods \& multiples in Years <br> X Factors (Planets) X Factors (Synodics) |  |  |  | Fibonacci "Periods" in Years (rounded) Resonant Fibonacci Triples |  |  |
|  |  |  |  |  |  |  |


| N | Planets | Periods T, | X | Fn | Products | RZ Triple |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 11 | Neptune | 199.0050 | 1 |  | 199.0050 |  |
| 10 9 | Synodic S <br> Uranus | $\begin{aligned} & 122.9919 \\ & 76.01316 \end{aligned}$ | $\begin{aligned} & 1 \\ & 2 \end{aligned}$ | "144" | $\begin{array}{r} 122.9919 \\ 152.0263 \end{array}$ | 1:1:2 |
| 9 | Uranus | 76.01316 | 1 |  | 76.01316 |  |
| 8 | Synodic S <br> Saturn | $\begin{aligned} & 46.97871 \\ & 29.03444 \end{aligned}$ | 2 3 | "89" | $\begin{aligned} & 93.95743 \\ & 87.10333 \end{aligned}$ | 1:2:3 |
| 7 | Saturn | 29.03444 | 2 |  | 58.06888 |  |
| 6 5 | Synodic S \|upiter | $\begin{aligned} & 17.94427 \\ & 11.09017 \end{aligned}$ | 3 5 | "55" | $\begin{aligned} & 53.83282 \\ & 55.45085 \end{aligned}$ | 2:3:5 |
| 5 | Jupiter | 11.09017 | 3 |  | 33.27051 |  |
| 4 | Synodic S <br> Ceres | $\begin{aligned} & 6.854102 \\ & 4.236068 \end{aligned}$ | $\begin{aligned} & 5 \\ & 8 \end{aligned}$ | "34" | $\begin{aligned} & 34.27051 \\ & 33.88854 \end{aligned}$ | 3:5:8 |
| 3 | Ceres | 4.236068 | 5 |  | 21.18034 |  |
| 2 | Synodic S <br> Mars | $\begin{aligned} & 2.618034 \\ & 1.618034 \end{aligned}$ | $\begin{gathered} 8 \\ 13 \end{gathered}$ | "21" | $\begin{aligned} & 20.94427 \\ & 21.03444 \end{aligned}$ | 5:8:13 |
| Synodic Periods \& multiples in Years <br> X Factors (Planets) X Factors (Synodics) |  |  |  | Fibonacci "Periods" in Years (rounded) Resonant Fibonacci Triples |  |  |
|  |  |  |  |  |  |  |

$\uparrow$ Spira Solaris - Table \#4: The Phi-Series Outer Planets Periods, Resonant Triples and Departures.

| PLANETS <br> Synodics | $\begin{array}{lc}\text { LUCAS } & \text { PHI-SERIES } \\ \text { Series } & \text { Periods }\end{array}$ | PHI-SERIES PERIOD Decomposition | FIBON. <br> Series |
| :---: | :---: | :---: | :---: |
| MARS | 1.618033989 | $\varnothing^{1}=1 \varnothing+0 \varnothing^{2}$ | 1 |
| Synodic | $3 \Rightarrow 2.618033989$ | $\varnothing^{2}=0 \varnothing+1 \varnothing^{2}$ | 2 |
| M/J GAP | $4 \Rightarrow 4.236067977$ | $\varnothing^{3}=1 \varnothing+1 \varnothing^{2}$ | 3 |
| Synodic | $7 \Rightarrow 6.854101966$ | $\varnothing^{4}=1 \varnothing+2 \varnothing^{2}$ | 5 |
| JUPITER | $11 \Rightarrow 11.09016994$ | $\varnothing^{5}=2 \varnothing+3 \varnothing^{2}$ | 8 |
| Synodic | $18 \Rightarrow 17.94427191$ | $\varnothing^{\mathbf{6}}=3 \boldsymbol{\square}+5 \varnothing^{2}$ | 13 |
| SATURN | $29 \Rightarrow 29.03444185$ | $\varnothing^{7}=5 \varnothing+8 \varnothing^{2}$ | 21 |
| Synodic | $47 \Rightarrow 46.97871376$ | $\varnothing^{8}=8 \varnothing+13 \varnothing^{2}$ | 34 |
| URANUS | $76 \Rightarrow 76.01315562$ | $\varnothing^{9}=13 \varnothing+21 \varnothing^{2}$ | 55 |
| Synodic | $123 \Rightarrow 122.9918694$ | Ø ${ }^{10}=21 \varnothing+34 \varnothing^{2}$ | 89 |
| NEPTUNE | $199 \Rightarrow 199.0050250$ | $\varnothing^{11}=34 \varnothing+55 \varnothing^{2}$ | 144 |

T Spira Solaris - Table \#5: Lucas Series, PhiSeries Periods, Phi-Series Decomposition and

## SG301.4.12.3 Harris - Spira Solaris (3)



## I Spira Solaris - Table \#6: Jupiter-Saturn-Uranus-Neptune real-time Fibonacci Resonances I, 1890-1990.

Table \#4 "shows the superior planet resonances in real-time in terms of the Fibonacci series (and like multiples) utilizing the methods of Bretagnon and Simon (1986) \& adapted to time-series analysis.
This table includes Fibonacci multiples and divisions and also shows in one form or another the resonant triples in the sequential forms: 1:1:2, 1:2:3 and 2:3:5."

## John N. Harris concludes:



## T Spira Solaris - Table \#7: Phyllotactic Resonant Triples in the Solar System.

Table \#6 shows that "the resonant periods obtained from Solar System mean values essentially follow the Fibonacci series from its beginning values out to the number 34 (i.e.,1, 1, 2, 3, 5, 8, 13, $\mathbf{2 1 , 3 4}, .$.$) . Thus, for the four superior planets Neptune, Uranus, Saturn and Jupiter, the first$ Fibonacci resonant sequence [ $1: 1: 2$ ] is followed by [1:2:3] then [2:3:5] and so on down to the last resonant triple [13:21:34] between Venus and Mercury.

Although it is the synodic cycle that binds each individual pair, it is clear from the resonant triples and the lower right insert that the middle number of the first triple (the number of Neptune-Uranus synodics) is the same as the first value of the next triple (the number of sidereal revolutions of Uranus), and that the last value of the first triple (also the number of revolution of Uranus in the first set) is the middle value of the next (i.e., the numbers of Uranus-Saturn synodics) and that this is a consistent pattern that links the resonant triples throughout."
"The implications and ramifications of a phyllotactic Solar System generate complex questions. If the Solar System is indeed phyllotactic, then there are wider implications concerning the nature of not only "Life" as we understand it, but the nature of Humankind, our current behavioral traits and our role in the general scheme of things... Where might we be today if the implications of the phyllotactic side of the matter introduced in 1850 by Benjamin Peirce had at least been allowed to filter into the mainstream of knowledge with its wider, all-inclusive perspective concerning "life" as we currently understand it? The realization, perhaps, that we may indeed belong to something larger than ourselves, and that as an integral, living part of the Solar System rather than an 94 isolated destructive apex, that we should conduct ourselves with more care and consideration towards all forms of life..." (John N. Harris)

## SG301.4.13.1 Warm - Signatures of the Spheres (1)

In Hartmut Warm, a German engineer and researcher, we now have our own Johannes Kepler. Warm's research was released in Germany in 2001 (Die Signatur der Sphaeren. Keplerstern Verlag) and translated in English in 2010 (Signature of the Celestial Spheres. Sophia Books.)

Warm established the musical structure of the Solar System with rigorous mathematics and beautiful diagrams, proving once again the classical quote: "... there is not the smallest orb but in his motion like an angel sings". A true "symphony of flowers and stars" is revealed in the harmonious interplay of the inner and outer planetary systems. Visit the website: www.keplerstern.com

The revealing discovery was to consider, for the first time, the data of the semi-minor axes of the planetary ellipses, rather than the other parameters used previously. The result is a clear geometric structure, that is further divided by ratios of small integers. The differences from the real values amount to only a few thousandths, except for the intervals $8 / 3$ and $3 / 2$ (slightly more than $1 \%$ ).

Presenting the work of H. Warm, the next pages consider the solar system as a whole, while the next chapter shows diagrams of planetary relationships as harmonic dances.

$\uparrow$ Geometry of the ellipse.


个 Diagram \#1: simple relationships of planetary orbits, symbolized by circles.

- The 1st and the 4th planet, counted from the inside as well as from the outside, are in a ratio of 4:1, relative to their semi-minor axes.
- The 1st and 6th (from inner and from outer) planets show the proportion 25:1.
- Earth / Mars = 3:2. - Saturn / Mars = 25:4. - Earth / Mercury = 8:3
- Uranus divides the region Saturn - Pluto in the octave ratio 2:1.
-Uranus divies the regin Saturn - Pluto in the octave ratio 2:1.
"The four mirrored intersecting main circles manifest a well-ordered structure. So clearly there cannot be but a deeper reason for it." Hartmut Warm.

$$
\text { Astronomical data used }
$$

Planetary positions and data from Mercury to Neptune used in "Signature of the Celestial Spheres" have been calculated according to the VSOP Planetary Theory (Variations Seculaires des Orbites Planetaires, long-term variations of the planetary orbits) developed by P. Bretagnon of the Bureau des Longitudes in Paris and published in 1982, revised for practical application in 1987 in collaboration with $\mathbf{G}$. Francou (many thanks from the author).
The data and calculation procedures needed for application of the VSOP Theory may be found (in a somewhat abbreviated form) in "Astronomical Algorithms" by Jean Meeus. These excellent publications make it possible in principle for anyone to calculate the planetary orbits for periods of several thousands of years to a fantastic degree of accuracy (< one arcsecond $=1 / 3600$ degree) with the use of a simple laptop.

## SG301.4.13.2 Warm - Signatures of the Spheres (2) Solar Arbelos

When looking at Warm's diagrams with a sacred geometer's eye, one can immediately see popping out nested and reciprocal Phi Arbelos figures. [ $\boldsymbol{\text { SG104] }}$
The appearance of the Golden Arbelos in the solar system is the tale-tell sign of a harmonic system - just like it appears in art, music, biology
and atomic/molecular systems.

\& Golden Ratio Arbelos in the radii of the hydrogen atom.
"The bond length of the hydrogen molecule is the diagonal of a square on the Bohr radius and hence also has two Golden sections, which form the cationic and anionic radii of hydrogen."

Raji Heyrovska. Link.

## SG301.4.13.3 Warm - Signatures of the Spheres (3) Solar Arbelos



个 Warm's diagram \#2. Intervals of the orbital periods (dotted) and the semi-minor axis of the planets (Mercury to Pluto). More symmetries.

In his diagram \#2, H. Warm looks at the 3 planets not included in the geometric ordering of diagram \#1: Venus, Neptune and Jupiter.

- Jupiter / Saturn =~5:2
- Jupiter / Earth = ~12:1
- Neptune / Pluto = 3:2
- Earth $/$ Uranus $=12 \times 7: 1$
- Jupiter / Mercury =~7²:1
- Jupiter / Uranus = 7:1
- Neptune / Jupiter = 14:1
- Earth $/$ Venus = 13:78
- Jupiter / Earth x Uranus / Jupiter = Uranus / Earth = $7 \times 12=84$

$\downarrow$ Fractal nesting of Phi Arbelos figures.


个 Robert Fludd's Cosmic Monochord. 1617.
An uncanny similarity to Warm's diagram.


## SG301.4.13.4 Warm - Signatures of the Spheres (4) Solar Harmonic Tree

Bypassing H. Warm's extensive explanations and mathematical proofs, we are sharing the two most graphic diagrams bringing together Warm's conclusions. The first diagram is what could be called "The Solar System Harmonic Tree" (left and below). The other diagram is a harmonic vortex mandala view of the harmonic ratios within the Solar System (next page - "The Solar Mandala"). We are quoting Warm - as even the comments to the diagrams are technical.

Comments by H. Warm on the The Solar System Harmonic Tree.
"This diagram reveals the truly architectural beauty of planetary conjunction ratios; above all it gives a voice to the fundamental themes, the Cross and the Pentagram, which have appeared again and again in the course of our investigations...

Order in the outer planetary system is governed by the conjunction relationship of Jupiter, Saturn and Neptune. By means of their various configurations, and in very resonant ways, these planets form diverse 12fold figures, some of which are exceedingly beautiful. Uranus is included here, too, because at 3 -fold conjunctions of the others its positions (in connection with Neptune) yield a geometric sequence which is also regulated by the number 12. Moreover, in the dynamic of the overall system, embodied by the movement of the Sun around the barycenter, this 12-fold order also emerges when the solar middle point is plotted at Jupiter/Saturn oppositions which are so decisive with regard to the balance of the system. (...)"

- Conjunction relationships between, in each case, depicted by means of triangles and numbers of the same color.

Small inset $\gg$
"The planet closest to the Sun, Mercury, is linked to one inner and one outer planet through the numbers 3 and 4. The integration of Neptune leads, in combination with the $\mathbf{2}$ inner planets, to the sum of those numbers, while, in combination to the $\mathbf{2}$ outer planets, it leads to their product. All the figures linked to the number 5 then arise through the inclusion of the 3rd planet from the centre, Earth, and the 3rd from the periphery, Uranus.
And finally Pluto, the most distant planet from the Sun, plays its part by means of a doubling of the numbers brought to bear by its opposite, Mercury. The numbers 2, 9 and 24 are also evidently situated at their correct locations.


## SG301.4.13.5 Warm - Signature of the Spheres (5) Solar Mandala (1)

The 2 diagrams by H. Warm that are shown below and next page are summing up extensive \& complex data about the geometric relationships displayed within the solar system. You can look up the technical details pp. 264-295 of Signature of the Celestial Spheres. Otherwise, just enjoy these two renditions of the Solar System as a pulsing, living mandala.


$\uparrow$ Ordering of the semi-minor axes and the Sun's diameter. (Plate 15 in Signature...)
"Squares, circles and triangles are the invisible symbols written in the sky which so impressively embody the mysterious order that exists in our solar system." (H. Warm).
"The universe is written in the language of mathematics and its symbols are triangles, circles and other geometrical figures without which one does not understand a word, without which one wanders through a dark labyrinth in vain". (Galileo Galilei)

## SG301.4.13.6 Warm - Signature of the Spheres (6) Solar Mandala (2)

\& • "We have allocated the common structural principle laid down in the 12pointed star-figure to the Sun (inmost circle) as being the source of all things in our planetary system.

- Venus is shown as a dodecagon.
- For Earth, we chose a construction involving a hexagon.
- In order to combine the various regions (of the solar system), Mercury, Earth, Mars , Saturn and Pluto have been included both as circles and as squares of the same area. The quadratures needed are shown in each case by the white gaps at the edges and by dotted lines.
- Neptune appears as a circle and a triangle (green).
- The outer dark blue ring marks the region, bordering on the stars, of Pluto's from the semi-major axis to the aphelion. That is to say that the whole of Pluto's sphere (from aphelion to perihelion) can also be approximated by the interval 1.666... constructed via decagon, hexagon and pentagon."

$\uparrow$ Combination of the ratios of the semi-minor axes, construction by means of circle, square and triangle.
From left to right: outer region, Saturn/Mars, Jupiter/Earth, inner region.


## SG301 Chapter 5. Planetary Partner Dances



Traditionally, numbers, music, geometry and astronomy were various aspects of the same and unique universal harmony. This was the primordial knowledge of the Quadrivium. The planets were dancing to the tune of geometry and music harmonics, as Kepler endeavored to prove.

Chapter 5 starts with examples of the main musical chords as embedded in the area ratios of simple geometric figures: circle, triangle, square, pentagon, hexagon. Traditional geometric examples are given as applied to planetary orbital relationships, followed by the update of Hartmut Warm based on the semi-minor axes.

The solar system now appears like a playful dance and partner yoga studio where planets in various configurations (duos, trios, quatuors as well as the entire familial assembly) execute exquisite dances of harmonic togetherness. Diagrams and snapshots of these dances have been captured by various researchers. But Harmut Warm has assembled and published in 2001 a stunning collection of most extraordinarily beautiful mandala-like graphics of the solar system's harmonic/geometric choreography.

Kepler is now fully and magnificently validated.

## SG301.5.1.1 The Geometries of Harmonics (1)

It is a fact of existence that the combination of simple numbers and geometric figures gives rise to harmonic musical ratios. When the Pythagoreans discovered that the most consonant or most perfectly harmonic chord arises when the monochord is divided in the ratio of $2: 1$, they initiated and celebrated the wedding of mathematics (and physics) and the perennial sense of Beauty via the musical built-in sensitivity of human beings. It is akin to instant love between the traditional (and oftentimes opposed) nodes of awareness called the body and the soul. An impetus of cosmic wisdom was given, lost and retrieved many times, and is now found again... Poetic awe and wonder are coupled with a new scientific curiosity... The rediscovery of universal harmony reveals a profound oneness between seemingly disparate elements...

In $\Delta$ SG201.3, we gave basic pointers to the specific relationship between music and Sacred Geometry. Let us now enter the larger realm of Geometry and Harmonics. Pythagoras, in the West, became the first "scientist of harmonics" when he demonstrated a basic fact of cosmic physics: simple integer numbers (and their geometric expression in simple shapes, 2D or 3D) correlate directly with musical intervals (octave, fifth, fourth, major second and major third...).

The 3 pages on Harmonic Geometry are based on the diagrams \& explanations given by Harmut Warm (chapter 2 of Signature of the Celestial Spheres).

## The Octave 2:1

Consider this double fact:

1. The ratio between the areas of an outer circle which contains the 4 corners of a square and that of the inner circle inside it ("in-circle") is exactly $2: 1$.
2. The most consonant / harmonious musical interval, the octave, arises when one divides the string of an instrument in the ratio $2: 1$. We have seen the demonstration on the monochord [ <SG201].


个 The Octave of the Squared Circle


个 The double octave of the Circled Triangle
In an equilateral triangle, the ratio of the areas between the in-circle and the out-circle is $4: 1$ or double octave. Drawing the squares shows the two octaves. Triangle and squares are in perfect geometric AND musical harmony.

The right hand diagram shows a progression of intervals 4:2:1 created by squared circles while the triangle jumps over one octave to unite outer and inner circle. This is an example of the utter simplicity of cosmic beauty and of the delightful awe one experienced when first discovering it.

Take the time to contemplating such a diagram... This is the gift of Sacred Geometry... Allow a profound universal truth to penetrate your mind-body-soul awareness: the dance of circle, triangle and square in number and in shape, in geometry and in music, in space and in time, in matter and in energy... and in your own inner self...

## SG301.5.1.2 The Geometries of Harmonics (2)

The hexagon is the next "musical" geometric shape. It yields the fifth (3:2), the fourth (4:3) and the major second ( $9: 8$ ) musical intervals.

$\uparrow$ Fourth (4:3) in the hexagon.

Basic schooldays construction: inscribe a hexagon in a circle by reporting the radius 6 times around the circle. Now inscribe another circle within the hexagon (middle circle).

The area ratio of the outer circle and the middle circle is a musical fourth (4:3).

The inner circle is the in-circle of a square inscribed in the outer circle and thus outer and inner circle have an area ration of $2: 1$ or octave. (See diagram on the right for the dotted square).

$\uparrow 4$ primal yantra shapes.

From a Sanskrit treatise on mathematics. Ganita Kaumudi (1350).]

$\uparrow$ Fourth (4:3), Fifth (3:2) and Major Second (9:8) in the hexagon. (After HW)

Here we draw another hexagon inside the middle circle and an incircle within this second hexagon.

The circle inside the first hexagon (middle circle) and the inner circle have an area ratio of 3:2 or musical fifth.

The area ratio between the inner circle of the second hexagon and the inmost circle (inscribed within the dotted square) is 9:8 or musical major second.
"It is a universal human phenomenon that the octave, fifth and fourth are experienced as being harmonious and that singing and music-making involve their use."

$\uparrow$ Major 3rd (5:4) of pentagon and decagon.

1. Inner base circle. 2. Pentagon around base circle.
2. Outer circle (dotted). 4. Within this are 2 decagons. (HW)

$\uparrow$ Major 6th (5:3)
3. Basic circle (=1). 2. Circumscribed: hexagon and circle. 3. Circumscribed: pentagon and circle. 4. Inscribed: 2 decagon circles. (HW)

## SG301.5.1.3 The Geometries of Harmonics (3)

In an appendix (1.6) of his book, Hartmut Warm gives the geometric ratios of areas for $\mathbf{1 2}$ musical intervals. In the table below, the multiplication sign (*) means that each subsequent figure is circumscribed, while the division sign ( $/$ ) means that each subsequent figure is inscribed.

