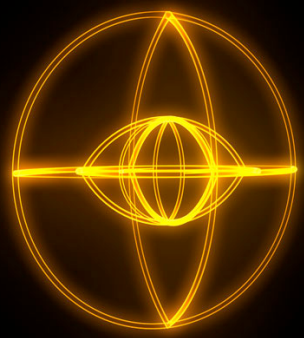
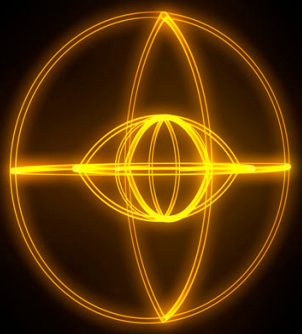




Visualizing sublime: intuitive approach to geometric construction

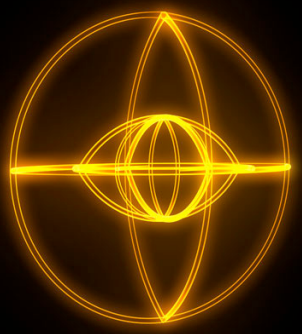
Eugenia Emets

2010



Content:

- ◎ Context of work
- ◎ 'Okean X Forms' 2007
- ◎ 'Manta Ray' 2008
- ◎ 'The Echo of Now' 2008 - present
- ◎ 'A-Field' 2010 - work in progress



Context of work:

Working with Space:

- Finding the center (ritual of orientation) - gnomon and bindu - creating a sacred space from a single point
- Transforming a space - working with architectural and cultural monuments
- Creating immersive environment - addressing the senses of the participants / audience
- Qualities of Space: Interactivity, Immersion, Invisible structure



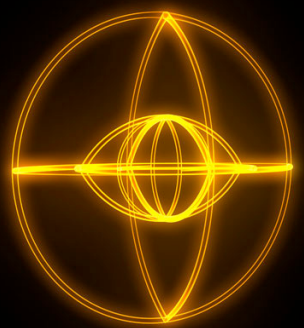
Two Borneo tribesmen measure the sun's shadow at summer solstice, the longest day of the year, producing the shortest shadow.



Alan Bean, Cernan, Gnomon, and Crater



Emets Eugenia, The Echo of Now, Bargehouse



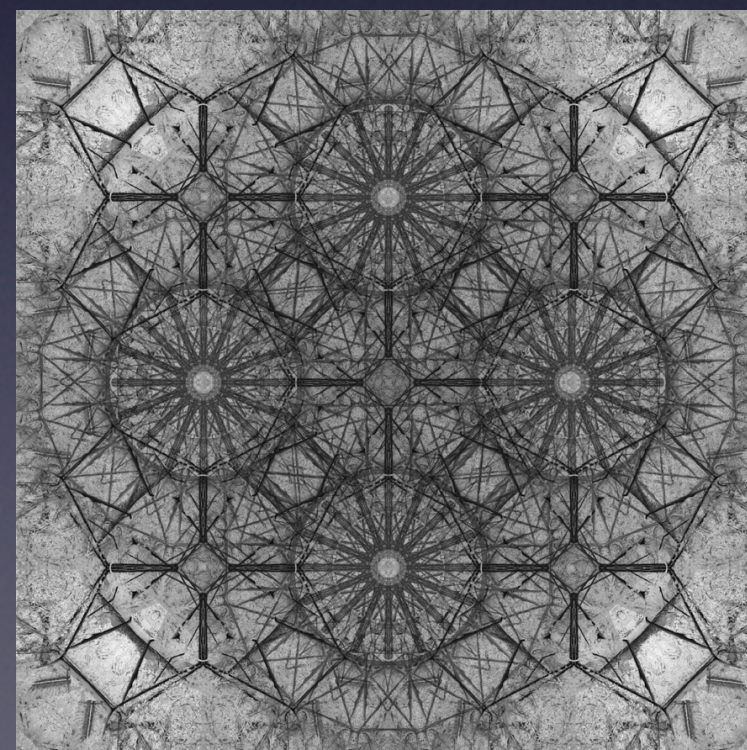
Context of work:

Geometry:

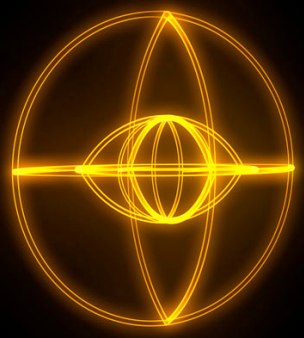
- Use of geometric forms / proportions / transformations
- Researching harmonious relationships between form/structure and energy (within tradition and experimentation)
- Observation of movement and transformations in dynamic form
- Use of optical illusions
- 'Mandala' - a graphic 2D representation of 3D 'palace'



Kalachakra Mandala 2D and 3D representation



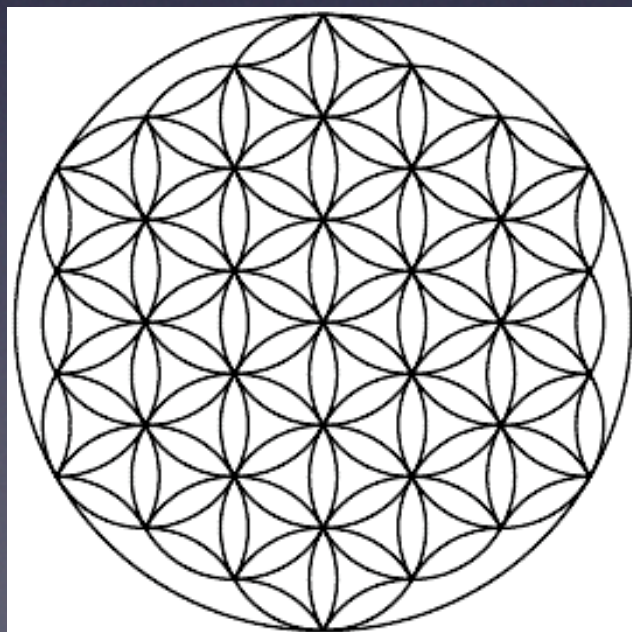
Eugenia Emets, Antialbion, 2009



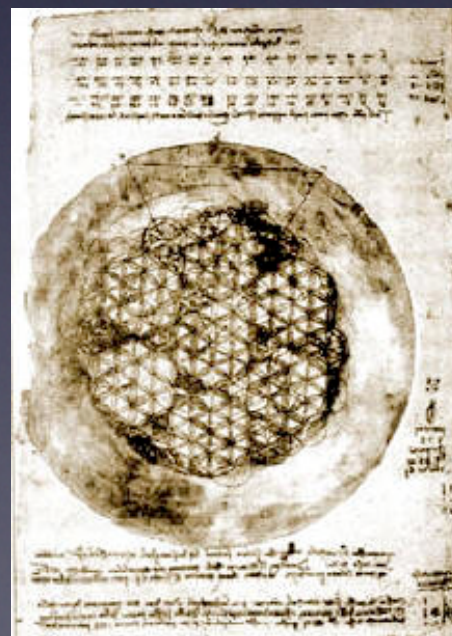
Okean X Forms (2007): research and ideas

Ideas behind the project:

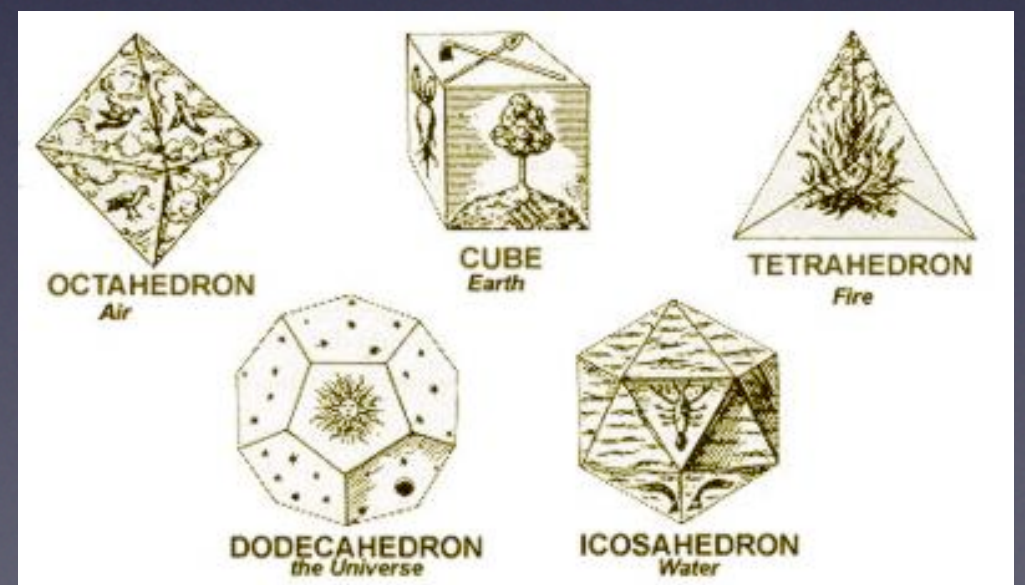
- Transformation of flat geometry into 3D
- Shifting perception / position of the viewer
- Primary polygons / platonic solids
- Emerge from sphere, transform into each other
- Aesthetics: precise laser beam projected onto a transparent gauze creates a 3D illusion in space