1. Octave $2: 1$
2. Fourth $4: 3$
3. Major Third 5:4
4. Fifth $3: 2$
5. Whole note 9:8
6. Major Sixth
7. Minor Sixth 8:5
8. Minor Third 6:5
9. Dim. Seventh 16:9
10. Major Seventh 15:8
11. Semitone 16:15
12. Tritone $45: 32$
circle * square* circle
circle * hexagon * circle
circle * pentagon * circle / decagon / circle / decagon / circle circle * square * circle / hexagon / circle
circle * square * circle / hexagon / circle / hexagon / circle $4 / 3 \times 5 / 4=$ hexagon $\times$ pentagon $/ 2$ decagons $=1.66666 \ldots$ circle / pentagon * 2 decagons * square * circle
circle / pentagon * 2 decagons * square / hexagon / circle circle * hexagon * hexagon * circle
circle * hexagon / pentagon * 2 decagons * circle
circle * square / hexagon / hexagon * pentagon / 2 decagons / circle circle * square / hexagon / hexagon * pentagon / 2 decagons / square


[^1]plan.et \'plan-ət\n[ME planete, fr. OF, fr. LL planeta, modif. of Gk planēt-, planes, lit., wanderer, fr. planasthai to wander; akin to ON flana to rush around] 1 : any of the seven celestial bodies sun, moon, Venus, Jupiter, Mars, Mercury, and Saturn that in ancient belief have motions of their own among the fixed stars $b$ (1) : one of the bodies except a comet, meteor, or satellite that revolves around the sun in the solar system (2) : a similar body associated with another star c: EARTH - usu. used with the 2 : a celestial body held to influence the fate of human beings 3 : a person or thing of great importance: LUMINARY


- In 1867, the American astronomer Daniel Kirkwood noticed that asteroids in the asteroid belt are not randomly distributed. There were distinct gaps in the belt at locations that corresponded to resonances with Jupiter. For example, there were no asteroids at the 3:1 resonance or at the 2:1 resonance. (Wikipedia).


## SG301.5.2.1 Dances of Orbital Periodicities (1)

Confirming the ancient world's knowledge about the "Music of the Spheres" as well as Johannes Kepler's intuition \& hypothesis about celestial harmonics, the Solar System indeed reveals itself as replete with beautiful harmonic mandalas formed, in space + time, by the dances of orbital resonance.

Resonance happens when any two periods have a simple numerical ratio. The most fundamental period for an object in the Solar System is its orbital period, and many orbital resonances have been observed and continue to be discovered at more complex levels of interaction and in longer cycles of time.

Because the inner planets orbits faster than the outer planets, interesting patterns evolve. Each planetary pairing has its own unique dance rhythm. These patterns of rhythmically "holding hands" and "sharing the same dance steps" between two planets are called "synods" (period between two successive conjunctions).

Five introductory examples are given on this page. They are reproduced, with the kind permission of John Martineau, from his delightful work "A Little Book of Coincidence" (Wooden Books, Walker \& Co. 1981).

\& The synod between Mercury and Venus = 145 days.

Their full
harmonic mandala dance is reached in 2030 days (see infra).


## SG301.5.2.2 Dances of Orbital Periodicities (2)

John Martineau, at the end of his Little Book of Coincidences, offers 36 mandala-like patterns illustrating the dances of orbital conjunctions (synods) between various members of the solar system.

We will see some of these patterns closer-up, along with other mandalalike renditions of the complex choreographies upon the solar system's harmonic stage. Various other researchers have plotted these dances but we will rely mostly on the revelatory work of Hartmut Warm.


## SG301.5.3 Sun, Moon \& Earth: 18, 19 \& PHII

The numbers 18 and 19 keep showing up in reference to the Sun, the Moon and the Earth (after Robin Heath):

- A famous family of eclipses is the Saros cycle = $\mathbf{1 8}$ years + $\mathbf{1 1}$ days = $\mathbf{2 2 3}$ lunations = 19 eclipse years.
- The eclipse year (346.62 days) = 11.738 lunations. Divide 19 eclipse years (the Saros) by 11.738 = $1.6186 \sim$ Phi.
- Because the eclipse year = $18.618 \times 18.618$ days, the Saros may be written: $19 \times 18.618 \times$ 18.618 days.
- 19 lunations $\sim$ Phi eclipse years $(19 \times 29.530=561.07$ and $346.62 \times 1.618=560.831)$. Note: lunation period $=\mathbf{2 9 . 5 3 0}$ days $/$ eclipse year $=346.62$ days).
- The combined motion of the line of the Moon's apsides and the nodal axis is $60^{\circ}$ per year, a remarkable coincidence causing the nodes and apsides to rendez-vous once more after 6 years (360). Three of these meetings take $18(6+6+6)$ years, coinciding almost exactly with the Saros cycle of $\mathbf{1 8 . 0 3}$ years.
- After 19 years, and within 2 hours of exactitude, the Sun and the Moon return to the same places in the sky, on the same date.
- For astronomy and calendar studies, the Metonic cycle is a period of very close to 19 years that is remarkable for being nearly a common multiple of the solar year and the synodic (lunar) month. The Greek astronomer Meton of Athens (fifth century BC) observed that a period of 19 years is almost exactly equal to 235 synodic months and, rounded to full days, counts 6,940 days. A mechanical computation of the cycle is built into the Antikythera mechanism.
- The Metonic cycle was used in the Babylonian calendar, ancient Chinese calendar systems (the "Rule Cycle") and the medieval computus (i.e. the calculation of the date of Easter). It regulates the 19-year cycle of intercalary months of the modern Hebrew calendar. The near commensurability of the two periods follows from the fact that 235/19 is the 6th convergent of the ratio of the lunar month and solar year periods (365.2425/29.53059). (Wikipedia / Wolfram.com)

19 solar years $(365.242$ days $)=6,939.60$ days.
235 lunations $=6,939.69$ days
Metonic cycle $=19 \times 18.618 \times 19.618=6,939.71$ days.

$\uparrow$ Tarot de Marseilles Moon (18) and Sun (19) cards. How and why did the creators of the Tarot pick these specific numbers: 18 \& 19?

$\uparrow$ Depiction of the 19 years of the Metonic cycle as a wheel. 9th century.


The current (ancient sources speak of a "pre-selenic" time when the Earth was "moonless" - see infra) Earth-Moon system is an amazing dance of harmonic relationships. Following on the steps of John Michell who put together his now famous "Earth-Moon diagram", many researchers have pointed to the following inter-harmonics:

- Earth radius $=3,960$ miles $=11 \times 360=33 \times 1 \times 2 \times 3 \times 4 \times 5$

Moon radius $=1,080$ miles $=3 \times 360$
Ratio of Earth $/$ Moon radii $=11 / 3=3.66$
Combined radii Earth + Moon $=5,040$ miles $=1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7=7 \times 8$ x $9 \times 10$

- A circle with radius 5,040 has a circumference $(\pi=22 / 7)$ of $\mathbf{3 1 , 6 8 0}$ miles. $=4 \times 7,920$ (the diameter of the Earth) = perimeter of the square containing the circle of the Earth.
- The perimeter of the hexagon circumscribed by the Earth $=\mathbf{2 3 , 7 6 0}$ miles (with $\pi=22 / 7$ ) = $1 /$ 10th the distance Earth-Moon ( $\sim 237,600$ miles). Per basic geometry, each of the 6 sides of the hexagon $=23,760 / 6$ $=3,960=$ radius of the Earth.
- Reversing the ratio $11 / 3$ into $3 / 11=.273$. The harmonic 273 shows up in the Moon's orbit around the Earth (every 27.3 days) and in the synodic rotation period of a sunspot (the time for a fixed feature on the Sun to rotate to the same apparent position as viewed from Earth $=27.27$ days). The closest / farthest distance ratio that Venus and Mars each experiences in the Mars-Venus dance is $\mathbf{3} / \mathbf{1 1}$. The Earth orbits between them.
- The proportions of the Earth-Moon system are a perfect representation of the ancient Sacred Geometry's teaching about "Squaring the Circle" (see next page).


## SG301.5.4.1 Earth - Moon (1) Ratios



个 Re-tracing of the classic Earth-Moon model by John Michell. He called it "the astronomical version of the New Jerusalem diagram" as he found in the EarthMoon system the same archetypal proportions as in Stonehenge. John Michell dubbed the common geometric blueprint "the New Jerusalem diagram". (See infra).

The Earth-Moon model is based on their relative dimensions. The Earth's radius $=\mathbf{3 , 9 6 0}$ miles; the Moon's radius $=1,080$ miles. The combined Earth + Moon radii $=\mathbf{5 , 0 4 0}$ miles (a highly significant "sacred number" [ SG202].

The perimeter of the (red) square $=4 \times 7,920$ miles (diameter of Earth) $=\mathbf{3 1 , 6 8 0}$ miles. The circumference of the (blue) circle $=2 \times 22 / 7$ $\mathbf{x} \mathbf{5 , 0 4 0}=\mathbf{3 1 , 6 8 0}$ miles. The Circle is Squared.

SG301.5.4.2 Earth - Moon
(2) Squaring the Circle



个 The Earth-Moon ratios nested in a larger Sacred Geometry matrix: Double Vesica and Double Square.

## Easy Squaring the Circle

1. Start with the Pythagorean 3-4-5 triangle (shaded). Trace a square on the " 3 " side and a symmetrical 3-4-5 triangle on the other side of the square. The baseline is now 11.
2. Trace a larger square ABCD , with side 11, on that baseline (red square).
3. With center $\mathbf{O}$, trace a circle cutting through the center H of the $3 \times 3$ square.
4. The perimeter of the red square ( $4 \times$ Earth's diameter $=$ $4 \times 7,920=31,680$ miles) and the circumference of the blue circle ( $2 \times 22 / 7 \times 5040=31,680$ miles) are EQUAL.

Note the ratio 3-11 between the diameters of the Moon \& Earth.


↔ The cross-section triangle (also called "Kepler's Triangle" [ SG104.4]) of the Great Pyramid (GP) not only displays PHI ratios but also fits the "Squared Circle" of Earth \& Moon.

- 5,040 miles = radius Earth + Moon = elevation GP $=\sqrt{ } \boldsymbol{\Phi}$.
$-3,960$ miles $=$ radius Earth $=$ half-base GP = 1 .
- 5,600 miles = distance equator Earth to center Moon = apothem GP = $\boldsymbol{\Phi}$

Verification: $5,040 / 3,960=1.272=\sqrt{ } \Phi$


## SG301.5.4.3 Earth Moon (3) "New Jerusalem" Diagram

$\uparrow$ Heptagonal geometry.
4 heptagrams $=28$ apices $=28$ phases of the moon.

British trail-blazer researcher John Michell has shared, in his many books, a Sacred Geometry diagram he called the "New Jerusalem of Ancient Cosmology". It is a syncretic mandala, a symbol of cosmic order on earth, bringing together, in a single scheme, the ancient science of proportion, the traditional canon of numbers and earth-commensurate measurements, the geomancy of temple building, the philosophy of cosmic harmony, the archetypal image of the Celestial City and the canonic ratios found in many sacred sites.

Based on the actual radii of the Earth and Moon and constructed with the 3-4-5 Pythagorean triangle, the "Cosmic Jerusalem" diagram is displaying so many synchronicities that they cannot just be "coincidences". This diagram points to the "cosmic canon", inherent in the solar system and every realm of nature, that was the foundation and secret of ancient sacred knowledge. It is, in John Michell's words, a "numerical image of the cosmos".

- 12 circles duplicate the moon and represent the 12 astrological signs and the 12 months of the Great Year (the Precession of the Equinoxes):

$$
25,920 / 12=2160=\text { diameter of the Moon (in miles). }
$$

- Radius of (black) circle (through the centers of 12 moon circles) $=\mathbf{5 , 0 4 0}$ miles, diameter $=10,080$ miles, circumference $($ with $\pi=22 / 7)=31,680$ miles $=$ perimeter of the (red) square (thus "squaring the circle").
- Diameter of (orange) circle A (inscribed in square) $=7,920$ miles $=$ diameter of Earth. 7,920 x $4=31,680$.
- The diagram accommodates every order of number up to 12 and can be divided up into the greatest number of integral parts. In the same way, it accommodates every order of geometry.

Earth/Moon numbers in the "72" Tribe [-SG201]
$3+4+5=12 \quad 3 \times 4 \times 5=60 \quad 6 \times 12=72 \quad 60+12=72$
$60 \times 12=720 \quad 1 \times 2 \times 3 \times 4 \times 5 \times 6=720$
$8 \times 9 \times 10=720$
$1.5 \times 720=1,080$ (radius Moon)
$3 \times 720=2,160$ (diameter Moon)
$4 \times 720=2,880 \quad 5 \times 720=3,600$
$7 \times 720=5,040$ (combined radii Earth + Moon)
$11 \times 720=7,920$
$2(2,880)+2,160=7,920$ (diameter Earth)

## SG301.5.5 The Moon-less Earth: a Hypothesis



个 This "Moon" Tarot card (owned by Charles VI) embodies the Golden Rectangle.

We take our good old Moon for granted. The Selenic influences (from tidal pulses to the feminine archetype) have been deeply imprinted in our experience on earth. Our human life seems to naturally occur "between Sun \& Moon", the luminaries of the day and the night.

However, the solar system has gone through quite a journey, from inexistence to its current and stable (for us) state. The origin of the Moon is debated among scientists who have offered different scenarios: Fission (Moon was ripped off the Earth), Capture (Moon was a wandering body), Co-accretion (Moon and Earth formed side by side) and - currently - Impact (Moon is left over from giant impact with Mars-size body). To this let us add the thought of a technological origin of the Moon, intentionally engineered \& "parked" where it is, for solar geomantic/harmonic reasons.

Curiously, quite a few antiquity sources are mentioning prehistoric times when the Earth was "moonless". [The quotes below are from: Dan Ward (link) and www.varchive.com]

- Democritus \& Anaxagoras taught that there was a time when the Earth was without the Moon.
- Aristotle wrote that Arcadia in Greece, before being inhabited by the Hellenes, had a population of Pelasgians, and that these aborigines occupied the land already before there was a moon in the sky above the Earth; for this reason they were called Proselenes.
- Apollonius of Rhodes mentioned the time "when not all the orbs were yet in the heavens, before the Danai and Deukalion races came into existence, and only the Arcadians lived, before there was a moon."
- Plutarch, in The Roman Questions, wrote: "There were Arcadians of Evander's following, the so-called pre-Lunar people."
- Ovid, in his elegiac poem Fasti, makes the following remark: "The Arcadians are said to have possessed their land before the birth of Jove, and the folk is older than the Moon."
- Hippolytus refers to a legend that "Arcadia brought forth Pelasgus, of greater antiquity than the moon."
- Lucian in his Astrology says that "the Arcadians affirm in their folly that they are older than the moon".
- Censorinus also alludes to the time in the past when there was no moon in the sky.
- In the 16th century, Giordano Bruno (1548-1600) wrote in De Immenso: "There are those who have believed that there was a certain time when the moon, which was believed to be younger than the sun, was not yet created...
Theodorus writes in his first book that the moon had appeared a little while before the war which was fought by Hercules against the giants. Aristochius and Dionysius Chalcidensis, in the first of their works, confirm the same."
- The Kalevala of the Finns recalls a time when the Moon was placed in orbit. (Rune III.35)
- This view is also held by South American Indians. A. von Humboldt in his Vues des Cordillères (1816) mentions that the Indians of the Bogota highlands relate some of their tribal reminiscences to the time before there was a moon. "In the carliest times, when the moon was not yet in the heavens..." (tribesmen of Chibchas.)

Can we just ignore these ancient sources? How would it feel to be "Moon-less"?


The geocentric orbit of Mercury 1961-1967
The numbers indicate the years belonging to different parts of the orbit. (The dash circle is the Sun's orbit).
(Joachim Schultz. Movement and Rhythms of the Stars).


SG301.5.6.1
Dances of
Mercury (1)


个 Mercury - Mars

$\uparrow$ Mercury - Ceres

$\uparrow$ Mercury - Jupiter


个 Mercury - Saturn

## SG301.5.6.2 Dances of Mercury (2)



Mercury - Venus: 240 days


Mercury - Venus: 770 days


Mercury - Venus: 2,030 days


Mercury - Venus
(Source: A Little Book of Coincidences. John Martineau. 2001)


Mercury - Earth 470 days


Mercury - Earth: 1,390 days


Mercury - Earth: 2,510 days


113


## Geocentric Venus orbit 1960-1968.

 Numbers show the position of Venus at the beginning of each year.The dash circle is the Sun's orbit.
(Joachim Schultz. Movement and Rhythms of the Stars).


Earth Year $=365.25$ days Venus Year = 224.7 days Earth $/$ Venus $=\Phi$


## SG301.5.7.1 Earth - Venus (1)

## Venus Harmonic Fifth Mandala

The sidereal period of Venus has a duration of . 615 tropical years ( $\sim$ PHI). Therefore, Sun-Venus conjunctions (as seen from Earth) take place at about the pentagon's 5 points on the ecliptic and the Earth-Venus dance returns to the original position after 8 Earth years.

## 8 Earth years = 13 Venus years. In 8 Earth Years, there are 5 Venus loops

(Note: 5, 8 and 13 are Fibonacci numbers).
The dance cycle is repeated every 8 years, in which time the points have shifted about 1.5 degrees. The Sun-Venus conjunction which takes place after 8 years at almost the same point is of the same kind: either an upper (Venus behind Sun) or a lower (Venus between Sun and Earth) conjunction again. After 4 years a conjunction of the opposite type takes place at the same point: after an upper one comes a lower one, and vice versa.
Within 8 years Venus has thus formed a 5-petaled mandala in the sky: Venus organizes the zodiac into 5 harmonic parts.


T The ratio between the Earth's outer orbit and Venus's inner orbit i given by a square. (H. Arrington).


The Venus - Earth mandala.

SG301.5.7.2 Earth - Venus (2)


## A magnificent celestial mandala

Venus - Earth linklines, continually plotted, with stepping interval of $\mathbf{3}$ days ( 1000 times). Scale in millions of km . The Sun is at the center of the coordinate plane. (Hartmut Warm).


个 Another rendition of the PHI dance between Earth and Venus. Howard Arrington programmed his computer to take the orbits of any two planets and draw a line between the two planet positions every few days. (http://ensign.editme.com/t43dances).


个 As explained by John Martineau: "The 5-fold nature of Venus \& Earth's dance extends to their closest and farthest distances from each other: Venus's perigee and apogee are defined by two pentagrams. The body of space one draws around the other is thus sized 1: $\Phi^{4 \prime \prime}$.


## SG301.5.8 Terraforming Futures - Mars \& Venus

Terraforming is the hypothetical process by which an un-hospitable planet's climate, surface and atmospheric composition would be deliberately altered to make large areas of the environment hospitable to humans.

Just for the fun of mind's expansion into new perspectives, we want to mention the vast area of applying harmonic geomancy and sacred geometry to schemes of terraforming Mars \& Venus.

First described in science fiction, the concept of terraforming was picked up by scientists such as Carl Sagan. Now, it is science reality: since 2014, the NASA Institute for Advanced Concepts (NIAC) program and 'Techshot Inc' are working together to develop sealed biodomes that would employ colonies of oxygen-producing cyanobacteria and algae for the production of molecular oxygen (O2) on Martian soil.



T↔Chris Wayan's
concept of a
terraformed Venus
in year 3000 .
[Link]

## SG301.5.9 Orbital Dances of Mars



Mars - Venus


Mars - Ceres
(Synodic diagrams by John Martineau)


Mars - Jupiter


The geometry of Mars - Jupiter

## Here is the diagram from Kepler's book:

DE MOTIB. STELLA MARTIS


Shown below is a diagram of the geocentric orbital path of Mars produced with modern computer software called Sirius:


M Mars - Earth
\& Mars - Saturn

## SG301.5.10 A Triadic Dance: Venus, Earth \& Mars

Venus, Earth \& Mars are in an exceedingly complex attunement. This can be called the VEM system.
Ancient tradition held that the God of War (Ares / Mars) mating with the Goddess of Beauty (Aphrodite / Venus) brought forth a child symbolizing the perfect balance between male and female. This legendary being was called Harmonia (Earth) and, presiding over the quality of concord / consonance, embodied cosmic order. Thus, the ancient cultures saw Earth as existing in a tension field between cosmic polar forces. [ SG102]. "What is opposed brings together: the finest harmony is composed of things in variance" (Heraclitus).