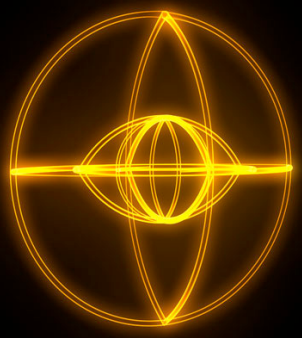
Flower of Life



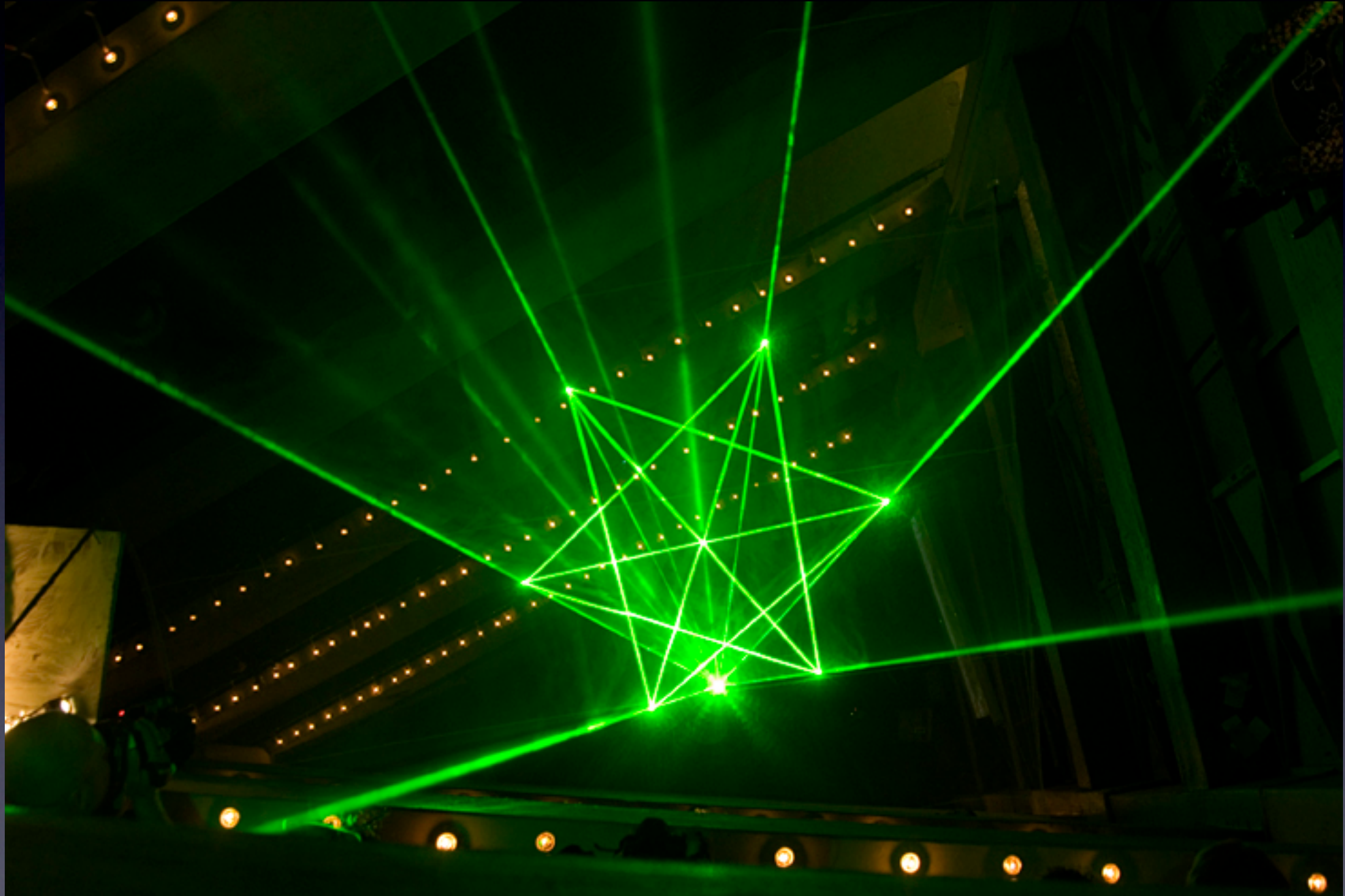
Leonardo's Flower



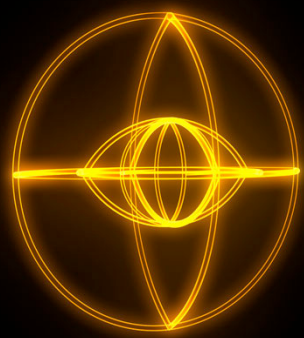
5 Platonic Solids with symbolism



Okean X Forms



Okean X Forms, Pandus 2007



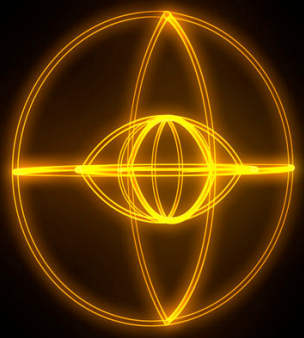
Manta Ray: research and ideas

Research:

- Vesica Pisces
- Nature and geometry of electromagnetic spectrum vibration (sound and light form)
- Principle of fractal growth

Aesthetic ideas:

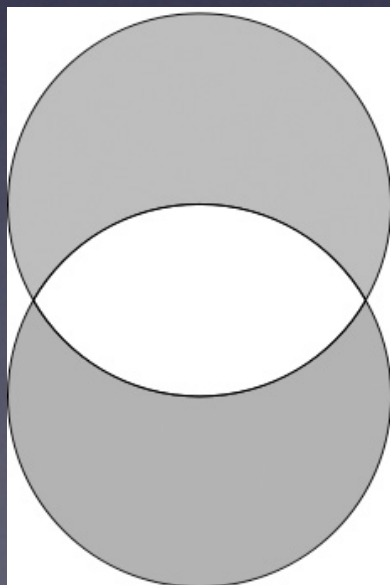
- Possibilities of creating holographic dynamic light sculpture
- Immersive environment
- Position of the observer within the virtual and physical installation space: observer participates in the process of creation
- View of being inside / outside the system



Manta Ray: research and ideas

Vesica Pisces: Geometry and symbolism

- shape created in the intersection of two equal circles (passing through the center of each other)
- symbolism: in Christianity - symbol of the Virgin (the womb), unity in duality (Keith Critchlow), balancing consciousness (intersection of lunar and solar energy)(Robert Lawlor), symbol of fish, eye, seed etc.



Vesica Pisces, wiki



Christ in Vesica Pisces, from web, unknown



Eye as Vesica Pisces, from web, unknown



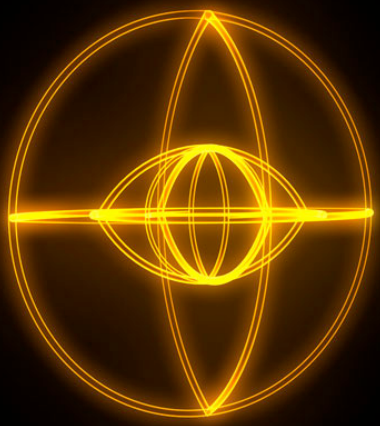
Eye in Vesica Pisces, Eugenia Emets



Geometry and symbolism: Vesica Pisces


$$CD = \sqrt{(CG^2 - DG^2)} = \sqrt{3}$$

(Pythagorean Theorem)