The numbers 3, 4 and 7 underscore the dance between the 3 "sister" planets, in what seems like a simple basic pattern: when all $\mathbf{3}$ are on one line at the beginning of a cycle (when they form a 3 -fold conjunction), Earth's two neighbors meet 7 times while Earth encounters the outer planet (Mars) 3 times and the inner planet (Venus) 4 times.
"This means that at every Venus / Earth encounter in a cycle Mars is situated opposite them (in opposition)". (HW)

Although the small variation from whole numbers creates a corresponding shift in the positions, "in summary, one can say that the 3 planets move in a rhythm that follows the beat of the Venus / Earth conjunctions: it is a $4 / 4$ beat with a strong accent on 1 and a somehow lesser emphasis on 3. This means that every second and even more so every fourth encounter of our planet with that of the goddess of love is likely to have an added significance". (HW)

The $\mathbf{3}$ synodic periods between Earth, Mars and Venus are (in days):
(1) Earth - Mars: 779.936
(2) Venus - Earth: 583.921
(3) Venus - Mars: 333.921

The mutual ratios of these 3 periods are:
(1) $/(2) \sim 4 / 3$
(1) / (3) $7 / 3$
$(2) /(3) \sim 7 / 4$
\& Venus, Earth and Mars at Venus / Mars (1) conjunction (65.5 years) and Venus / Earth (2, 3 \& 4) conjunction (64 years; 127.9 years; 255.8 years).
(HW)

SG301．5．11 The 3 Solar Gods：Jupiter，Saturn \＆Neptune

Approaching now the outer planets of the solar system，H．Warm notes that the number $\mathbf{1 2}$ is found in the various patterns of relationship between the planets Jupiter，Saturn and Neptune．The geometry of the conjunctions between the $\mathbf{3}$ central planets of the solar system shows the continuous 12－pointed figure constructed from joining every 5th vertex of the dodecahedron，the master Platonic Solid hailed by the ancients to contain the key to the cosmos．It holds true for the solar system and，as we will see in Chapter 7，for the entire observable universe．［For the symbolism of the archetypal number 12：\＆SG202］（Warm．p．264）

In the following pages，we are merely showing，for inspiration，some of H．Warm＇s diagrams that are pointing to the harmonic patterns occurring between the $\mathbf{3}$ main＂gods＂of the solar system． For all technical explanations，please refer to H．Warm＇s book：Signature of the Celestial Spheres．


Bringing Uranus into the picture will only confirm the hidden，albeit intuited，harmonic orchestration of the neighborhood we live in．

६＂Jupiter－centered view of Saturn at Earth／Saturn conjunctions， 900 times，beginning 11－19－2000， period 931，63 years＂．（HW）


个＜＂Linklines at Jupiter／Saturn conjunctions．Beginning c．4－5－4950 BC， 750 times，period 14，893．9 years＂．（HW）

Top：Jupiter－Neptune． Left：Saturn－Neptune．


个 Dances of of Jupiter，Saturn and Neptune．Namely the positions of the three planets at 362 conjunctions from A．D． 18 Nov． 0002 to 14 May 4617．Note the number 12．（HW）


个 The 12 Olympian gods of Greek mythology．


个 Diagram from Mysterium Cosmographicum (1597) showing the recurrence pattern of the conjunction of Saturn / Jupiter. The approximate triangle has been termed "Trigon" and was considered a major astrological event. It is this Trigon, visible in the sky, that convinced Kepler to start a search for geometrical patterns in the solar system.


个 A series of Great Conjunctions from Kepler's book De Stella Nova (1606).


T Current Trigons. H. Warm's diagram (2001) showing the positions of the Jupiter / Saturn conjunctions beginning June 23, 2000. Saturn orbit.

## SG301.5.12.1 Jupiter \& Saturn (1)

The most well-known pattern relationship between Jupiter \& Saturn was discovered long ago, as it is visible in the sky from the Earth: their triangular dance or Great Conjunction. Great conjunctions are less spectacular than eclipses or comets but they have attracted considerable attention as celestial omens. During the late Middle age and the Renaissance they became a rather popular topic broached by most astronomers of the period up to the times of Tycho Brahe and Kepler, by scholastic thinkers as Roger Bacon or Pierre d'Ailly, and they are mentioned in popular and literary writing by authors such as Dante or Shakespeare. This interest is traced back in Europe to the translations from Arabian sources, most notably Albumasar's Book on Conjunction.

As successive Great Conjunctions occur nearly $\mathbf{1 2 0}{ }^{\circ}$ apart, their appearances form a triangular pattern. In a series every fourth conjunction returns after some 60 years in the vicinity of the first. These returns are observed to be shifted by some $7-8^{\circ}$, so no more than four of them occur in the same zodiacal sign. To each sign astrologers have ascribed one from the series of four elements and thus four triplicities or 'trigons' are formed. Particular importance has been accorded to the occurrence of a great conjunction in a new trigon, which is bound to happen after some 200 years at most. Even greater importance was attributed to the beginning of a new cycle after all 4 trigons had been visited, something which happens in about 800 years.

Kronos \& Zeus. In the Greek mythology, Kronos was the leader and the youngest of the first generation of Titans, the divine descendants of Uranus, the sky and Gaia, the earth. He overthrew his father and ruled during the mythological Golden Age, until he was overthrown by his own son Zeus. The legends about this pair, the ancient Kronos and Zeus, or Saturn and Jupiter, as reflected in many traditions all around the world, tell a story of vigorous interactions, less sedate than in modern astronomy.

Star-sized, both planets are covered with gases like the sun, and have a family of satellites: they could easily form a binary-star system. In the scenario of a close encounter between Jupiter \& Saturn, Saturn may have become unstable and dismembered with a core removed to another orbit.

The ancient Greeks saw this as Zeus, victorious over his father, forcing him to release the children he earlier had swallowed and banishing him to the outer reaches of the sky. In Egyptian eyes it was Horus-Jupiter assuming royal power, leaving Osiris to reign over the kingdom of the dead.


↔ Left: Kronos or Saturn. Center: Zeus \& Chronos.
Right: Zeus.
120

## SG301.5.12.1 Jupiter \& Saturn (2)

The conjunction of Jupiter and Saturn, the two weightiest planets, is of special importance: it has been called the "pulse of the solar system". Like the heart interconnecting with the other organs, the relationship Jupiter / Saturn affects all the other planets.

This "pulse" is very accurate at 89 conjunctions of Jupiter-Saturn, yielding 149.0003 Jupiter's orbits and 60.0003 Saturn's orbits: a definite harmonic fit. We are here reminded again that, in order to "see" the harmonic sacred geometry of the solar system, we need instruments \& data that can span large time periods: then patterns appear that would not be discernable at smaller scales.


## H. Warm also noticed two "golden" facts:

- Dividing the Ju/Sa synodic period by PHI, the golden ratio, yields 149, the number of Jupiter's orbits. "The result is almost precisely 5/12 Saturn years; thus, in 5 orbits Saturn would trace a precise, continuous 12-pointed star figure. And if, after each completion of the star (rhythm of 5 Saturn years), we were to enter the positions of Jupiter, exactly the same figure would arise since, on each occasion, Jupiter completes $12^{5 / 12}$ circuits. After 149 orbits, corresponding to 60 Saturn years, Jupiter would have completed its 12 -pointed star figure". (H. Warm)
- During 1 synodic period with Jupiter or Saturn, Earth covers on average 1 orbit plus $\mathbf{3 3 . 1 4 3 8}$ or, respectively, 12.6508 degrees. The ratio of the two angles is 2.617989:1 = PHI². In other words, the angle which earth traverses between 2 conjunctions with Jupiter and the difference between this angle and the angle created by the corresponding encounters with Saturn is almost in the ratio of $1.618 . .: 1\left[33.14^{\circ} /\left(33.14^{\circ}-12.65^{\circ}\right)=1.617 \ldots\right]$


个"Earth - Saturn linklines at Earth / Jupiter conjunctions, 750 times, beginning 28 November 2000, period 819.05 years. Scale in millions of kilometers". (HW)
H. Warm comments:
"In the outer planetary system, in the region bordering on the stars with their signs of the zodiac, the symbolic number 12 (which has been associated with heaven since time immemorial) appears before our eyes and before our minds. The number 12 is attained in all the possible constellations arising from the encounters of Jupiter, Saturn \& Neptune."


T "Linklines from the planet-centered view at Jupiter / Saturn conjunctions, 500 times, beginning 5-11-1455 BC, period 9929.26 years. Left: Jupiter-Neptune as seen from Saturn.
Right: Jupiter-Saturn as seen from Neptune." (HW).


个 Jupiter - Saturn linklines. (Martineau).

SG301.5.13 Enters Neptune

$\uparrow$ "Neptune as seen from Uranus, 600 times.
Left: At Jupiter / Neptune conjunctions, beginning 3-4-2477 BC, period 7669.18 years. Right: at every 8th Venus / Earth conjunction, beginning 5-22-3115 BC, period 7673.58 years". (HW)


个"Saturn - Neptune linklines as seen from Jupiter at Saturn /
Neptune conjunctions, 500 times, beginning 10-9 6943 BC, period 17,934.63 years". (HW)
\& "Saturn - Neptune linklines, stepping interval 400 days, period c. 821 years". (HW)
$\uparrow$ "Neptune as seen from Uranus.
Left: At every 4th Venus / Earth conjunction. 750 times, beginning 4-20-557 BC, period 4795.99 years.
Right: at every 32nd Venus / Earth conjunction, 300 times, beginning 4-29-4995 BC, period 15,347.15 years". (HW)


## SG301.5.14.1 Enters Uranus (1)

How does the 4th of the great planets fit into the harmonic scheme of the solar system? H. Warm explains: "At 3-fold conjunctions of the $\mathbf{3}$ other great planets, Uranus yields a geometrical sequence regulated by the number 12." (Warm. p. 264)


个 Uranus \& Neptune's dance. (J. Martineau. A Little Book...)


T Uranus \& Chiron's dance. (J. Martineau. A Little Book...)

$\uparrow$ The geometries of Uranus (left) \& Neptune (right).
(J. Martineau. A Little Book...)

SG301.5.14.2 Enters Uranus (2)

$\uparrow$ Jupiter - Uranus linklines, stepping interval 121.562 days, period c. 248.61 years. (H. W)
Here, in the outer planetary system, we have the appearance of the hexagram as two interlaced triangles (in 3D, this would be the Star-Tetrahedron). The hexagram is, traditionally, the geometric symbol of the cosmos (the two universal principles of YIN and YANG inter-penetrating), whereas the pentagram, found in the inner planetary system, is the symbol of the human being within the universal order.


124

The planet Jupiter has 67 confirmed moons. This gives it the largest retinue of moons of any planet in the Solar System. The most massive of them, the 4 Galilean moons, were discovered in 1610 by Galileo Galilei and were the first objects found to orbit a body that was neither Earth nor the Sun. From the end of the 19th century, dozens of much smaller Jovian moons have been discovered and have received the names of lovers, conquests, or daughters of the Roman god Jupiter, or his Greek predecessor, Zeus.

Dan Ward, in his www.halexandria.org website, made two general observations:

- The degree to which Jupiter's (main) satellites fall into 4 groups of 4 is "exceptionally quantum-like in the partiality to certain energetic levels or orbits."
- A curious balancing of the 16 main satellites shows up in the average of their inclination. This is independent of mass and appears to be a geometrical condition.

The Galilean moons are by far the largest objects in orbit around Jupiter, with the remaining $\mathbf{6 3}$ moons and the rings together comprising just 0.003 percent of the total orbiting mass.

The Galilean Satellites ("Big Four") have very interesting resonant relationships (Note: Saturn's satellites do not show similar quantum or PHI resonances, but the rings do.)

- Octave Orbital Resonance. Europa's orbital period is half of Ganymede's, and Io's orbital period is half of Europa's: in the time it takes Ganymede to make 1 orbit, Europa makes 2 orbits, and Io makes 4 orbits. However, weekly observations show that Io, Europa, and Ganymede are slowly shifting backward. This slow shift explains transits (e. g. Europa crossing in front of Jupiter), eclipses (e. g. Ganymede moving in and out of Jupiter's shadow) and occultations (e.g. Ganymede passing behind Jupiter).
- Earth Week ~ Ganymede's Rotation Period. It takes Ganymede exactly 7 days, 3 hours, and 43 minutes (7.16) to complete one orbit around Jupiter. Thus, if we observe Jupiter's satellites just once a week, we will see Ganymede in almost exactly the same place each time.
- PHI Resonance of Relative Distances. Dan Ward calculated the following PHI-related values for the comparative distances from the primary (Jupiter). $[\Phi=$ Golden Ratio $=1.618 \ldots \phi=1 / \Phi=0.618 \ldots]$

| Galilean Satellites | Ratios (miles) | Resonance |
| :---: | :---: | :---: |
| Europa / Io | $416,900 / 262,000$ | $=1.5912(\Phi$ within $98.33 \%)$ |
| Ganymede / Io | $664,900 / 262,000$ | $=2.5378\left(\Phi^{2}\right.$ within $\left.96.94 \%\right)$ |
| Callisto / Io | $1,170,100 / 262,000$ | $=4.4660\left(\Phi^{3}+\phi^{3}\right.$ within $\left.99.86 \%\right)$ |
| Ganymede / Europa | $664,900 / 416,900$ | $=1.5949(\Phi$ within $98.57 \%)$ |
| Callisto / Europa | $1,170,100 / 416,900$ | $=2.8067\left(\Phi^{2}+\phi^{3}\right.$ within $\left.98.33 \%\right)$ |
| Callisto / Ganymede | $1,170,100 / 664,900$ | $=1.7598\left(\Phi+\phi^{4}\right.$ within $\left.99.70 \%\right)$ |

SG301.5.15 Satellites of Jupiter

$\uparrow$ Montage of Jupiter and the Galilean Satellites. From top to bottom: Io, Europa, Ganymede, and Callisto. Europa is slightly smaller than the Earth's Moon. (Wikipedia).


## SG301.5.16 Neptune - Pluto Resonance

Pluto's orbital period is 247.7 years, while Neptune's orbital period is 164.8 years. The ratio 247.7:164.8 is equal to 3:2, so Pluto completes two orbits around the Sun in the same time it takes Neptune to complete exactly three orbits. This resonance explains how Pluto and Neptune can cross orbits without colliding: Pluto only comes within Neptune's orbit when Neptune is on the other side of the Solar System.

From Wikipedia: "Neptune's orbit has a profound impact on the region directly beyond it, known as the Kuiper belt. The Kuiper belt is a ring of small icy worlds, similar to the asteroid belt but far larger, extending from Neptune's orbit at 30 AU out to about 55 AU from the Sun. Much in the same way that Jupiter's gravity dominates the asteroid belt, shaping its structure, so Neptune's gravity dominates the Kuiper belt. Over the age of the Solar System, certain regions of the Kuiper belt became destabilized by Neptune's gravity, creating gaps in the Kuiper belt's structure. The region between 40 and 42 AU is an example.

There do exist orbits within these empty regions where objects can survive for the age of the Solar System. These resonances occur when Neptune's orbital period is a precise fraction of that of the object, such as $1: 2$, or 3:4. If, say, an object orbits the Sun once for every two Neptune orbits, it will only complete half an orbit by the time Neptune returns to its original position. The most heavily populated resonance in the Kuiper belt, with over 200 known objects, is the 2:3 resonance. Objects in this resonance complete 2 orbits for every 3 of Neptune, and are known as Plutinos because the largest of the known Kuiper belt objects, Pluto, is among them. Although Pluto crosses Neptune's orbit regularly, the 2:3 resonance ensures they can never collide. The 3:4, 3:5, 4:7 and 2:5 resonances are less populated."


T The simulation PlutoResonance.gsim shows the orbit of Pluto in a rotating frame whose period matches the period of Neptune. This causes Neptune to appear stationary, exposing the $3: 2$ resonance. (Link)
"Pluto is locked into a 3:2 resonance with Neptune. For every 3 orbits of the Sun completed by Neptune, Pluto completes 2 orbits. At any given moment, however, the ratio is not exactly 3:2. Sometimes Pluto's period is slightly faster than its average value. Sometimes it is slower.

When Pluto's period is slightly faster than average, the points where its orbit intersects the orbit of Neptune advance with each orbit. But when this intersection gets too close to Neptune, Pluto is accelerated by Neptune's gravity. This causes Pluto to rise into a higher orbit with a longer period. Now orbiting the Sun with a period slightly slower than its average value, the points where Pluto's orbit intersects Neptune's orbit retreat with each orbit. Eventually, it approaches Neptune from the other direction, allowing Neptune's gravity to pull Pluto into a lower orbit with a shorter period. This repeats indefinitely, ensuring that Pluto and Neptune never get too close to each other." (Link)


Major orbital resonances in the Kuiper belt caused by Neptune: the highlighted regions are the $2: 3$ resonance (Plutinos), the non-resonant "classical belt" (Cubewanos), and the 1:2 resonance (Twotinos).


个 Example of a Plutino resonance:
The motion of (15875) 1996 TP66 (red) and Pluto (grey) in a rotating frame with a period equal to Neptune's orbital period. Neptune is held stationary. (Wikiwand.com)

## SG301.5.17 Near \& Proto Resonances

A special case of resonance is called "near resonance" or near-integer-ratio relationships between the orbital frequencies of the planets or major moons. Astrophysics textbooks label them "coincidental" and "dynamically insignificant", even if the mismatch is quite small, "because (unlike a true resonance), after each cycle the relative position of the bodies shifts." The Wikipedia article on Orbital Resonance give the Earth-Venus example as a case of "near resonance" and dismisses it as purely "random". However, as the work of H. Warm shows, when more sophisticated calculations are engaged and specific time frames are involved, very interesting and "significant" patterns of harmonic dance emerge and point to a larger orchestration. Moreover, in the long-term perspective of the evolution of the solar system, "the presence of a near resonance may reflect that a perfect resonance existed in the past, or that the system is evolving towards one in the future." (Wikipedia).

This brings us to look into the evolution of the solar system. Indeed, the "stable" solar system we know and inhabit turns out to be the current step of a complex and tumultuous evolutionary process. The numerous discontinuities, eccentricities and irregularities of the present solar system point to a phenomenally unstable and dynamically dramatic past involving a Proto-Jupiter, a Grand Tack manoeuver and migration into proto-resonance modes.

The questions arising, from the standpoint of Harmonic Resonance in the solar system, and in the long-term, are: - Does a solar system progressively evolve from a state of dynamic, formative birth to a sustained (adult) stage of optimum harmonic balance able to support entities endowed with increased intelligence and consciousness? The analogy is that of the human body: at birth, the proportions of a baby are "in process" to eventually settle to a Golden Ratio overall format at adult age.

- Is our solar system in its optimum (peak) stage at the present evolutionary time or is it still evolving towards more exquisitely "fine-tuned" harmonic balance and resonance, emerging from rough proto-resonances?
- Is humanity going to evolve with the solar system (and co-engineer it) or evolve out of it? Is it conceivable that humanity may have been cocooning (in a human body chrysalis) on a planet harmonious to life (Earth) and that the human "butterfly" may now (or soon) be ready for a flight away from the birthplace (nest)?

§ The near 18:7 resonance pattern of Pallas with Jupiter only marches clockwise. It never halts and reverses course (i.e. librates). It shows the motion of Pallas in a rotating frame with a period equal to Jupiter's orbital period. (Jupiter is held basically stationary.) Jupiter (rotating frame) is the pink ellipse at 10 o'clock, Mars is orange, the Earthmoon system is the blue and white. The orbit of Pallas is green if it is above the ecliptic, and red if it is below. (Link)


个 Diagram of the orbits of Pluto's small outer four moons, which follow a remarkable 3:4:5:6 sequence of near resonances relative to the period of its large inner satellite Charon. The moons Styx, Nix and Hydra are also involved in a true 3-body resonance. (Link)


1 3:1 resonance that the asteroid Toutatis is in with Jupiter, but in a rotating reference frame from a Jovian perspective. (Link)


- Depiction of Haumea's presumed 7:12 resonance with Neptune in a rotating frame, with Neptune (blue dot at lower right) held stationary. Haumea is a "TNT" (see next page). (Wikipedia)


## SG301.5.18 Eris, Haumea \& TNO's

The suburb of the solar system is teeming with a wide variety of astronomical "objects" collectively known as TNOs (Trans-Neptunian Objects). A TNO is any minor planet in the Solar System that orbits the Sun at a greater average distance (semi-major axis) than Neptune, 30 astronomical units (AU). Twelve minor planets with a semi-major axis greater than 150 AU and perihelion greater than 30 AU are known, which are called Extreme Trans-Neptunian objects (ETNOs).