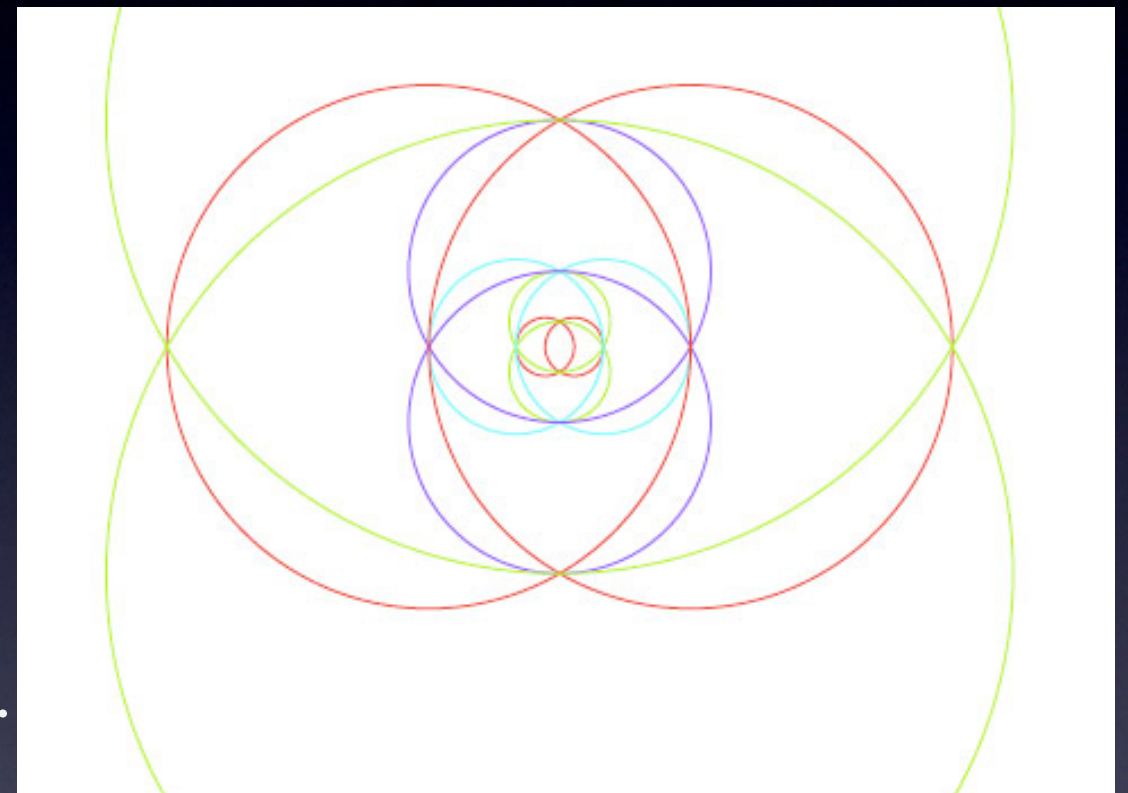
Manta Ray: research and ideas

An iteration in the plane

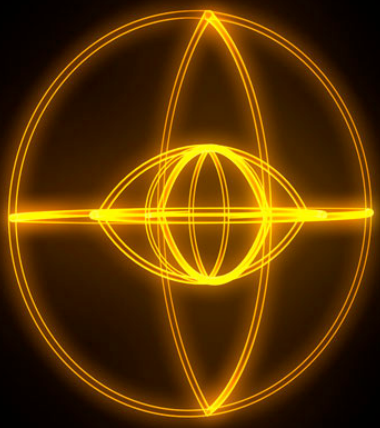
Start with two points P, P'

Construct circles C, C' with centres P, P' passing through P, P' respectively.

Replace P, P' by the intersection points Q, Q' of C and C' and repeat indefinitely ...