The first Trans-Neptunian object to be discovered was Pluto in 1930. It took until 1992 to discover a second Trans-Neptunian object orbiting the Sun directly, (15760) 1992 QB1. As of July 2015 over 1,650 Trans-Neptunian objects appear on the Minor Planet Center's List Of Trans-Neptunian Objects. Of these TNOs, 1471 have a perihelion further out than Neptune (30.1 AU). As of November 2009, 200 of these have their orbits well-enough determined that they have been given a permanent minor planet designation.

The largest known Trans-Neptunian object is Pluto, followed by Eris, Makemake, 2007 OR10 and Haumea. The Kuiper belt, scattered disk, and Oort cloud are three conventional divisions of this volume of space.

Clearly, further discoveries will give us many more glimpses about the complex and evolving inter-connectedness and harmonic resonance dynamics of this "organism" called the Solar System.

## Largest known trans-Neptunian objects (TNOs)



Art rendering comparing Earth with various TNTs. (Wikipedia). (Link).


The Kuiper Belt contains objects with an average distance to the Sun of $\mathbf{3 0}$ to about 55 AU . One group is called "Kuiper Resonant Objects" (in red on the diagram at left): they are locked in an orbital resonance with Neptune. Objects with a 1:2 resonance are called twotinos, and objects with a 2:3 resonance are called plutinos, after their most prominent member, Pluto.

## SG301 Chapter 6. Star \& Galactic Choreographies



What exactly is the hyper-dimensional harmonic map of the galaxy with regards to the Earth and humanity?

We are entering here a territory that is unrecognized by most people.
While we have an obvious notion of the day / night cycles caused by the spinning motion of the Earth and the yearly cycles of the seasons caused by the Earth orbiting the sun, as well as the moon cycles and effects, we usually do not recognize longer cycles or dynamic dances caused by stars, by constellations of stars or by the Milky Way galaxy, not mentioning other galaxies and their super-clustering. Yes, the astrological approach considers effects of the planets within the solar system but rarely looks into stellar or galactic effects.

So it is that inter-connectivity with the larger universe beyond the solar system is usually ignored or deemed to be too distant to be meaningful. There is yet, in the general education and media, but little interest or curiosity in questions like: what is (or could be) cosmic scale resonance? How do we fit in and interact with the entire universe? What does it mean to be entangled on a quantum level with a primordial continuum? How do we dance with and respond to vibrational drum-beats emanating from deeper / higher dimensions of the universe? How do the dances of our galaxy affect earth's evolution and humanity's history? What is the higher-dimensional map of the galaxy?

We are babies, at the dawn of awakening to a much larger consciousness of who we are... not as individual egos but as co-creators of a gigantic mystery. Let's face it: even though it is moving faster \& faster, human knowledge is in its infancy - yet is on the verge of a leaping bound when the two wings of consciousness will reunite: scientific knowledge and inner intuitive wisdom.

As we will see, ancient peoples cherished their connection to the stars and were well aware of larger cosmic cycles, beyond day/night and yearly earth seasons. They had charted the Great Year or galactic cycle and the corresponding precession of the equinoxes. They even charted the 4 main "seasons" or Ages cycling through the Great Year: Gold, Silver, Bronze and Iron. The ancients also talked about a Great Center influencing humanity's consciousness.

Regaining our lost connection to the stars and the galactic context through the third celestial motion of the Earth (the precession) will gift us again with a source of higher wisdom as well as give us back an essential perspective: where do we come from and where we are going... "History" will massively enlarge to include a vaster heritage from the past and a renewed understanding of the future "ages" seen through "galactic" time.

SG301.6.1 Celestial Spirals


个 Galaxies too have a birth, a sprouting time, a flowering and dying moment. We humans, on Earth, are intimately responding to the Galactic Year cycle/spiral of the Milky Way.


## SG301.6.2.1 Solar System \& Milky Way (1)



个 Infrared picture of the Milky Way (bright median line). The more diffuse blueish light is the zodiacal light from our solar system (with a $60^{\circ}$ tilt). (Link)

## \& Perspectives:

The Sun lies close to the inner rim of the Milky Way Galaxy's Orion Arm, in the Local Fluff or the Gould Belt, at a hypothesized distance of $7.5-8.5 \mathrm{kpc}(25,000-28,000$ light years) from the Galactic Center, contained within the Local Bubble, a space of rarefied hot gas, possibly produced by the supernova remnant, Geminga. The distance between the local arm and the next arm out, the Perseus Arm, is about 6,500 light-years. The Sun, and thus the Solar System, is found in what scientists call the galactic habitable zone.

The Apex of the Sun's way (solar apex), is the direction that the Sun travels through space in the Milky Way, relative to other nearby stars. The general direction of the Sun's galactic motion is towards the star Vega in the constellation of Lyra, at an angle of roughly 60 sky degrees to the direction of the Galactic Center.

The Sun's orbit around the Galaxy is expected to be roughly elliptical with the addition of perturbations due to the galactic spiral arms and non-uniform mass distributions. In addition, the Sun oscillates up and down relative to the galactic plane approximately 2.7 times per orbit. It takes the Solar System about 225-250 million years to complete one orbit of the galaxy (a galactic year), so it is thought to have completed 20-25 orbits during the lifetime of the Sun. The orbital speed of the Solar System about the center of the Galaxy is approximately 220-250 $\mathrm{km} / \mathrm{s}$. At this speed, it takes around 1,190 years for the Solar System to travel a distance of 1 light-year, or 7 days to travel 1 AU.


T The plane of the Solar System is tilted with respect to the equatorial plane of the galaxy. Our solar system is hurtling through space while angled nearly perpendicular to the plane of the Milky Way, new computer models suggest.
"It's almost like we're sailing through the galaxy sideways," said study team leader Merav Opher, an astrophysicist at George Mason University in Virginia.

The findings, detailed in the May 11 issue of the journal Science, suggest the magnetic field in the galactic environment surrounding our solar system is pitched at a sharp angle and not oriented parallel to the plane of the Milky Way as previously thought. (Link)

Milky Way Illustration Credit: ©R. Hurt (SSC), JPL-Caltech, NASA. Survey Credit: GLIMPSE Team


## SG301.6.2.2 Solar System \& Milky Way (2)

The Solar System shows three main motions with regard to our galaxy:

1. The orbital motion of the Solar System around the center of the galaxy is the wider and faster displacement. The speed of the Solar System orbital motion around the center of the galaxy is $\mathbf{2 2 0} \mathbf{- 2 5 0} \mathbf{~ k m} / \mathrm{s}$. The Solar System completes an orbit around the galaxy center each 225-250 million years (Galactic Year).
2. An oscillation of the Solar System from North to South and from South to North with respect to the galactic plane. The oscillation "upwards" and "downwards" is mainly established by the gravitational pull exerted by other bodies of the Solar System on the Sun, i.e. planets, asteroids, etc. The speed of this movement is $7 \mathrm{~km} / \mathrm{s}$.
3. A displacement of the solar system towards and outwards the center of the galaxy. It is also an oscillatory movement that is affected by the gravitational pull of cosmic objects in and out the galaxy that are relatively close to the Solar System. This motion has a speed of $20 \mathrm{~km} / \mathrm{s}$, and it is now on course to the constellation of Hercules.

If we sum the three motions of the Solar System to represent the apparent spiral journey of the sun system, we get a complex helicoidal spiral.
\& Motion \#1: the orbital motion of the Solar System is represented by the yellow slashed line. The Solar System moves at $\sim 220$ - 250 $\mathrm{km} / \mathrm{s}$ around the Galactic Nucleus.
$\downarrow$ Motion \#2 (up and down) - 7 km/s


While the sun is spinning around the center of the milky way, the milky way itself spins
around the center of the galactic super cluster, and super clusters spin around the next larger scale cosmic hub of the universe...

个 Link

## SG301.6.3.1 The Great Year (1) Current Science

The precession of the equinoxes refers to the observable phenomena of the rotation of the heavens, a cycle which spans a period of (approximately) 25,920 years, over which time the constellations appear to slowly rotate around the earth, taking turns at rising behind the rising sun on the vernal equinox. This remarkable cycle is due to a synchronicity between the speed of the earth's rotation around the sun, and the speed of rotation of our galaxy. However, there may be more as to the cause of the precession (see infra).

Earth's precession was traditionally called the precession of the equinoxes or Great Year. Historically, the discovery of the precession of the equinoxes is mostly attributed to Hellenistic-era (2nd century BC) astronomer Hipparchus, although evidence is mounting that it was well known to Vedic India and possibly to the Babylonians and the Egyptians. Since 2006, it is called general precession and combines:

- Planetary precession (precession of the ecliptic) - due to the small angle between the gravitational force of the other planets on Earth and its orbital plane (the ecliptic).
- Lunisolar precession (precession of the equator) - $\mathbf{5 0 0}$ times greater and caused by the gravitational forces of the Moon and Sun on Earth's equatorial bulge, causing Earth's axis to move.

The Precession cycle is measured in 'star months' named according to the constellation visible behind the vernal equinox sunrise. We are presently finishing the 'Age of Pisces' and will be soon entering the 'Age of Aquarius'. It is suggested (and supported by growing evidence) that this cycle was recognized at least as far back as the Age of Taurus, although there are suggestions of recognition as far back as Leo (as represented by the Sphinx at Giza).

$\uparrow$ Earth's precession through the equinoctial points (vernal \& autumnal). (Link)
$\uparrow$ Path of the pole in the northern hemisphere over a complete cycle of the Great Year.


| Constellation | Date as Suns <br> 'Carrier' |
| :---: | :---: |
| Leo (Lion) | $10,800-8,640 \mathrm{BC}$ |
| Cancer (Crab) | $8,640-6,480 \mathrm{BC}$ |
| Gemini (Twins) | $6,480-4,320 \mathrm{BC}$ |
| Taurus (bull | $4,320-2,160 \mathrm{BC}$ |
| Aries (Ram) | $2,160 \mathrm{BC}-0$ |
| Pisces (Fish) | $0-2,160 \mathrm{AD}$ |
| Aquarius (Water jug) | $2,160-4,320 \mathrm{AD}$ |

个 Recent "star months" of the precession cycle.

25,920: 12 $=\mathbf{2 , 1 6 0}$ A New sign appears on the horizon each $2,160 \mathrm{yrs}\left(30^{\circ}\right)$ Note: $(2 \times 2,160$ or $12 \times 360=4,320 \mathrm{yrs})$. To move $1^{\circ}$ on the horizon $=72 \mathrm{yrs}$.

## SG301.6.3.2 The Great Year (2) Ancient References

Ancient sacred cultures, such as the Egyptian, Greek, Mayan and Vedic Indian, were keenly aware of the vast celestial precession of the Earth with respect to the constellations. This was called the Great Year or Platonic Year. They understood the longer cyclical patterns of the heavens as potent influences in human affairs and they incorporated the reckoning of these cycles in their architecture.

References to the Great Year and the rise and fall of the ages are found in over $\mathbf{3 0}$ ancient cultures as documented by the ground-breaking research of G. de Santillana and H. von Dechend in Hamlet's Mill (1969). The authors lay out in great detail the astronomical meaning of worldwide myths and folklore dealing with the precession and the ages of man, and they show that myth \& folklore represent the scientific language of the ancients, designed to convey astronomical knowledge.

In more recent years, Florence and Kenneth Wood have shown, in Homer's Secret Ifiad (1999), that the cycle of precession also is at the origin of the Iliad and that the main fights are the waxing and waning of the constellations.

As pointed by W. Cruttenden in Lost Star (2006): "To the Ancients, an understanding of precession was as significant as an understanding of the day or the year. To the Moderns, precession is an obscure term best left to astronomers". And so it is that we are now totally disconnected from the knowledge of larger cosmic cycles and their effects on humanity's history and consciousness.

The Four Ages of man or Four Previous Worlds (sometimes five) are a re-occurring theme in ancient cultures: the Greeks (Hesiod), the Latins (Ovid), Indian Americans... These accounts tell of the successive degradation of the human condition, from an original "Golden" age, as indicated symbolically with metals of successively decreasing value.

The most elaborate understanding of the cyclical nature of the ages (Yugas) of man comes from the sages of Vedic India. The Yuga Cycle is a series of ages that rise and fall, each with their own properties. According to B. G. Siddhart in The Celestial Keys to the Vedas (1999), the Rig Veda mentions the precession and its effects. But the first written mention is found in the Laws of Manu. Sri Yukteswar wrote about the Yuga Cycle and its connection to the precession in The Holy Science (1894). "He pointed out that the Yuga Cycle is not only tied to the periodicity of the precession, but that is it based on a forgotten motion of our sun around another star." (Cruttenden)

The 24,000 years of the Indian Yugas are divided into two halves (ascending and descending) of 12,000 years each. The ages see a gradual decline of dharma, wisdom, knowledge, intellectual capability, life span, emotional and physical strength, as well as a gradual increase of ignorance.

- Satya Yuga: Virtue reigns supreme. Man comprehends the source of universal magnetism with its principle of duality, or polarity, and his intelligence reaches out to grasp the mystery of Vibration, Aum, the creative power that sustains the universe.
- Treta Yuga: $3 / 4$ virtue/ $1 / 4$ "sin" (as separation). Man extends his knowledge and power over the attributes of universal magnetism, the source of the positive, negative, and neutralizing electricities, and the two poles of creative attraction and repulsion.
- Dwapara Yuga: - $1 / 2$ virtue / 1/2 sin. Man gains basic comprehension of the electrical attributes, the finer forces and more subtle matters of creation. We are at the beginning of Dwapara Yuga...
- Kali Yuga: - $\mathbf{1 / 4}$ virtue / $3 / 4$ sin. The focus is upon gross matter and material objectivity.

| DESCENDING YUGA | CALENDAR YEARS |
| :--- | :---: |
| SATYA - Golden Age - 4,800 years | 11,501 BC to 6,701 BC |
| TRETA - Silver Age - 3,600 years | 6,701 BC to 3,101 BC |
| DWAPARA - Bronze Age - 2,400 years | 3,101 BC to 701 BC |
| KALI - Iron Age - 1,200 years | 701 BC to AD 499 |
| ASCENDING YUGA |  |
| KALI = Iron Age - 1,200 years | CALIN 499 to AD 1,699 |
| DWAPARA - Bronze Age - 2,400 years | AD 1,699 to AD 4,099 |
| TRETA - Silver Age - 3,600 years | AD 4,099 to 7,699 |
| SATYA - Golden Age - 4,800 years | AD 7,699 to AD 12,499 |

## The PRECESSION Number

Traditionally $=\mathbf{2 5 , 9 2 0}$ years $=\left(360^{\circ}\right.$ rotation $)=$ Grand Cosmic Year. If the sky is divided into 12 constellations: $(\mathbf{2 5 , 9 2 0} / \mathbf{1 2}=\mathbf{2 , 1 6 0})$

## SPEED OF LIGHT

If the speed of the light in the vacuum is $300,000 \mathrm{~km}$ per second, then the light, in a solar day, covers $\mathbf{2 5 , 9 2 0}$ million kilometers.

REVOLUTION OF EARTH AROUND THE SUN
In its revolution around the sun, the speed of the earth is 30 km per second and it covers $\mathbf{2 , 5 9 2 , 0 0 0} \mathrm{km}$ per day. It is hundred times more than the number of years of the Great Cosmic Year.

## DIAMETER OF THE SUN

Sacred number $33.333333333 \times 25,920=864,000$ which equals the Diameter of the Sun in miles.

## RADIUS OF THE MOON

25,920 divided by $24=1080$ miles which is the radius of the Moon.

## SG301.6.3.3 Great Year (3) A New Galactic Spring

Ancient cultures observed and lived the cosmic connection between Above and Below, between celestial cycles and human affairs. As put by W. Cruttenden: "The ticking hand of the grand cosmic clock, the Precession of the Equinox, revealed the ages in which men and civilizations found themselves."

Ancients had an innate understanding of the long-term cyclical nature of these ages. All over the world, myths and legends point to previous "higher" ages, at the beginning of "time" (galactic "springs") and to previous "dark" ages (galactic "winters") - just like the cycle of the seasons on Earth marks new life in the spring, fruition in summer, harvest in the fall and hidden gestation in winter. The "time" of the day, the "time" of the seasons and the "time" of the ages are harmoniously related, regardless of the scale. They are scale-invariant "fractals".

- Both Hesiod and Ovid gave accounts of the successive ages of humanity, which tend to progress from an original, long-gone "Golden" age in which humans enjoyed a nearly divine existence to the current age of the writers: the Iron age, in which humans are beset by innumerable pains and evils. This degradation of the human condition over time is indicated symbolically with metals of successively decreasing value: Gold, Silver, Bronze and Iron.
- Egyptians also believed that higher knowledge was prevalent in former ages. Their accounts of Zep Tepi, the First Age, is similar to the Greek account of the Golden age.
- The Book of Daniel in the Bible makes clear reference to the Great Year and the progression through the ages.
- The Mayan Long Cycle calendar marked time over many thousand of years, following the transition from one "Sun" (great age) to another.
- The Hopis also talk about the transition from the "Fourth World" to the "Fifth World". They describe the First World as a paradise and then the creation \& destruction of each successive world as humanity lost its state of harmony.
- According to the Yuga system, we have entered the Ascending Galactic Cycle of 12,000 years and are now over 400 years into the Dwapara Yuga (set to end in 4,098/4,099 AD, after 2,400 years). The Dwapara Yuga (Bronze age) signals the dawn of a new springtime. "The fog of materialism begins to lift and man discovers that he is more than flesh \& bones: he is energy. Men of this age build great civilizations, more concrete and less spiritual than those of the Golden and Silver ages, but still superior to any civilization of earlier times... Man gains understanding of the finer forces of creation which are reflected in many new discoveries and inventions..." (W. Cruttenden)

Laurie Pratt, writing in the 1930s, said: "So far, only two of the five kinds of electricities, corresponding to sight and sound, have been developed. Three more remain for the future, when we may reach across the world to touch beloved friends and to smell and taste objects in their rooms."


T The Yuga system.
The blue arrow shows where we are at current time.

The question arises: if indeed ancient cultures had the knowledge of the precession of the equinox and were able to predict the "golden times" (Silver \& Golden ages) and the "dark times" (Bronze and Iron ages), then they should have been able to witness at least one (if not several) of this long time frames of nearly 24,000 years.

And this implies that civilization has been around for much longer than the academic textbooks acknowledge.

Indeed several authors of antiquity imply that civilization dates back to at least 200,000 years. And recent archeological discoveries are continuously pushing the timelines further back, way beyond now obsolete academic/historical "consensus".

## SG301.6.4.1 Who are the Stars? (1) Astrophysics

The little points of light we see as "stars" are entire worlds - and some of them are far from being little. All of them go through a life cycle - just like any other living being but their life varies vastly depending on their masses and other factors.

All stars spend the majority of their existence as main sequence stars, fueled primarily by the nuclear fusion of hydrogen into helium within their cores. However, stars of different masses have markedly different properties at various stages of their development. (See diagram at right).

Stars also have varied and exotic "personalities": variable stars (variable, eruptive, explosive), pulsars, magnetars... All of these starry "characters" are, in a subtle or grand way, influencing the Earth and humanity's evolution.
$\downarrow$ A gallery of planets and stars, by size. Stars vary widely in size. In each image in the sequence, the right-most object appears as the left-most object in the next panel. The Earth appears at right in panel 1 and the Sun is second from the right in panel 3. The rightmost star (in panel 6) is UY Scuti, the largest known star. (Wikipedia)


T Stellar evolution of low-mass (left cycle) and high-mass (right cycle) stars, with examples in italics. (Wikipedia).


## SG301.6.4.2 Who are the Stars? (2) Influences

In the old days, stars were personalized as gods, semi-gods and figures of collective history, legends and mythology. Stars and their groupings into constellations were related to as influencing human affairs, be they tribal or individual. The movements of the stars and their positions at certain chosen times were carefully recorded by all ancient cultures in star monuments \& calendars, in order to assess their powers and benefits or detriments. The celestial starry sky was the familiar courtyard of all past generations. Starlore was intimately linked with astrology, architecture, agriculture, medicine, healing, ceremonies and just about all aspects of the governance of life. (See infra "Celestial Grids of Light").

Current astro-physical science, after denying the existence of stellar influences, is now progressively opening to a vast host of "radiations" emanating from the stars. Science is now understanding better the energy fields emitted by the sun (see supra for the cycles of the sun, its oscillations, the heliospheric current sheet etc...). Likewise, stars are now understood as interactive, at close and far range, through their many types of radiation. Below are some glimpses into the re-assessed influences of the stars and, next page, some data on the Interstellar Medium. We will then look at other candidates for "star interconnectedness" with Earth \& humanity, such as pulsars, magnetars, blazars and the star systems of Sirius and the Pleiades, and speculate on what is the "Great Center" that somehow pulses the precession.

## Current data on star radiations

- The energy produced by stars, as a product of nuclear fusion, radiates into space as both electromagnetic radiation and particle radiation. The particle radiation emitted by a star is manifested as the stellar wind, which streams from the outer layers as electrically charged protons and alpha and beta particles. Although almost mass-less there also exists a steady stream of neutrinos emanating from the star's core. (Wikipedia).
- Besides visible light, stars also emit forms of electromagnetic radiation that are invisible to the human eye. In fact, stellar electromagnetic radiation spans the entire electromagnetic spectrum, from the longest wavelengths of radio waves through infrared, visible light, ultraviolet, to the shortest of X-rays, and gamma rays. From the standpoint of total energy emitted by a star, not all components of stellar electromagnetic radiation are significant, but all frequencies provide insight into the star's physics. (Wikipedia).
- August 27th, 1998. The blast wave of radiation from SGR 1900+14 (a neutron star about 45,000 light years away) hit the night side of the Earth - something the solar flares from the Sun cannot do - and scorched the upper atmosphere of the Earth. The radiation broke apart atoms and molecules into charged ions which in turn interact with radio signals: hams experienced a blackout. (Dr Tony Phillips. Link). Flares from magnetars can also ionize the night side. Comments W. Cruttenden: "Imagine a measurable change in the Earth's ion atmosphere (ionosphere) caused by a star over 45,000 LY away, Then connect this ion disturbance with man's extreme sensitivity to negative ions - and you have compelling model for a change of consciousness (with a stellar origin)".


个 Twinkle, twinkle, little star, How I wonder what you are! (Link)


Surface magnetic field of SU Aur (a young star of T Tauri type), reconstructed by means of Zeeman-Doppler imaging. (Wikipedia)
"It would appear that just as the Earth feeds and provides for man, so too does the Sun feed and provides for the Earth, and very likely, the combined forces of the galaxy provide for the Sun. It looks like one giant symbiotic relationship with all the parties interacting through subtle magnetic \& electromagnetic forces." (W. Cruttenden).


个 Distribution of ionized hydrogen in the parts of the Galactic interstellar medium visible from the Earth's northern hemisphere. (Link)


## \& Graphical

 exhibition of the effects of dust at different wavelengths shown by the visible (left) and infrared (right) images of the constellation Orion. Dust scatters and obscures visible wavelengths where stars emit most of their light (note Betelgeuse the bright red giant at Orion's left shoulder). Dust is largely transparent in the infrared. (Link)
## SG301.6.5 The Interstellar Medium

The space between the stars in a galaxy like the Milky Way is far from empty. The interstellar medium (ISM) is the matter that exists in the space between the star systems in a galaxy. This matter includes gas in ionic, atomic, and molecular form, as well as dust and cosmic rays. It fills interstellar space and blends smoothly into the surrounding intergalactic space. The energy that occupies the same volume, in the form of electromagnetic radiation, is the interstellar radiation field.

The interstellar medium is composed of multiple phases, distinguished by whether matter is ionic, atomic, or molecular, and the temperature and density of the matter. The interstellar medium is composed primarily by hydrogen followed by helium with trace amounts of carbon, oxygen, and nitrogen. The thermal pressures of these phases are in rough equilibrium with one another.

The ISM plays a crucial role in astrophysics precisely because of its intermediate role between stellar and galactic scales. Stars form within the densest regions of the ISM, molecular clouds, and replenish the ISM with matter and energy through planetary nebulae, stellar winds, and supernovae. This interplay between stars and the ISM helps determine the rate at which a galaxy depletes its gaseous content, and therefore its lifespan of active star formation.

On September 12, 2013, NASA officially announced that Voyager 1 had reached the ISM on August 25, 2012, making it the first artificial object to do so. Interstellar plasma and dust will be studied until the mission's end in 2025.

$\leftarrow$ Gas in the interstellar medium close to the Sun, i.e., within 50 light years of Earth. Fifteen of these turbulent clouds have been identified thus far. (Link)

## SG301.6.6 The Search for the Great Center

The current standard theory of precession is referred to as "luni-solar" because it says that "the Earth's changing orientation to the fixed stars is mostly due to the gravitational forces of the Moon and the Sun tugging on the Earth's bulge. These forces are thought to produce enough torque to slowly twist the Earth's spin axis in a clockwise direction so that after a period of about 25,770 years the Earth would have completed one retrograde motion on its own axis, and one retrograde orbit. In this theory the Earth is thought to behave like a wobbling top." (W. Cruttenden)

However, according to researchers like W. Cruttenden, K-H \& Uwe Homann, Eugen Negut and C. Santagata, the standard contemporary explanation of the precession has a number of problems, such as, among others, the steadily increasing rate of the precession over the past century. The new generation researchers are looking, with new eyes, into other completely different explanations for the phenomenon we call "precession". They ask: what if precession is actually due to the motion of the solar system itself? Precession, they say, is caused by something other than pure local forces: a binary star, a galactic source center, magnetars, a black hole, another "frame of reference"... Whatever is the case, "something is moving the solar system in an elliptical pattern far tighter than any galactic motion would produce." (Cruttenden)

This "something other" has traditionally, been called the "sweet influence" or the "Great Center" and points to the Galactic Center - Galactic Anticenter Axis. Other names include the "Sun Behind the Sun" and the "Spiritual Sun".

- The Vedic tradition seems to have been very aware of this Great Center and its axis: "The Sun also has another motion by which it revolves round a great center called Vishnunabhi... When the Sun in its revolution round its dual comes to the place nearest to the great center (an event that takes place when the autumnal equinox comes to the first point of Aries), the mental virtue becomes so much developed that man can easily comprehend all, even the mysteries of spirit... After 12,000 years, when the sun goes to the place in its orbit which is farthest from Brahma, the grand center ... [then] dharma, the mental virtue, comes to such a reduced state that man cannot grasp anything beyond the gross material creation." (Sri Yukteswar. The Holy Science.)
- In the Vedic tradition, Vishnunabhi means the "Navel of Vishnu" and describes the Galactic Center, the emanation point of the cosmos.
- Vedic scholar and teacher David Frawley assessed Yukteswar's model and adds some clarity: "When the Sun is on the side of its orbit wherein its dark companion comes between it and the galactic center, the reception of that cosmic light appears to be greatly reduced. At such times there is a dark or materialistic age on Earth."
- John Major Jenkins adds: "The critical information encoded in Yukteswar's book-written decades before the Galactic Center was "officially" discovered in the 1920s-is that the ancient Vedic Yuga doctrine was calibrated with the periodic alignments of the solstice sun and the Galactic Center. If we do sense that the Vedic wisdom speaks a truth to us (nothing less than a lost science of the galactic influences on human evolution) the words of David Frawley may help us understand the importance of our impending "harmonization" with the Galactic Center. " [Note: This "harmonization" is the new Galactic Spring - see supra]. An important cosmic event is occurring now. The winter solstice is now at a point in conjunction with the galactic center . . This should cause a slow harmonization of humanity with the Divine will as transmitted from the galactic center . . . By the accounts of thinkers like Plato, the flood that destroyed Atlantis (and probably ended the Ice Age) occurred about 9300 B.C. ( 9000 years before Plato). This appears to have been when the summer solstice was in conjunction with the galactic center-a point completely opposite to the one today." (Link)
- "In fact, Frawley believes that all of Vedic astrology 'orients the zodiac to the galactic center' as the source of creative intelligence, mediated to human beings by the fixed stars of Sagittarius and the guru planet Jupiter, the Divine teacher. Frawley gives an astronomically accurate sidereal location for the Galactic Center: $6^{\circ} \mathbf{4 0}$ ' Sagittarius. This corresponds to $28^{\circ}$ Sagittarius in the unadjusted tropical system, wherein the December solstice is nearby at $0^{\circ}$ Capricorn (by definition). Now, precession has shifted the artificial frame of the zodiacal signs some 22 degrees such that the true sidereal position of the solstice meridian is actually in early Sagittarius, in alignment with the galaxy. Thus, the place of importance is the Galactic Center (in early Sagittarius). And the time is now." (Jenkins. Link).
- The Great Center is also, holographically, located within the energy/spiritual body. "The Pineal Gland is the 'North Gate.' This, in man, is the central spiritual creative center. Above in the heavens, it is found in the beginning of this sign Sagittarius, and is the point from which spiritual gifts are given."


## SG301.6.7 Binary Star \& Precession

In addition to the Vedic tradition, briefly reviewed in the previous page, the Arabic, Sumerian, Mithraic traditions... as well as esoteric wisdom writings have all made reference to "another star" that drove precession. That other star has been called by many names: Nibiru, Indra, Mithras... This "companion star", according to ancient cultures, is the cause of the precession: "our sun's motion around its 'dual star' is the reason we see the equinox slowly precess through the zodiac."

- "If a binary companion to the Sun were known to the Sumerians, then it would fit the Nibiru quite accurately, seeming to move independently from the apparent backward precessional motion of the rest of the stars." (Cruttenden. Lost Star. p. 94)
- The Platonists held that a 'hypercosmic sun' is located beyond the sphere of the fixed stars, in Plato's Hyperouranos Topos. (David Ulansey. Link)
- The Mithraic tradition explains that the God Mithras was a second, 'hypercosmic' sun, responsible for driving precession and the cycle of ages through the zodiac... Helios was the visible sungod and Mithras the 'unconquered sun'. (Cruttenden. Lost Star. p. 95)
- "Our solar system is revolving around a cosmic center... and is in relation with the three constellations: the Great Bear, the Pleiades, the Sun Sirius... Like the planetary atom, the solar atom not only rotates on its axis but likewise spirals in a cyclic fashion through the Heavens." (Alice Bailey. Cosmic Fire.)

Intrigued by the problems inherent to the "Luni-Solar" contemporary explanation of tbe precession, as well as by the world-wide traditions about a companion star to the Sun, Walter Cruttenden has formed the Binary Research Institute to explore the science of precession and evaluate the "binary model" of a companion star. From the scientific evidence gathered, the hypothesis seems more and more compelling, as described in Lost Star (2006) and Cruttenden's website. A binary model seems to solve many of the long-standing issues in the solar system formation theory. Here are some examples:

1. "It has been found that the Earth does not precess relative to objects within the solar system (like the Moon or Perseids comet debris) but it does precess relative to fixed stars outside the solar system. This is very hard to explain if precession is caused by anything other than a binary motion."(Link)
2. "Also the binary motion seems to easily solve problems with an uneven distribution of angular momentum within the solar system, and it provides a logical reason for the observed non-random long cycle comet paths and the sheer edge of the Kuiper belt." (Link)
3. "Sidereal and solar 'time deltas' are the natural result of a binary star."
4. The binary model conforms to the elliptical equation model (Kepler's laws). It also has direct ties with the Milankovitch cycles (past global climate changes over millions of years.)
5. "Precession accelerates past apoapsis (the point at which an orbiting object is farthest away from the body it is orbiting) and is commensurate with angular rate of change of binary motion."
(Above quotes. W. Cruttenden. Lost Star.)


## SG301.6.8.1 Cosmic Characters (1)Pulsars

Here is another original character in the starry family: a pulsar - which may be an element in the larger solution to the cause of precession.

A pulsar (originally short for 'pulsating star') is a highly magnetized, rotating neutron star - the remnant of a supernova explosion. It has a powerful magnetic field, shooting out jets of radiation that sweep across space like lighthouse beams. This radiation can only be observed when the beam of emission is pointing toward Earth, much the way a lighthouse can be seen only when the light is pointed in the direction of an observer, and is responsible for the pulsed appearance of emission - when they line up with Earth they appear as a rapidly repeating burst of light, radio waves and other radiations. Pulsars are believed to be one of the candidates of high and ultra-high energy astroparticles.


个 Diagram of a pulsar, a spinning neutron star. [Link]


个 Composite optical/X-ray image of the Crab Nebula, showing synchrotron emission in the surrounding pulsar wind nebula, powered. by injection of magnetic fields and particles from the central pulsar. (Wikipedia)

$\uparrow$ Relative position of the Sun to the center of the Galaxy and 14 pulsars with their periods denoted. Pulsar maps have been included on the two Pioneer

## SG301.6.8.2 Cosmic Characters (2) Magnetars

- A magnetar is a type of neutron star with an extremely powerful magnetic field. The magnetic field decay powers the emission of high-energy electromagnetic radiation, particularly X-rays and gamma rays.
- Like other neutron stars, magnetars are around $20 \mathrm{~km}(12 \mathrm{mi})$ in diameter and have a greater mass than the Sun. The density of the interior of a magnetar is such that a thimble full of its substance would have a mass of over 100 million tons. Magnetars are differentiated from other neutron stars by having even stronger magnetic fields, and rotating comparatively slowly, with most magnetars completing a rotation once every one to ten seconds, compared to less than one second for a typical neutron star. This magnetic field gives rise to very strong and characteristic bursts of X-rays and gamma rays.
- Starquakes triggered on the surface of the magnetar disturb the magnetic field which encompasses it, often leading to extremely powerful gamma ray flare emissions (recorded on Earth in 1979, 1998, and 2004).
- Magnetars are characterized by their extremely powerful magnetic fields of $\mathbf{1 0 8}$ to 1011 tesla. These magnetic fields are hundreds of millions of times stronger than any man-made magnet, and quadrillions of times more powerful than the field surrounding Earth.

Our question here is: can a magnetar influence the solar system and the Earth? Magnetic fields drop off at an exponential rate and any field generated by a magnetar would be much weaker than the Earth's magnetic field. It turns out, as explained by W. Cruttenden, that the important factor is not the field itself but the frequency and the resonance: "If the magnetar pulses happen to match a resonance mode for our earth, the entire planet's surface would act to store this energy, building up a standing wave of bound EM energy. The excited Earth resonance could possibly alter climate and geological functions... The Earth resonance field also stimulates the human brain and neurological rhythms..."

\& Indicated on this infrared image of the galactic center region are positions of candidate magnetars -- believed to be the strongest magnets in the galaxy.


## SG301.6.8.3 Cosmic Characters (3) Blazars

Among the latest denizens in the cosmic zoo are the Blazars. A blazar is a very compact quasar (quasi-stellar radio source) associated with a presumed super-massive black hole at the center of an active, giant elliptical galaxy. Blazars are among the most energetic phenomena in the universe and play an essential part in the cosmic web of "galactic interconnectedness", as longrange communication beams.

Blazars are members of a larger group of active galaxies that host active galactic nuclei (AGN)... Blazars emit a relativistic jet that is pointing in the general direction of the Earth. The jet's path corresponds with our line of sight, which accounts for the rapid variability and compact features of both types of blazars. Many blazars have apparent superluminal features within the first few parsecs of their jets, probably due to relativistic shock fronts.

The generally accepted picture is that OVV quasars are intrinsically powerful radio galaxies. Blazars, like all AGN, are thought to be ultimately powered by material falling onto a supermassive black hole at the center of the host galaxy. Gas, dust and the occasional star are captured and spiral into this central black hole creating a hot accretion disk which generates enormous amounts of energy in the form of photons, electrons, positrons and other elementary particles. This region is quite small, approximately $10-3$ parsecs in size.

Perpendicular to the accretion disk, a pair of relativistic jets carries a highly energetic plasma away from the AGN. The jet is collimated by a combination of intense magnetic fields and powerful winds from the accretion disk and toroid. Inside the jet, high energy photons and particles interact with each other and the strong magnetic field. These relativistic jets can extend as far as many tens of kiloparsecs from the central black hole. The special jet orientation explains the general peculiar characteristics: high observed luminosity, very rapid variation, high polarization (when compared with non-blazar quasars), and the apparent superluminal motions detected along the first few parsecs of the jets in most blazars.



## SG301.6.9.1 The Sun-Sirius Resonance (1) Current Science

The star Sirius is brightest star in our night sky - 3 x brighter than Alpha Centauri and twice as bright as the next brightest star Canopus. Sirius is also the 5th closest system of stars to our own. Small wonder this star was granted God / Goddess status by many ancient cultures (see next page).
As modern astro-cosmology progresses beyond the older hypothesis of various "wobbles" to explain the discrepancies in Earth's motions, there is mounting evidence of the special status of Sirius and its binary star harmonic resonance with the Sun, and therefore with the Earth.

Sirius is a triple star system. Sirius A is the white giant star (left). Sirius B is a white dwarf (right). Sirius C is a invisible neutron star.

Binary star systems are the norm. The vast majority of observable stars are binary or multiple star systems. In these systems, two or more stars share a common focus of revolution and are gravitational bound to each other in defined orbits. This is such a common observation such that the gravitational interaction of multiple stars appears to be the "normal" mode of stellar system formation.

Sirius A, B and C. We know of two stars there, and perhaps a third. The largest, the one we see as the brightest star in all the heavens, is Sirius A, outshining our sun 10 times over with only the mass of three suns. Sirius B, a white dwarf star invisible to the naked eye, packs almost the entire mass of our sun into a globe only four times as large as the Earth. White dwarf stars are extremely dense $\sim$ in fact, Sirius B's surface is 300 times harder than diamonds, while its interior has a density 3000 times that of diamonds.

Sirius, a fixed star reference. Sirius appears to be in a static position in relation to precession. The periodicity of the helical rising of Sirius was such that the Egyptians based their (Sothic) calendar on it: every year for millennia the appearance of Sirius coincided with the flooding of the Nile, an event that remarkably still happens to this day. As Jed Buchwald, professor of the history of science at Caltech, states: "Sirius remains about the same distance from the equinoxes - and so from the solstices - throughout these many centuries, despite precession" [Link]. The Sirius Research Group (led by Walter Cruttenden) has been recording the position of Sirius for approximately 20 years now and has not measured any alteration in its location relative to the precession. Sri Yukteswar mentions that the precession is due to the motion of our sun around another star (Sirius). The Great Pyramid provides a historical clue: a shaft leading from the Queens chamber of the Great Pyramid of Egypt was (and still is) precisely aligned with Sirius. This shows how many centuries Sirius has been in a stationary position relative to the movement of the other stars.

The "Downstreaming" of Sirius. Recent findings reveal we are "downstream" from Sirius in the part of the galactic arm our solar system resides in. Our sun obviously deserves the title of "life bringer," as no life could exist in the solar system without its sustaining rays. But part of this "solar" energy may well transit from the Sirius system. Spinning on its axis about 23 times a minute, Sirius B generates huge magnetic fields around it, broadcasting down the galactic arm huge amounts of energy from its larger host body, Sirius A.

The Great Conjunction of Sirius A and B. Every 49.9 years, the two stars in the system, Sirius A and B, come as close together as their orbits allow, creating huge magnetic storms between them. As they approach each other, the stars both begin to spin faster as tidal forces become stronger, finally flip-flopping over, actually trading places with each other. This extra energy is eventually released to flow down the magnetic field lines to the sun, which transmits it like a lens to all the planets.
It is a cultural fact that Sirius is associated with liberation. Interestingly enough, the time each year our sun conjuncts Sirius at 14 degrees Cancer is close to many of the Independence days during the month of July. In 1993-1994, as the Great Conjunction of Sirius A and B approached, a wave of freedom swept our world culminating in the breakdown of the communist rule in Europe. The Berlin Wall fell as the cold war ended ... these events transpired simultaneously with the magnetic forces building to their highest intensity on Sirius. Is there a connection? Perhaps.

Sirius-Sun, part of a larger long-range galactic system. Robert Temple, in the new edition of The Sirius Mystery (1998), calls this cosmic Sirius-Sun co-system the Anubis Cell and proposes that the Sun and Sirius systems share a synchronous harmonic resonance with each other and communicate by a quantum potential field. The Anubis Cell may be analogous to a macroscopic "neuron" seen from the point of view of the galactic scale organism.