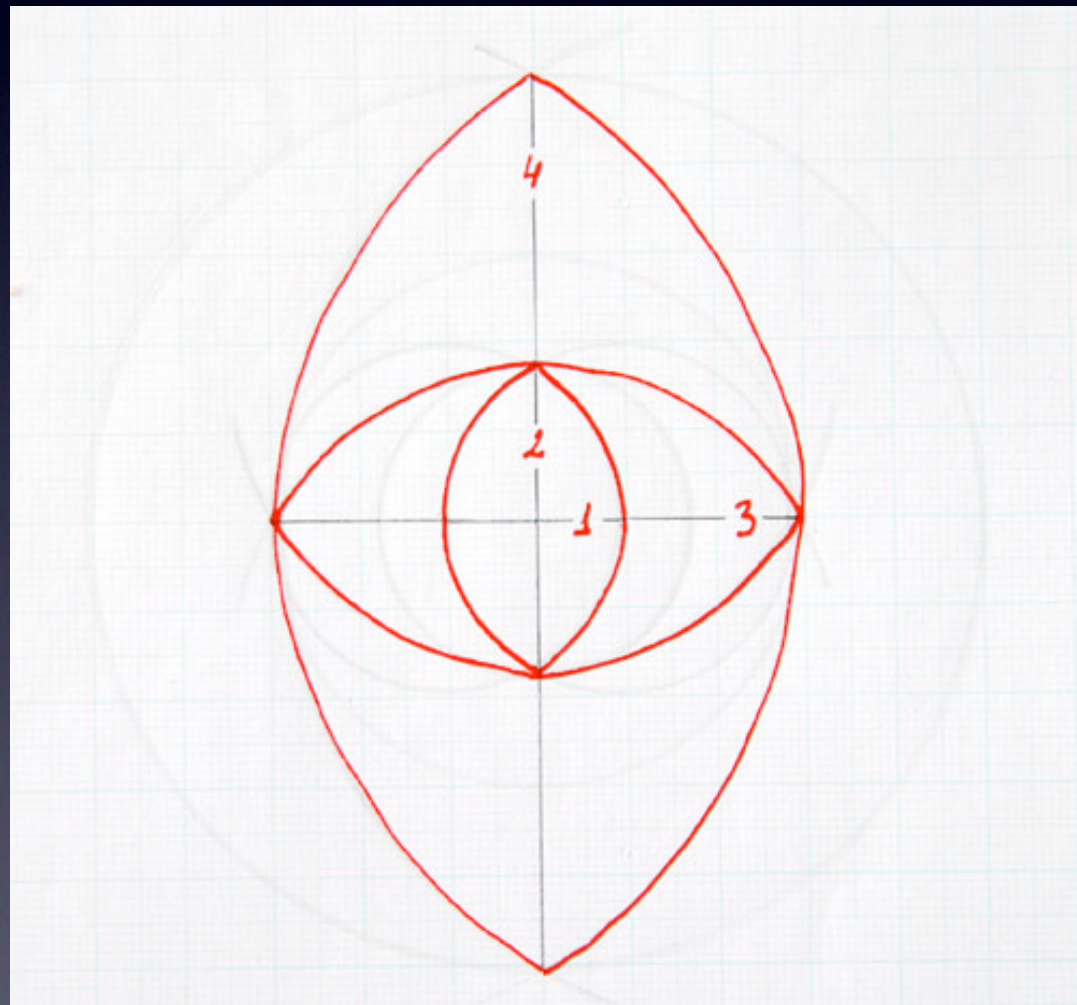


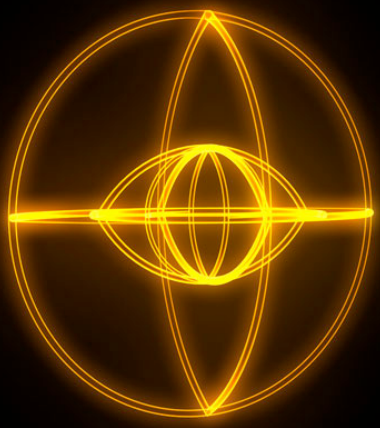
The circles get bigger by a factor $\sqrt{3}$ each time.
Or invert the operation so the circles get smaller