## SG301.6.9.2 The Sun-Sirius Resonance (2) Ancient Cultures

The celebration of Sirius was wide spread in ancient cultures. Sirius was understood as the Spiritual Sun (esoterically, the Heart of the Sun). Since ancient times and across multiple civilizations, Sirius, the dog star, has been surrounded with a mysterious lore. Esoteric teachings of all ages have invariably attributed to Sirius a special status and the star's importance in occult symbolism is an attestation of that fact.


EGYPT - Sirius (Sothis), considered by the ancient Egyptians to be the most important star in the sky, was astronomically the foundation of their entire religious system. Its celestial movements determined the entire Egyptian calendar ( $\mathbf{1 2}$ months of three 10-days weeks ["decans"]). The main star / decan was Sirius. Sirius's heliacal rising (when Sirius again rose into visibility after being hidden by the sun's light for 70 days) marked the beginning of the Egyptian year and roughly coincided with the flooding of the Nile (and a renewed period of wealth and prosperity). Sirius rising was marked by feasting and celebration.
Great temples were erected to be oriented, with utmost precision, to the heliacal rising of Sirius on the expected morning. The light of a single star, Sirius, was precisely focused to illuminate the inner sanctum altar - as a laser point of light. The energy of the star was made manifest within the sacred temple. The temple of Isis at Denderah bears this inscription: "She shines into her temple on New Year's Day, and she mingles her light with that of her father Ra on the horizon." Sirius was identified with the goddess Isis and Ra is Egyptian name for the Sun.
The ancient Egyptians said that when people die they go to the Sirius system. The Dogon say the same thing. Perhaps the Sirius system in a dimension of the "other world" in more senses than one.

SUMER - In the Sumerian civilization, predating the Egyptians, their epic poem Epic of Gilgamesh describes a dream of Gilgamesh where the hero is drawn irresistibly to a "heavy star" that cannot be lifted despite immense effort. This star descends from heaven to him and is described as having a very "potent essence" and being the "God of heaven." Gilgamesh had, for his companions, 50 oarsmen in the great ship Argo (this constellation borders Canis Major, where Sirius is found). These elements comprise almost a complete description of Sirius B: a super-heavy gravitationally powerful star made of concentrated super-dense matter (essence) with the number 50 associated with it (describing its orbital period).

DOGON - The Dogon, the African tribe who have worshipped the invisible star Sirius B for thousands of years, claim visitations from beings of the Sirian system. In their religious dogma, they acknowledge the star as "immensely heavy, invisible, very small, yet extremely powerful." Their understanding of the two stars' orbits coincides with modern astronomical findings, yet was arrived at before the scientific era. Their ability to recognize the awesome power of Sirius B, a star that can't even be seen, is a challenge to rational science.

INDEPENDENCE DAYS. It is a cultural fact that Sirius is associated with liberation. Interestingly enough, the time each year our sun conjuncts Sirius is close to many of the Independence days during the month of July. America's Independence Day - July 4. French Bastille Day - July 14. Canada's Independence - July 1. Venezuela's Independence Day - July 5. Argentina's - July 9.

Previous civilizations understood celestial mechanics at an advanced level, and the mathematical precision of their astronomical observations is a testament to this. The reason why the Egyptians and many other civilizations of that era used Sirius as their marker for the passage of time is because they picked the most stable object as their reference point. We choose the Sun as our reference point, and this is obviously highly inaccurate. Every 4 years a day has to be added to keep accurate time.
"But even Sirius was not accurate enough for the "Keeper's of Time", the Mayans. With their remarkably advanced astronomy they quickly detected the inaccuracies in using Sirius as a marker for the passage of time, and switched to an even more accurate cycle involving the Pleiades. There is however an even more stable reference point than the Pleiades and that is the Galactic center, which from the perspective of our galaxy is the ultimate center of rotation. And, going beyond, the Mayan's chose the Galactic Center as a reference point as the ultimate center of rotation, which is evident as the Mayan Long Count ends with the galactic alignment of the Solar System on December 21 st 2012. Therefore, the idea that the Earth orbits the Sun, or that the Sun orbits Sirius, or that Sirius orbits Alcyone and that Alcyone orbits the Galactic Nucleus, is not revolutionary -

## SG301.6.10 The Pleiades Resonance

The high visibility of the star cluster Pleiades in the night sky has guaranteed it a special place in many cultures, both ancient and modern. The heliacal rising of Pleiades often marks important calendar points for ancient peoples. Could the Pleiades play a key role in the multi-dimensional topology of the local universe, with regards to the earth and the precession?

- The Babylonian star catalogues name the Pleiades MUL.MUL or "star of stars", and they head the list of stars along the ecliptic, reflecting the fact that they were close to the point of vernal equinox around the 23 rd century BC.
- "Canst you bind the sweet influence of the Pleiades." (Old Testament. Book of Job).
- "The pagan Arabs, according to Hafiz, fixed here (in the Pleiades) the seat of immortality; as did the Berbers, or Kabyles, of Northern Africa; and, widely separated from them, the Dyaks from Borneo; all thinking them the central point of the universe." (Allen. Star Names. p. 400)
- "There is a tradition from Borneo of a 'whirlpool island' with a tree that allows a man to climb up into heaven and bring back useful seeds from the 'Land of the Pleiades'. (Hamlet's Mill. p. 213)
- "In India, Alcyone (the principal star of the Pleiades or "Light of the Pleiades") was individually known as Amba, the Mother."
(Allen. Star Names. p. 404).
- In Greece, many temples were oriented to the Pleiades and their correspondingly different positions when rising." (R. H. Allen. Star Names. p. 399).
- Astronomers have noted exotic conditions in the area of the Pleiades. "Conditions in the Pleiades are fantastic. The giant blue stars produce strong stellar winds, which have interesting effects on the surrounding gases... Alcyone is the brightest star (magnitude 2.9), Caelano and Sterope are variable stars... all of these are hot blue stars spinning at high speeds. They rotate so fast they've been flattened into oblate spheroids..." (Raymond Shubinski. East Kentucky Science Center. Link). Comments Cruttenden: "This is just the type of action you need to generate massive magnetic or EM forces."



T The Pleiades as the Seven Sisters of mythology. (Link)


个 X-ray images of the Pleiades reveal the stars with the hottest atmospheres. Green squares indicate the seven optically brightest stars. (Wikipedia)

## SG301.6.11 The Milky Way

The name "milky" is derived from the appearance of our galaxy as a dim glowing band arching across the night sky whose individual stars cannot be distinguished by the naked eye. The term "Milky Way" is a translation of the Latin via lactea, from the Greek $\gamma \alpha \lambda \alpha$ ģíaç кúкえoc (galaxias kýklos, "milky circle").

The Milky Way is a barred spiral galaxy that has a diameter usually considered to be about $\mathbf{1 0 0}, \mathbf{0 0 0} \mathbf{- 1 2 0 , 0 0 0}$ light-years but may be $\mathbf{1 5 0 , 0 0 0} \mathbf{- 1 8 0 , 0 0 0}$ light-years. The Milky Way is estimated to contain 200-400 billion stars, although this number may be as high as one trillion. There are probably at least $\mathbf{1 0 0}$ billion planets in the Milky Way.

The rotational period of the Milky Way is about 240 million years at the position of the Sun. The Milky Way as a whole is moving at a velocity of approximately 600 km per second with respect to extragalactic frames of reference.

The cosmos is a dance floor. An astonishing variety of figures are played and displayed, bewildering even the most open-minded researchers... Here are some of the "feature dances" that have been recently observed about this galaxy of ours:

- The Galactic Center is marked by an intense radio source named Sagittarius A* (pronounced Sagittarius A-star). The motion of material around the center indicates that Sagittarius A* harbors a massive, compact object.
This concentration of mass is best explained as a super-massive black hole (SMBH) with an estimated mass of 4.1-4.5 million times the mass of the Sun.
- In 2010, two gigantic spherical bubbles of high energy emission were detected to the North and the South of the Milky Way core, using data of the Fermi Gammaray Space Telescope (see picture at right). The diameter of each of the bubbles is about 25,000 light-years ( 7.7 kpc ); they stretch up to Grus and to Virgo on the night-sky of the southern hemisphere. Subsequently, observations with the Parkes Telescope at radio frequencies identified polarized emission that is associated with the Fermi bubbles. These observations are best interpreted as a magnetized outflow driven by star formation in the central $640 \mathrm{ly}(\mathbf{2 0 0} \mathrm{pc})$ of the Milky Way.
- Later, on January 5, 2015, NASA reported observing an X-ray flare 400 times brighter than usual, a record-breaker, from Sagittarius A*, a black hole in the center of the Milky Way. The unusual event may have been caused by the breaking apart of an asteroid falling into the black hole or by the entanglement of magnetic field lines within gas flowing into Sagittarius $\mathrm{A}^{*}$, according to astronomers. (Wikipedia)


The Milky Way as seen in Tasmania. (Link)

\& Bright X-ray flares from Sagittarius A*, location of the super-massive black hole at the center of the Milky Way.

The Milky Way galaxy is embedded in a cascade of larger choreographies with many partners:

- In 2014 researchers reported that most satellite galaxies of the Milky Way actually lie in a huge disk, with almost all satellite galaxies moving in the same direction within this disk. This came as a surprise: according to standard cosmology, the galaxies should form in halos of dark matter, be widely distributed and should move in random directions. This discrepancy is still not fully explained.
- The Andromeda galaxy as a binary partner forming with the Milky Way the double system of a giant spiral galaxy.
Current measurements suggest the Andromeda Galaxy is approaching us at 100 to 140 kilometers per second. In 3 to 4 billion years, there may be an Andromeda-Milky Way collision, depending on the importance of unknown lateral components to the galaxies' relative motion. If they collide, the chance of individual stars colliding with each other is extremely low, but instead the two galaxies will merge to form a single elliptical galaxy or perhaps a large disk galaxy over the course of about a billion years.
- The group of 50 closely bound galaxies known as the Local Group, itself being part of the Virgo Supercluster. The Virgo Supercluster forms part of a greater structure, called Laniakea.
- Two smaller galaxies in the Local Group orbit the Milky Way. The largest of these is the Large Magellanic Cloud with a diameter of 14,000 light-years. It has a close companion, the Small Magellanic Cloud. In January 2006, researchers reported that the heretofore unexplained warp in the disk of the Milky Way has now been mapped and found to be a ripple or vibration set up by the Large and Small Magellanic Clouds as they orbit the Milky Way, causing vibrations when they pass through its edges. Previously, these two galaxies, at around $2 \%$ of the mass of the Milky Way, were considered too small to influence the Milky Way. However, in a computer model, the movement of these two galaxies creates a dark matter wake that amplifies their influence on the larger Milky Way.
- A number of dwarf galaxies are part of the Local Group. One of the oldest ones, Sagittarius DEG (Dwarf Elliptical Galaxy) is an elliptical loop-shaped dwarf satellite galaxy of the Milky Way. It has passed through the plane of the Milky Way several times in the past and will pass again in the next 100 million years.
A simulation published in 2011 suggested that the Milky Way may have obtained its spiral structure as a result of repeated collisions with Sag DEG (Wikipedia). [See next page].


## SG301.6.12.1 The Local Super-Galactic Dance (1)



个 Milky Way's satellite galaxies. (Link). The globular clusters can follow rosette orbits about the Milky Way, in contrast to the elliptical orbit of a planet around a star.

\& A Galaxy Evolution Explorer image of the Andromeda Galaxy. The Andromeda galaxy is a sister galaxy forming a binary galaxy system with the Milky Way.
(Wikipedia)

## SG301.6.12.2 Local Galactic Dance (2) Milky Way \& Sag DEG

## Galactic Genealogy: Where are we-0f-the-solar-system exactly coming from?

Astronomers have long suspected that the Milky Way Galaxy was formed from smaller galaxies. Moreover, after becoming a relatively large galaxy, it may have continued to acquire a substantial part of its mass by assimilating smaller galactic companions that moved too close. Large galaxies are now understood as being the aggregation of many smaller galaxies, over astronomical times of cosmic evolution. Impacts between galaxies and their companions are thought to be widespread in the cosmos, and many of the spiral galaxies we can see were probably formed in this way.

- 1994: confirming that hypothesis was the discovery of the Sagittarius Dwarf Elliptical Galaxy (Sag DEG), found very close to the Milky Way on the opposite side of the Galactic Center from the Solar System. Sag DEG is one of the Milky Way's nearest known neighbors and is comprised of mostly old, yellowish stars. Astrophysicist Rosemary Wyse of Johns Hopkins University has estimated that as much as $\mathbf{1 0}$ percent of the stars in the Milky Way's halo came from dwarf galaxies like Sag DEG, merging with the Milky Way over the past eight billion years or so.
- 2003: astrophysics teams from both the University of Virginia and Massachusetts were able to analyze data gathered by 2MASS (Two Micron All Sky Survey), a major M.I.T. project to map out the sky in infrared frequencies. The new star map revealed the adjoining presence of an old dwarf galaxy, Sag DEG, now 10,000 times smaller than the Milky Way Sag DEG has been dancing with the Milky Way for the last 2 billion years, circling it at least 8 times, and is now a stretched out, looped dwarf galaxy of stars that are pulled in, intersect and merge with the Milky Way equatorial disc.
- September 14, 2011: a team of astronomers revealed that the Milky Way's spiral arms could have been generated after two collisions with Sag DEG over the past billion years. As the galaxies collide, model simulations indicate that stars are sent streaming in long loops from both galaxies. These loops continue to swell with stars and are gradually tugged outward by the Milky Way's rotation into ringed arms. For the arms to form, Sag DEG needed a substantial amount of dark matter that is mostly stripped off ( 80 to 90 percent) by the collision along with stars of normal matter.
- 2012: the Solar System is slated to be at the exact intersection of the Milky Way and the Sag DEG star stream. From orbital and star composition data, astrophysicists have hypothesized that the Milky Way may not our original galactic parent. We may not be "from" the Milky Way! We, as inhabitants of the Solar system, may come from the Sag DEG galaxy. This hypothesis has created quite a controversy.
- Some researchers contend that this is why the Milky Way is seen sideways in the night sky. The Solar System may have been actually formed in a whole different galactic environment.
- Others theorize that, only now, after several encounters between the two galaxies, is the Solar System being pulled in sufficiently by the Milky Way to be able to break free from distended Sag DEG and gravitationally adopted by a new galactic foster parent, a much larger and more powerful system: the bright 200 billion star glow of the Milky Way!


Sag DEG Tidal Stream. (Link)

$\uparrow$ 2012: the Sun at the intersection "of two galaxies: the Milky Way \& Sag DEG. (Link)

## SG301.6.13 The Global Dance: Superclusters



The local dance of our Milky Way galaxy is played within the context of the Local Group ( $\mathbf{5 0}$ closely bound neighbor galaxies), itself part of the Virgo Supercluster which has a diameter of 100 million light years. The Virgo Cluster in turn is part of a greater structure, called Laniakea, a larger Supercluster spanning over $\mathbf{5 0 0}$ million light years while the Local Group spans over 10 million light years. The number of superclusters in the observable universe is estimated to 10 million. (See supra: Where Are We? \#0)

Galaxies are grouped into clusters instead of being dispersed randomly. Clusters of galaxies are grouped together to form superclusters. Typically, superclusters contain dozens of individual clusters throughout an area of space about 150 million light years across. Unlike clusters, superclusters are not bound together by gravity. They are all shifting away from each other due to the Hubble flow. (Wikipedia)

The Shapley Supercluster or Shapley Concentration (SCl 124) is the largest concentration of galaxies in our nearby universe that forms a gravitationally interacting unit, thereby pulling itself together instead of expanding with the universe. It appears as a striking over density in the distribution of galaxies in the constellation of Centaurus.

The Shapley Supercluster lies very close to the direction in which the Local Group of galaxies (including our Galaxy) is moving with respect to the Cosmic Microwave Background (CMB) frame of reference and may indeed be one of the major causes of our galaxy's peculiar motion - the Great Attractor may be another.

The Great Attractor (see supra, Chapter 3) is a gravity anomaly in intergalactic space within the range of the Centaurus Supercluster that reveals the existence of a localized concentration of mass equivalent to tens of thousands of galaxies, each of which is the size of the Milky Way.

## SG301.6.15 The Cosmic Dance of Shiva


"While the West was still thinking, perhaps, of a 6,000 years old universe India was already envisioning ages and cons and galaxies as numerous as the sands of the Ganges. The Universe is so vast that modern astronomy slips into its folds without a ripple." (Huston Smith)

The cosmos reveals itself as a magnificent hologram woven with endless forces, phenomena, events, dynamical flows and connectivities... a few are visible and a few more are progressively detected by advancing technology. But it appears that, casting a veil of humbleness upon human science, the vast majority of the cosmic nature is still invisible to us and undetected by us. The universe remains mysterious - and this becomes a compliment again. One thing is certain: the cosmos is no longer a problem to "solve" but appears more \& more like a gigantic organism to harmonize with, a vast being to fall in love with, on such a scale of totality that a planet like the Earth is only a nuclear particle embedded in its atmospheric cloud and organically cycling in and around a vast cascade of harmonic centers of attraction... The cosmos is the ultimate love affair.

In their own ways, the ancients knew about the cycles, the influences and the attractions of the cosmos and its vast orchestral tapestries. Now science is catching up, albeit reluctantly. In India, the cosmic Dance of Shiva Nataraj has been embodying the inner knowledge of being entangled with evolutionary unfolding and, at the same time, freely co-creating in consciousness the supreme experience of BEING.

The re-cognition of the Earth-Milky Way coupling, as particularly expressed by the precession of the equinoxes with its influence upon human evolution, seems to be the next frontier of human awakening, upping the limits of human beings understanding who they are. Galactic consciousness is calling humanity.

As pointedly summarized by W. Cruttenden:

- Ancient myth \& folklore speak of a long-term cycle of expansion \& contraction of humanity's global consciousness. Ancient stories \& legends attribute this cycle to the Precession of the Equinox. They also mention a lost Golden Age followed by periods of increasing dark ages.
- The archeological record shows evidence of a slow collapse of civilizations throughout the ancient world culminating during the historical Dark Ages, circa 500 AD.
- Then, almost 1,000 years later, the "Dwapara Yuga" dawns as the historical Renaissance.
- Now, on the ascending arc of the long-term cycle, humanity is re-awakening to an awareness of more \& more subtle forces operating in nature and in man's consciousness.

The question naturally arises: what is the cause of the Precession?

- Astronomy attributes it to a wobble of the earth... But this standard "luni solar" theory has a number of problems.
- Some sources (ancient and modern) attribute the precession to the motion of the sun around a binary companion star. Which binary star and where? And how a binary coupling can affect humanity's consciousness? Is a magnetar hidden within the Pleiades? - There is mounting evidence that hitherto unknown fields can be cyclically encountered by the sun system in its "precessional" journey: blazars, magnetars etc... We already know that ultra-weak magnetic fields as well as levels of ionic charges in the air affect our thoughts, our feelings, our perceptions of the world and the way we relate to others and to our environment. We have yet to know about the "sweet influences" of subtle higherdimensional fields, traditionally named "metaphysical" or "mystical". They will eventually be understood as a loving "presence".


## SG301 Chapter 7. A Golden Holo-Fractal Cosmos



Stars in the fields, flowers in the skies.
Two wings of the Spirit Bird.
Only one garden.
A cosmological map
of the One engendering the One.
At bottom, within the teepee cone of power, a pilgrim offering up human life to the light. Many realms and celestial spheres to visit, each one leading to a larger Universality.

If you walk over the crystal bridge between the worlds,
and bathe your soul in the golden sun ocean, you will find the inner heavens governing the worlds below.

The sky door opens: you are welcoming yourself

## SG301.7.1.1 Fractal Scaling of the Cosmos

We have described the global scaling nature of a scale-invariant, fractal resonant, cosmos in SG203B, Chapter 6. As a reminder, we are bringing up a few contextual comments as well as quoting here again from the research of Dr. Hartmut Müller on Global Scaling. Introducing again he Haramein-Rausher Scaling Law for All Matter will help us to see why we need a new Theory of General Fractality describing the Grand Self-Similarity of the cosmos...

- Following on the steps of Ukrainian biologist Cislenko, it is now recognized that there is a logarithmic scaling in the frequency distribution of biological species with reference to the body size and body mass of organisms.
- In physics, a similar phenomenon of logarithmic scaling (logarithmic scale invariance) was discovered in the frequency distribution of elementary particles based on the particles rest mass. In 1982, Harmut Müller was able to broaden this discovery into a global law by showing that it not only applies to all known particles, nuclei and atoms, but that is applies to the macro-cosm as well: stars, galaxies, clusters... Müller's theory, derived from the statistical analysis of huge amounts of data and successfully applied in sciences and technology today, is based on the concept of standing wave processes on the $\log$ (not linear) scale. The observed dimensions of all objects in the universe, from atoms to galaxies, are determined by interaction with standing wave processes determined by log scaling.
- Scaling is a global, harmonic, musical phenomenon. In fact, it may be the blueprint of the universe itself. Historically, people and natural sciences have been conditioned to think in terms of linear scales and to measure in regular intervals. With the birth of fractal mathematics, linear scales are now replaced by fractal, hyperbolic, golden-ratio scales featuring a basic scale-invariance (a definition of fractals). Scale invariance is a feature of objects or laws that do not change if length scales (or energy scales) are multiplied by a common factor.
- The sum of probabilities that makes a certain physical value appear at a certain position along the logarithmic scale can be graphically represented by means of the so-called Muiller fractal. Knowledge of just this fractal set, combined with additional understanding as to how the fractal is used in a specific application, allows the Global Scaling engineer to quickly and efficiently prognosticate values and parameters that otherwise would have been found only through a tedious process of trial and error. (Link)

$\uparrow$ The new fractal log-resonant perception of the universe, seeing self-similarity, nestedness and sym-phonic harmony.


Global Scaling
Die Basis ganzheiticher Naturwissenschatt

## SG301.7.1.2 Universal Scaling Law - Haramein \& Rausher

in their 2008 paper Scale Unification A Universal Scaling Law For Organized Matter, Nassim Haramein, Michael Hyson and Elizabeth A. Rauscher have collected data about resonance rates in the universe and plotting them against size, from lowest size (the Planck's length $=10^{-35}$ ) all the way up to the largest cosmological sizes. Comparing then frequencies, they found astonishingly coherent results.
If the universe was simply a randomly evolved collection of matter and energy as still believed by the scientific materialist established paradigm, there would be no relationship at all. But if there was an underlying unity or wholeness, then there would be some sort of relationship.
Comparing then frequencies, Haramein et al. found astonishingly coherent and "golden" results.

The graph shows an almost straight-line relationship.
On the vertical axis of the graph is the frequency (rate of vibration), from highest at the top to lowest at the bottom. On the horizontal axis is the radius of the object, from lowest to highest. At the top left is the Big Bang itself: a condition whereby all of the energy of the universe was crunched into a tiny primordial seed, called a singularity:
this is the smallest object with the highest rate of vibration. At the bottom right of the graph is the very largest object (marked "U" on the graph, for universe), which has the lowest frequency.

When the data points on this graph are analyzed, they demonstrate the Phi relationship: BB-U / BB-S :: A-U / U-S = PHI

$$
\mathrm{BB}-\mathrm{U}=1 ; \mathrm{BB}-\mathrm{S}=1 / \Phi=.618
$$

$$
A-U=1 ; U-S=.618
$$

What Haramein et al. have not shown on this graph is the position of the human cell. It is right in the middle of the graph (at the 10" line and marked "C") between "A" (atomic nuclei) and "S" (stellar). The human cell resonates at the frequency of about $10^{11} \mathrm{~Hz}$ (cycles, or vibrations, per second). Thus, this graph not only shows the holistic relationship between matter and energy in the universe, but it places life at the very center of the process. We are the interface between the micro and the macro. Haramein and Rauscher refrained from plotting the biological data point in the center of the graph, because it would seem controversial to the mainstream physics community.

## Scaling Law for All Organized Matter



个 Haramein-Rausher Universal Scaling Law.
The blue dot corresponds to the human cell.


When fractal scaling is further based on PHI (Golden Ratio) cascades, we have Golden Fractal Scaling (see ©SG203B, Chapter 1)
"Fractal Field Unified Theory" is the name used by Dan Winter combine the two principles of Fractality and the Golden Mean. It could also be called the "Golden Fractal Field Theory".

1-1-2-3-5-8-13-21...

"An inspiring new order of pure scientific principles, the Fractal Field operates and expresses itself through phase conjugation. Because a fractal is infinite compression, it is what spans the gap between the symmetries of the very small and the very large. Fractals exhibit self-similarity: their inner structure has the same pattern as their outer structure - like a pine cone or a fern tree. Just like fractality describes the geometry of waves of energy or charge, fractals manifest as wave patterns that evolve ad infinitum, like an encoded thread linking large spirals to infinitely smaller ones.

The concept of SYMMETRY is common to the Fractal Field and PHI. Symmetry is the language of nature, on all scales. Quantum physicists explain the zoo of fundamental particles as different facets of a symmetrical object. Relativity too is an expression of the symmetries that exist between space \& time. The Fractal Field Unified Theory illustrates that the perfect, infinite symmetry sought by physicists pre- and post-Einstein is a fractal and Golden ratio based conjugate field.

Practically speaking, PHASE CONJUGATION describes nature's ability to organize and correct itself on a global scale. It is implosion perfected by the Golden ratio, and the path that energy takes from chaos into life." (For more on Golden Implosion: \&SG203B, Chapter 6).

Dan's unified field theories have formed the basis of notable research around the world. In his book Implosion: the Secret Science of Ecstasy and Immortality, Dan has proposed a radical and dramatically exciting answer that is deeply challenging the community of physicists. Various physicists have joined him to explore the unified physics of the Golden Ratio and test his original hypothesis that the Golden ratio-based self-similarity is the electrical cause of gravity."

## Here is the way PHASE CONJUGATION

as constructive Adding \& Multiplying of Self Similar Wave Fronts ... CAUSES - Self Organization, Gravity, Perception, Color, and Bliss...


Because there is a place of perfect Plasma Compression at the Core - the Implosive Inertia Eliminates all Waves Which are out of phase- so it appears to Self Organize.

The hypothesis that the Golden Ratio is the essence of fractality - and thereby the root cause of gravity, along with all centripetal forces is groundbreaking in that it links waves of all kinds to a single fractal heart. (Dan Winter)

What if all the cosmic bodies (stars, galaxies, super-clusters...) actually are intelligent conscious macro-organisms? What if these macro-organisms are macro-beings of a totally incomprehensible nature to us and are integral parts of yet a much larger omni-conscious being, orchestrating the music of its existence by tuning its interactive parts with elegant harmony? Remember PHI? - The Lesser Part, the Middle Part and the Greater Part: all in golden ratio harmonic relationship...

The traditional wisdom of As Above, So Below might just have been the inner knowledge of the inherent Macro-Micro fractal self-similarity of the universe. The fact is that there is stunning fractal resonance, in terms of patterns of growth, between scales \& magnitudes of the universe. Let us be reminded that fractality is scale-invariant: regardless of the size, the geometry is similar. The spiral (preferably PHI-based or Golden) is ubiquitous throughout the cosmos and star events can look like giant-size biological displays.

With the advances in imaging technology on both extremes of the visual scale, we can expect that the field of Cosmic Fractal Resonance will blossom to give us abundant data \& proofs of the Grand Self-Similarity of the universe as it is re-creating itself "according to its image" (or original template of harmonic growth - also called Love).


个 "As Above, So Below".
SG301.7.2.1 Macro-Micro Fractal Gallery (1)


156
Alchemy engraving by Matthäus Merian, 1618.

SG301.7.2.2 Macro-Micro Fractal Gallery (2)


$\uparrow$ Cell structure


个 Center of the Milky Way.

## SG301.7.3 A Cosmos of Holo-In-Formation

[This page is an import from SG203B, Chapter6].
In the new scientific paradigm of the universe as a coherent, inter-connected, scale-invariant entity, the concept of INFORMATION become primordial. Information, on a cosmic scale, is beginning to be seen as all-pervasive and more fundamental than matter, energy or space and time. Transmitting coded information, through holographic wave-interference super-positions, may even be the very purpose of the ZPF or Vacuum/Plenum Field. Are we seeing, on a new turn of the evolutionary spiral, a re-discovery of the Akasha, the all-pervasive space of Hindu metaphysics, the location of the "Akashic Records"?

One of the most important aspect of waves is that they encode and carry information. When two waves phase conjugate, they create positive interference and exchange information: in fact, each wave contains all the information of the other. Interference patterns constantly accumulate information, in fractal and holographic ways that equip waves for a virtually infinite capacity of storage.

Information is emerging as the basic feature of nature - and therefore of physics. Moreover, it may well be an active factor that connects phenomena and informs their behavior. Physicist David Bohm (1917-1992) introduced the term "in-formation". In his book (co-written with B. Hiley) "The Undivided Universe: An Ontological Interpretation of Quantum Theory" (1993), Bohm explains that quantum processes - by which a determinate physical outcome emerges out of a multiplicity of potentialities - are accounted for in reference to a holographic field carrying active in-formation. In this context, "information" does not involve conventional (vectorial) energy, but the more subtle influence of scalars (torsion waves) that affect phase only. "This creates information of a particular variety: one that is physically effective without conveying manifest energy - it "in-forms" the system receiving it.

As explained by Ervin Laszlo in The Connectivity Hypothesis (2003): "Bohm's concept was anticipated by Einstein with his 'Guidance Field' (Führungsfeld) as a non-energetically in-forming field, governing the motion of particles in space-time. Although Einstein came close to incorporate this concept into his unified theory, he opted instead for the geometry of space-time to guide the motion of particles... However Einstein did note that the concept of a 'physical real ether' must be re-introduced in the worldview of physics, and his insight is now gaining validity."

Bohm's concept of a non-vectorially propagating "in-formation" has been found to exist beyond the quantum scales, and to be a factor in the evolution of the living world, consciousness and the universe as a whole. Many cutting-edge scientists are following on the steps of Einstein and Bohm and are exploring the fundamental role of in-formation and information coding fields, in a wide range of scientific domains. Among the pioneers: Harold Puthoff, (ZPF), Roger Penrose (Role of Consciousness), Fritz-Albert Popp (Bio-photon Emission), Laszlo Gazdag (re-interpretation of General Relativity), Hans Primas (Psycho-bio-physics), Marco Bischof (Integral Biophysics)...
> "What would emerge would be an increased understanding that all of us are immersed, both as living and physical beings, in an overall inter-penetrating and inter-dependent field in ecological balance with the cosmos as a whole, and that even the boundary lines between the physical and the 'meta-physical' would dissolve into a unitary viewpoint of the universe as a fluid, changing, energetic, informational cosmological unity." Harold Puthoff

The question of the 'shape and structure of the universe' has been an age-old quest, in all cultures. Explanations have come and gone, from descriptions of shamanic journeys to string theory... resulting in various cosmological models.

The scientific word for shape \& structure is topology. About 15 years ago, a small group of astronomers, interpreting the data from new probes and instrumentation, started to link cosmology and topology to try to give a shape and a size to the universe. They developed what is now called Cosmic Topology. One conclusion is already clear: large scale structures are characterized by a noticeable regularity and periodicity. Interestingly enough, the Platonic solids seem to be fitting the data, from the octahedron to the traditional dodecahedron. A reminder: the Platonic solids are self-nested and generate each other by the Golden ratio (\$SG107).

Around 2000, new data have allowed for the mapping of galactic super-clusters. It was found that they are gathered along lines \& intersecting points which form at least 4 locally identified octahedra. Below are the two closest octahedra, seen from our sun's position near their meeting point. The super-clusters, which may each contain billions of galaxies, are found along the edges and at the corners of the shapes, and relative voids are indeed found within the shapes.


个 The "egg carton" universe by Drs. E. Battaner and E. Florido showing the double octahedral distribution of galactic superclusters within our supercluster neighborhood. The Solar system (marked "Sun") is near the junction of the two octahedra.

$\uparrow$ Ideal scheme of the egg-carton universe formed with octahedra only contacting at their vertexes.

Battaner and Florido (1997).
"A fractal nature could be compatible with the octahedron web... There could be sub-octahedra within octahedra, at least in a limited range of length scales. The simplest possibility is 7 small octahedra contacting at their vertexes: they have their egg-carton structure within a large octahedron, the ratio of large/small octahedron size being equal to 3 . The fractal dimension becomes quantified, with 1.77 and 2 being the most plausible values. The scale of the fractal structure would range from 150 Mpc , i.e. slightly lower than the deepest surveys, down to about 10 Mpc ." [Link]
"The distribution of superclusters in the Local Supercluster neighborhood presents such a remarkable periodicity that some kind of network must fit the observed large scale structure... the real large-scale structure is actually fitted by the theoretical octahedron geometry".

## SG301.7.4.1 Cosmic

 Geometry (1) Galactic Octahedra
$\uparrow$ Overton crop circle
showing an octahedron fold-out.
159

## The Geometry of the Universe



A A page from the Manual of Sacred Geometry. Vol. 4. 2005.

Tracking the Plato's quote. The above quote by Plato was actually found in the dialogue "Phaedo". also known to ancient readers as Plato's On The Soul, it is one of the great classical dialogues. The Phaedo, which depicts the death of Socrates, is also Plato's fourth and last dialogue.
[110b] "If I may tell a story, Simmias, about the things on the earth that is below the heaven, and what they are like, it is well worth hearing. 'By all means, Socrates,' said Simmias, 'we should be glad to hear this story.' Well then, my friend, said he, to begin with, the carth when seen from above is said to look like those balls that are covered with twelve pieces of leather; it is divided into patches of various colors, of which the colors which we see here may be regarded as samples, such as painters use."

$\uparrow$ Star gazing in Egypt

$\uparrow$ Plato

In October 2003, new data about the cosmic background radiation brought by NASA's Wilkinson Microwave Anisotropy Probe (WMAP) may hint at a possible answer along the line of ancient Sacred Geometry: the universe is finite and resembles a dodecahedron.
Jeffrey Weeks and a team of French cosmologists (among them, J. P. Luminet), came to that model after careful measurements of the WMAP data. The density fluctuations of the cosmic background radiation can tell a lot about the physical shape \& structure of space. The conclusion was that the mathematics add up nicely to support a finite dodecahedral topology. [Link]
Mathematician George Ellis wrote: "Can this theory be confirmed? Yes, indeed", explaining that WMAP's successor will provide even more precise key data on the cosmic background radiation that will confirm or disprove Weeks \& colleagues' theory.

## SG301.7.4.3 Cosmic Geometry (3) The PDS <br> y (3)

The topological models of the universe are giving good results with a strong candidate the Platonic dodecahedron, called by mathematicians the Poincaré Dodecahedral Space (PDS), the traditional dodecahedron (and its dual, the icosahedron) gives a good fit with the actual CMB data provided by WMAP.

Note. we have to smile here: the name "PDS" gives the astronomers the feeling that they have made a brand new discovery. The truth is that the tradition of Sacred Geometry has said, since antiquity, that the dodecahedron IS the seed shape of the universe.

The Poincaré homology sphere (aka Poincaré dodecahedral space) is a particular example of a homology sphere. Being a spherical 3-manifold, it is the only homology 3 -sphere (besides the 3 -sphere itself) with a finite fundamental group (the binary icosahedral group with order 120).


T View from inside the PDS.



The spherical dodecahedron space $\Rightarrow$ as originally described by Threlfall \& Seifert, 1931.


161

## SG301.7.5 Inclusive Oneness

## The Golden Fractal Field Science of Oneness

As we have seen in SG202, the invention in India and the slow but inexorable adoption in the West of the current number system (1-9 plus zero) is what made possible the scientific materialism of the present western/international culture. It certainly allowed for an extraordinary explosion of technologies and life styles, but also brought about a host of dire consequences: a science \& philosophy of material reductionism \& determinism, the increased psycho-social alienation from wholeness and meaningfulness, a shift of control from religious to massive political-financial systems backed by blind legal-military enforcement, and the casual and short-sighted exploitation of nature \& people as commodities...


A personal \& collective mindset of ego-based competition and a separation from the oneness of life and the wholeness of the universe have been the insidious diseases of this modern culture now facing prompt replacement due to failure. A "spontaneous evolution", mandated by the now extent 6th mass extinction, is brewing and re-birthing a renewed global civilization of expanded consciousness.

The foundation of this New Paradigm is an awareness of the universe based on harmonic inclusiveness, i.e. oneness with each other, with the web of life and with the spirit of the universe. We are duly invited to re-enter the dance with the multi-dimensional Beingness of the universe. This new paradigm requires new tools for perceiving expanded realities: new PHI/fractal mathematics \& number systems, new non-local quantum physics of omni-connectivity, new music-color scales, new time navigation and calendars... All other aspects of civilization will follow on these premises: philosophical \& spiritual systems, languages, economics of sharing, architecture, arts, medicine $\&$ health, diets of living foods, life styles of peace \& harmony, psycho-spiritual well-being, new families \& communities...

A phenomenal display of human creativity is awaiting us as we enter this exciting \& inciting adventure of cosmic co-creation: moving towards the upcoming precessional Golden Age on Earth. It is premised upon adopting a new mathematical language derived from the fractal, globally coherent, phi-based, harmonic scale structure and interactive non-locality of the universe, as we are starting to understand it at the cutting edge of science and consciousness exploration.

Galactic-level science \& wisdom are the gifis and returns of embracing this ancient-future golden field and tending the Earth as a Golden Garden of celebrative creation.
As we enter the Garden, we are regaining our essential sense of belonging to larger wholes. We are vortexing into the super-spirals and hyper-mandalas of the harmonic orchestra playing the music of human evolution.


Vision of a celestial grid of light. (Link)


个 Young open star cluster IC 2944.
This is full of "life".

$\uparrow$ Static sketch of star lines in the region of the Pleiades. They are actually pulsing and ever changing.

SG301.7.6.1 Celestial Grids of Light (1)

When looking at the night sky with peripheral vision, instead of the usual focused vision, it becomes possible to see, in between stars, lines of energy looking like filaments of light. Some are faint \& tenuous, others are clearly charged with high energy, like superhighways, but they all feel alive, vibrant, pulsing.

These lines, which can be called "sky ley lines", are not necessarily connecting stars within the same constellation, as we would expect. They appear to be mapping pathways of resonance that are beyond conventional 3D astronomy. These lines might possibly be indicators of higher dimensional circuits for light/consciousness circulation/distribution... They might also be filaments of the Cosmic Web now identified by astronomers (see supra).

Quote from a friend who enjoys looking at the night sky and seeing much happening there:
"There are white energy cords or lines between stars, stars connected to particular stars and not others, some energy cords appearing brighter than others, sometimes an impression of a pulse of energy along a cord, sent from one star to its connected star. When you look up at the night sky and take it all in, there is the impression that the stars in our heavens are meaningfully connected, and to view many of these energy cords at once is to see criss-crossing everywhere through the night sky.

And so while there are the pretty zodiac signs of Aquarius and Pisces and Sagittarius etc, there is also the question in my mind of whether they might be true depiction of actual interconnection discovered by ancient astronomers.

As we gain greater scientific knowledge and awareness of the energy in a droplet of water, a cement wall, a sky, we come to find that everything is energy. That there is meaning and design in it, a particular star connected to a particular specific star, that is awesome. So this is not just energy flow we're talking about, but design. And that opens up the question why, and what is this all about?" (K. N.)


SG301.7.6.2 Celestial Grids of

Light (2)

In 1988, Aya created this StarWheel as a vision of celestial harmony. "Pagoda Heaven".
Below is the StarWheel Sutra for this painting.
A display of heavenly fire-works. It is festivity time. The central burst of Light becomes the many tongues
speaking of new worlds, endlessly.
A spark of Spirit is dropped into the Ocean of Milk: a myriad splashes are born creating their own droplets. One is Many.
The Sourcing Hostess
is welcoming countless guests. Over the horizon, earthling pagodas point up to alignment with their lacy celestial counterparts. Pagodas are evolutionary vortical star-streams: they live for an instant on the wings of a drop of light, bridging universes \& connecting galaxies.

The living fingers of creation lovingly reach out from the Holy Hand.
Each pagoda whirls like a prayer wheel to sound forth a unique modulation on the basic mantra of life:

Joyous Happiness.
Many is One.


Celestial navigation has guided man around the world cons. Recent studies have showed that birds \& seals are also using star guides.

Now scientists from South Africa and Sweden have published findings showing the resonance link between dung beetles and the spray of stars of our Milky Way, thus giving new meaning to dancing with the stars!

The beetles have a hierarchy of preference when it comes to available light sources of reference. If the moon and the Milky Way are visible at the same time, the beetles zero in the galaxy.

Source: Marie Dacke and al. Dung Beetles Use the Milky Way for Orientation. Current Biology, 2013. [Link]

## SG301.7.7 Celestial Navigation in Birds, Seals \& Insects

Many animals, small \& large, have a remarkable homing instinct. Migratory birds are able to return to the same area year after year, even when their migration takes them halfway around the world. Seals and other marine mammals have an uncanny ability for offshore navigation. In order to accomplish these feats, there is a need for both an internal map and one (or several) internal compass systems to guide the journey and keep it on course. Current research points to the simultaneous use of several maps \& compass systems combined in an elaborate innate GPS. The history of research into animal navigation is quite revealing:

- Initial explanations relied on sensory cues, such as olfactory or visual, but was falling short of being a real explanation.
- Further theories emphasized the role of the earth magnetic field as sensed by elaborate antenna systems (internal or external). The earth's magnetic field becomes stronger as one travels away from the equator and toward the poles. In theory, a bird might be able to estimate its latitude based on the strength of the magnetic field.
- In 1951 Gustav Kramer discovered the sun compass. Further research revealed that the bird's sun compass is tied to its circadian rhythm. It seems birds have a time compensation ability to make allowances for changes in the sun's position over the course of the day. Study has also revealed that pigeons have to learn the sun's path to use it in navigation.
- In 1957 Franz and Eleanor Saur demonstrated that birds do use the stars for migration, via a star compass.
- In 1967, Stephen Hemler showed that birds learn a North-South orientation system from a rotational star pattern: one group of birds was raised in a windowless room, but on alternate nights was exposed to a simulated night sky in the planetarium, manipulated to rotate about the star Betelgeuse. When release in the planetarium with normal sky, these birds oriented themselves away from Betelgeuse.
- In 2001, experiments by Mouritsen \& Larsen (2001) suggested that young pied flycatchers \& blackcaps use a time-independent star compass based on learned geometrical star configurations to pinpoint the rotational point of the starry sky (North). [Link]
- More recently, experiments indicated that night-migrating birds learn and orient by spatial relationships among the constellations, rather than using information supplied by any single star. Birds begin to develop star compass capability when they are quite young, and as experienced adults they can use many parts of the sky to decipher compass directions. [Link]
- In 2008, Mauck and al. showed that Harbour seals learned to highly accurately identify a lodestar out of a pseudo-randomly oriented, realistic projection of the northern hemisphere night sky. This is providing the first evidence for star orientation capability in a marine mammal as the seals' outstanding directional precision would allow them to steer by following lodestars of learned star courses. Celestial navigation has been used by Polynesian sailors but had not been considered for animals yet. [Link].
- In 2013, beetles were proven to use the Milky Way for navigation, via a galactic compass. (see left box).


Animals might prove to be a lot more cosmically

## SG301.7.8 Quantum Cosmology

## We quote here from Robert Lanza's clear and pertinent explanations. (Lanza. Link)

"Quantum mechanics is the physicist's most accurate model for describing the world of the atom. But it also makes some of the most persuasive arguments that conscious perception is integral to the workings of the universe. Quantum theory tells us that an unobserved small object (for instance, an electron or a photon's particle of light) exists only in a blurry, unpredictable state, with no well-defined location or motion until the moment it is observed. This is Werner Heisenberg's famous Uncertainty Principle. Physicists describe the phantom, not-yet-manifest condition as a wave function, a mathematical expression used to find the probability that a particle will appear in any given place.
When a property of an electron suddenly switches from possibility to reality, physicists say its wave function has collapsed. What accomplishes this collapse? Messing with it. Hitting it with a bit of light in order to take its picture. Just looking at it does the job. Experiments suggest that mere knowledge in the experimenter's mind is sufficient to collapse a wave function and convert possibility to reality.
When particles are created as a pair - for instance, two electrons in a single atom that move or spin together - physicists call them entangled. Due to their intimate connection, entangled particles share a wave function... If one photon is observed to have a vertical polarization, the act of observation causes the other to instantly go to the opposite, horizontal polarity - even if the two photons have since moved far from each other.

Recent quantum studies help illustrate what a new biocentric science would look like. Recently, Nicolas Gisin announced a new twist on his entanglement experiment; in this case, he thinks the results could be visible to the naked eye. At the University of Vienna, Anton Zeilinger's work with huge molecules called buckyballs [SG...] pushes quantum reality closer to the macroscopic world. In an exciting extension of this work, proposed by Roger Penrose, the renowned Oxford physicist, not just light but a small mirror that reflects it becomes part of an entangled quantum system, one that is billions of times larger than a buckyball. If the proposed experiment ends up confirming Penrose's idea, it would also confirm that quantum effects apply to human-scale objects. (Note: ...and astronomical objects.)

Before these experiments most physicists believed in an objective, independent universe. They still clung to the assumption that physical states exist in some absolute sense before they are measured. All of this is now gone for keeps." (Lanza. Link)

It may be that, at the extreme of the macro scale, we are peering back into the quantum scale.

## Quantum Space \& Time

"In daily life, space and time are harmless illusions. A problem arises only because, by treating these as fundamental and independent things, science picks a completely wrong starting point for investigations into the nature of reality. Most researchers still believe they can build from one side of nature, the physical, without the other side, the living. (Note: ...and conscious.)

## Time

The reality of time has long been questioned by philosophers and is now overturned by cutting edge science. According to quantum experiments, time does not exist independently of the consciousness that notices it. Everything we perceive is being reconstructed inside our heads in an organized whirl of information.
Time in this sense can be defined as the summation of spatial states occurring inside the mind. So what is real? ... We can award that change with the word time, but that does not mean there is an actual invisible matrix in which changes occur. That is just our own way of making sense of things.

## Space

There is a peculiar intangibility to space, as well. We cannot pick it up and bring it to the laboratory. Most of us still think like Newton, regarding space as sort of a vast container that has no walls. But our notion of space is false:

1. Distances between objects mutate depending on conditions like gravity and velocity, as described by Einstein's relativity, so that there is no absolute distance between anything and anything else.
2. Empty space, as described by quantum mechanics, is in fact not empty but full of potential particles and fields.
3. Quantum theory even casts doubt on the notion that distant objects are truly separated, since entangled particles can act in unison even if separated by the width of a galaxy.

Like time, space is neither physical nor fundamentally real. Rather, it is a mode of interpretation and understanding. It is part of an animal's mental software that molds sensations into multidimensional objects."

Ray Tomes is a highly-respected mathematician who has dedicated his life to researching harmonic theory and calculating the complex cycles of nature and human interactions. Hailing from New Zealand, Ray Tomes began his research career years ago with the mathematical analysis of stock market data which culminated in the discovery of numerous known and previously undiscovered cycles. Since then, he has developed his Harmonic Theory of the Universe.
"There are cycles in everything. There are cycles in the weather, the economy, the sun, wars, geological formations, atomic vibrations, climate, human moods, the motions of the planets, populations of animals, the occurrence of diseases, the prices of commodities and shares and the large scale structure of the universe. None of these are independent of each other. Research shows that very different disciplines often find the same cycle periods in their data. The inter-relatedness of all things is an idea whose time has come. The study of cycles is an excellent way to understand this because the periods of cycles are as easy to recognize as fingerprints or DNA sequences." (Ray Tomes).

Harmonics theory is very clear in the order of formation from the top down and not the bottom up. This easily explains the large scale structure in the universe such as the galactic supercluster scale.

Ray Tomes explains the simple basic concept:
"The Universe consists of a standing wave which develops harmonically related standing waves and each of these does the same."

$\uparrow$ Relative strength of Harmonics 1-100.
These harmonics are related by ratios of prime numbers.

SG301.7.9.1 Harmonic Cosmology (1)


Harmonic Cosmology expands on tbe good old concept of RESONANCE between natural oscillations. While old paradigm logic implies the disjunction of object and subject, resonance involves their conjunction, their 'unison', their co-immersion. While logic and reasoning require the separation and individualization, resonance creates togetherness, sym-pathy, sym-phony, 'love', and brings the collapse of the walls between perceiver and perceived.

Resonance in now found in all aspects of of biology, physics and cosmology. With the recognition of the primary role of the Quantum Field, many aspects of an overall Cosmic Resonance have come into view: quantum coherence, super-radiance, selfinduced transparency, super-conductivity, self-similarity, entanglement, Phi-based fractality... The realization is that all levels of the universe and all life forms are exquisitely in tuned resonance with each other. (See -SG204)

The cycles of (exact) fractional periods are called 'harmonics' of the original cycle. Tomes worked out a number relationship between the harmonics that corresponds to the ancient Just Intonation Scale: 24, 27, 30, 32, 36, 40, 45, 48. These harmonics fit together in many ways: for example the values $24,30,36,40$ are in the proportion 4:5:6:8 and make a major chord. So the values $32,40,48$ are a major chord... It is the richness of harmonic relationships which gives clues about a cycle and its 'life story'.
"Reality cannot be found except in One single source, because of the interconnection of all things with one another." (Leibniz, 1670)

Harmonics and the Just Intonation Scale


Indian Music
Harmonic relationships in Indian music include ratios of 2, 3, 5 and 7 .

"The universe is a musical instrument and everything in it is vibrating in tune with the larger things that contain it. There are no other laws in the universe than this. All the other laws of physics appear to be the result of the wave structure that leads to the Harmonic law." (Tomes)

SG301.7.9.2 Harmonic Cosmology (2)
"When much data from different fields of study are brought together it is clear that there are certain cycle periods which occur quite commonly. These periods are related to each other harmonically in exactly the same way that musical notes are.

Starting from a single low frequency, non-linear systems can generate harmonics which are multiples of that frequency. In a complex system (such as the universe) it seems that the harmonics generated may take on a life of their own and proceed to generate further harmonics of their own frequency. Once this happens some frequencies will be produced in many more ways than others. These frequencies are the ones that are harmonics of the original where the harmonic number has many ways to be factorized such as 12 and 24 and the just intonation scale of $48,54,60,64,72,80,90,96$." (Tomes. Link)

The Longest Wave
The harmonics theory predicts that, compared to the entire observable universe taken as the fundamental oscillation, the 34560 th harmonic is essential. It also predicts that at further ratios of 34,560 (including cubical harmonics) in size there will be important oscillations. Factors of 34,560 are $2 * 2 * 2 * 2 * 2 * 2 * 2$ * 2 * 3 * 3 * 3 * 5 . The number 34,560 has 72 divisors.


世 When we do the calculations from the size of the observable universe we find that the 34560 harmonic predicts the correct typical distances between galaxies, stars, planets and so on.

Eventually we get the typical distance between cells, atoms and nucleons (protons and neutrons).

So the entire structure of the universe is predicted from this one simple principle.

## SG301.7.10 A Higher-Dimensional Live Universe

"The cosmos is continuously regenerated. For decades, the dominant cosmology in contemporary physics has held that creation ended with the Big Bang some fourteen billion years ago and that, since then, nothing more has happened than a rearranging of the cosmic furniture. Because traditional physicists think of creation as a one-time miracle from nothing, they regard the contents of the universe such as trees, rocks, and people as being constituted from ancient matter. In sum, the dead-universe theory assumes creation occurred billions of years ago, when a massive explosion spewed out lifeless material debris into equally lifeless space and has, by random processes, organized itself into life forms on the remote planet-island called Earth.

In striking contrast, the living-universe theory proposes that the cosmos is completely recreated at each moment, and is maintained, moment by moment, by an unbroken flowthrough of energy. Imagine the cosmos as the vortex of a tornado or a whirlpool, as a completely dynamic structure. David Bohm calls the universe an undivided wholeness in flowing movement. In this view, our universe has no freestanding material existence of its own. The entire cosmos is being regenerated at each instant in a single symphony of expression that unfolds from the most minute aspects of the subatomic realm to the vast reaches of thousands of billions of galactic systems. It overwhelms the imagination to consider the size and complexity of our cosmos with its billions of galaxies and trillions of planetary systems, all partaking in a continuous flow of creation. How can it be so vast, so subtle, so precise, and so powerful? We are not stuff that abides, but patterns that perpetuate themselves; whirlpools of water in an ever-flowing river, states the mathematician Norbert Wiener. Physicist Max Born, adds: we have sought for firm ground and found none. The deeper we penetrate, the more restless becomes the universe; all is rushing about and vibrating in a wild dance. Physicist Brian Swimme tells us, the universe emerges out of an all-nourishing abyss not only twelve billion years ago but in every moment.

Everything that exists contributes to the cosmic web of life at each moment, whether it is conscious of its contribution or not. In turn, it is the consistency of interrelations of all the parts of the universe that determines the condition of the whole. We therefore have great freedom to act within the limits established by the larger web of life within which we are immersed. Our universe is infused with an immense amount of energy, and is being continuously regenerated in its entirety, while making use of a capacity or consciousness throughout. As an evolving, growing, and learning system, it is natural that freedom exists at the quantum foundations of the universe. It even appears that the universe has the ability to reproduce itself through the mechanism of black holes. When we put all of these properties together, it suggests an even more spacious view of our cosmic system." (Duane Elgin. Link).


We are calted as the human species to enter in conscious communion with our smaller \& Carger selves.

We are called to ascend the 'fractalline' Cadder of the Golden Ratio, as the harmonic scaling constant of the universe.

We are called to inherit again a wisdom understanding of the reniverse from a cosmic perspective.
"In the end you'll see how the human body is interconnected at all scales with the architecture of the universe. Don't you see, we don't live in a dead universe tending toward entropy and nihilism as science would have you believe. We are travelers in a magical universe, interconnected with all things: as above, so below." (Scott Onstott. Link)

## SG301.7.11.1 Who is the Universe? (1)

"I would say that if 'dead' matter has reared up this curious landscape of fiddling crickets, song sparrows, and wondering men, it must be plain even to the most devoted materialist that the matter of which he speaks contains amazing, if not dreadful powers, and may not impossibly be, as Thomas Hardy has suggested,
'but one mask of many worn by the Great Face behind.'"

As we arrive at yet another turn of the spiral of human consciousness, we are opening again to the ancient cosmological intuition of the universe (and ourselves within it) as a gigantic living being ("Cosmos"), orchestrating all life and consciousness with golden fractal harmony and holographic oneness. Below is a quotation by biologist Robert Lanza, retrieved when googling <Is the Universe One Big Living Organism?>
"All life can be traced back to some single-celled organism in the early Archean sea. Today - nearly 4 billion years later - you and I find ourselves sharing the planet with elephants and whales, and over 8 million other eukaryotic species. Clearly, we are all interrelated, but are we part of a single and absolute totality, a common being? Are we like the hundreds of different types of cells in our body that are constantly dying and being replaced, part of a complex organism greater than ourselves?

There is nothing in modern physics that explains how a group of molecules in your brain creates consciousness. The beauty of a flower, the miracle of falling in love, the taste of a delicious meal, these are a scientific mystery on par with the origins of the universe...

When you think of a living organism, you think of how its parts operate as a unified whole, much like the workings of a fine watch. For instance, the cells in leaves produce food for a plant, converting the energy in sunlight into chemical energy that it can use as food. The cells in its stems and branches transport food and water from the leaves and roots to the whole organism. Of course, instead of branches, we vertebrates have bones for support, and muscles that give us the ability to locomote, to hunt and scavenge for food. This dynamic cellular interrelationship occurs at the interspecies level, as well, not only in our gut but on a planet-wide scale. We oxygen-breathing lifeforms continuously inhale oxygen $\left(\mathrm{O}_{2}\right)$ and then exhale carbon dioxide $\left(\mathrm{CO}_{2}\right)$; plants then take in the $\mathrm{CO}_{2}$ and use it in their photosynthesis process and in turn give off or "exhale" oxygen...

At first glance, it seems bizarre that a frog in the rain forest or a dolphin in the ocean should be directly connected to us. But they are the subjects of the same reality that interested John Bell, the physicist who proposed an experiment, verified by Alain Aspect and his colleagues in 1982, that showed once and for all that at least on a quantum level, what happens locally is affected by nonlocal events. Surely this is what Spinoza predicted when he contended that consciousness cannot exist simply in space and time, and at the same time be aware, as it is, of the interrelations of all parts of space and time. Our individual separateness in space and time (as, for instance, the apatosaurus and velociraptors of the Jurassic Period, the pandas in China, or the mountain gorillas of East Africa) is, in a sense, illusory. We are all melted together, parts of an organism that transcends the walls of space and time...

If we could see behind the fiddling crickets and song sparrows, before the first single-cell organism, and after the last man and woman, only you would remain -- you, the Great Face behind, that consciousness whose mode of thinking contains the frog, the dolphin and the whales. Nay, that contains the world."

## SG301.7.11.2 Who is the Universe? (2)

 Oneness and Love

Some of our
astronomical data are quite astounding in terms of the images they evoke...

Graduating from "What is?" to "Who is?"...


## SG301.7.12 Is There a Mother Universe?

Are we living within a Daughter Universe that, for 12 billion years, has been living and growing within the womb-like space of a Mother Universe?

The Mother Universe may have existed for much longer than the young life of her daughter universe, as she may have been holding countless daughter universes in her grand embrace. Is She the Great Mother revered by ancient cultures? Is She the Womb or Source Universe, the Place of Origin?
"A new picture of the universe is emerging, one of a vast cosmic interdependence and connectedness. From first cosmos to last electron, the whole universe is a complex of coils within coils, spirals within spirals, magnetic fields within magnetic fields. The stars are interconnected to each other, exchanging particles and gases constantly, all flowing down the magnetic field lines or arteries of the galactic body. Scientists now feel it's very likely the galaxy's coiled field lines diverge into intergalactic space where they may ultimately be connected to other galaxies. Are these tendrils of energy the nervous system of the galaxy, relaying information from star to star, galaxy to galaxy, on and on? One can only wonder."


Denise St. Denis. (Link)

## SG301. Conclusion



## SG301.Cb School of Sacred Geometry - Curriculum (1)

Sacred Geometry Introductory Level: 8 Modules
SG 101 Intro I Sacred Geometry: Universal Order \& Beauty
SG 102 Intro II History \& Traditions of Sacred Geometry
SG 103 Intro III
SG 104 Intro IV
SG 105 Intro V
SG 106 Intro VI
SG 107 Intro VII
SG 108 Intro VIII Sacred Geometry: A Grand Tour PHI: the Golden Ratio \& the Fibonacci Series The Golden Rectangle \& Golden Spiral Pentagons, Pentagrams \& the Penta-Modules The Five Platonic \& 13 Archimedean Solids
The Vesica Piscis: Cosmic Womb of Creation
Sacred Geometry Intermediate Level: 8 modules
SG 201 Interm I The Monochord, Music \& Cymatics
SG 202 Interm II The Power of Archetypal Numbers
SG 203A Interm IIIA Sacred Geometry Resurgence in Science - Part 1
SG 203B Interm IIIB Sacred Geometry Resurgence in Science - Part 2
SG 204 Interm IV PHI in the Human Body, Biology \& DNA
SG 205A Interm VA Sacred Geometry in Nature - Part 1: Plants
SG 205B Interm VB Sacred Geometry in Nature - Part 2: Minerals \& Animals
SG 207 Interm VII SG in Architecture, Sacred Sites \& Green Design

## SG301.Ce School of Sacred Geometry - Curriculum (2)

Sacred Geometry Advanced Level: 8 modules
SG 301 Adv I Golden Cosmos: Planets, Stars \& Cosmology
SG 302 Adv II SG in Art, Culture \& Creativity
SG 303 Adv III Universal Symbols: Geometric Knowledge
SG 304 Adv IV Labyrinths: Mini Pilgrimages to Self
SG 305 Adv V Mandalas \& Yantras: Sacred Vortices
SG 306 Adv VI Languages \& Gematrias: Sacred Communication
SG 307 Adv VII Sacred Geometry in the Healing Arts
SG 308 Adv VIII Science of Harmonics \& Consciousness of Harmony

Upon completion of each level (Introductory, Intermediate \& Advanced), a Certificate of Graduation from the Sedona School of Sacred Geometry will be presented to Certification Students.

Postgraduate seminars on current Sacred Geometry research, discoveries \& updates will be organized in the Harmonic Future.

Questions: phi@schoolofsacredgeometry.org


[^0]:    "Our existence does not just depend on all of these constants having the right values one by one. It also depends on all of them being exactly right in combination. One cosmologist, Lee Smolin, estimates that the probability of all these constants of nature together having values that allow for the emergence of our kind of life is as low as $10^{220}$ - a number greater that the total number of atoms in the universe." (Calleman. Link).

[^1]:    Ratios between the inner planets of the solar system. (H. Warm. Signature. p. 280)