Manta Ray: research and ideas

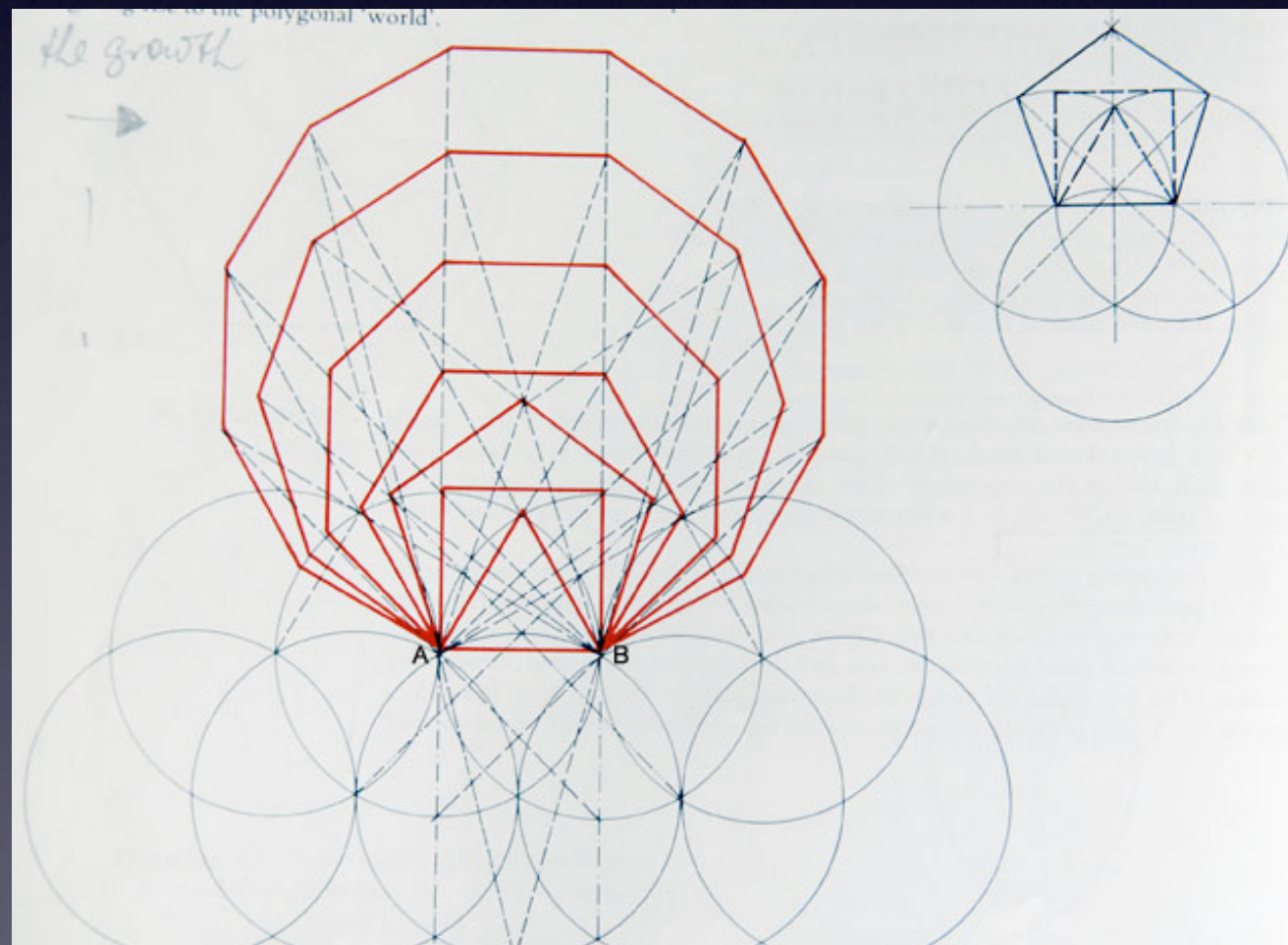
$$\text{axis 1/axis 2} : \text{axis 2/axis 3} : \text{axis 3/axis 4} = 1/\sqrt{3} : \sqrt{3}/3 : 3/3\sqrt{3}$$

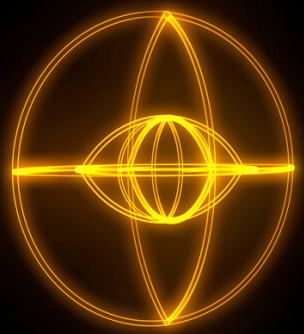




Manta Ray: research and ideas

Vesica as a seed: from AB unfolds equilateral triangle, which successively defines the sides of the square (4), pentagon (5), hexagon (6), octagon (8), decagon (10) and dodecagon (12).

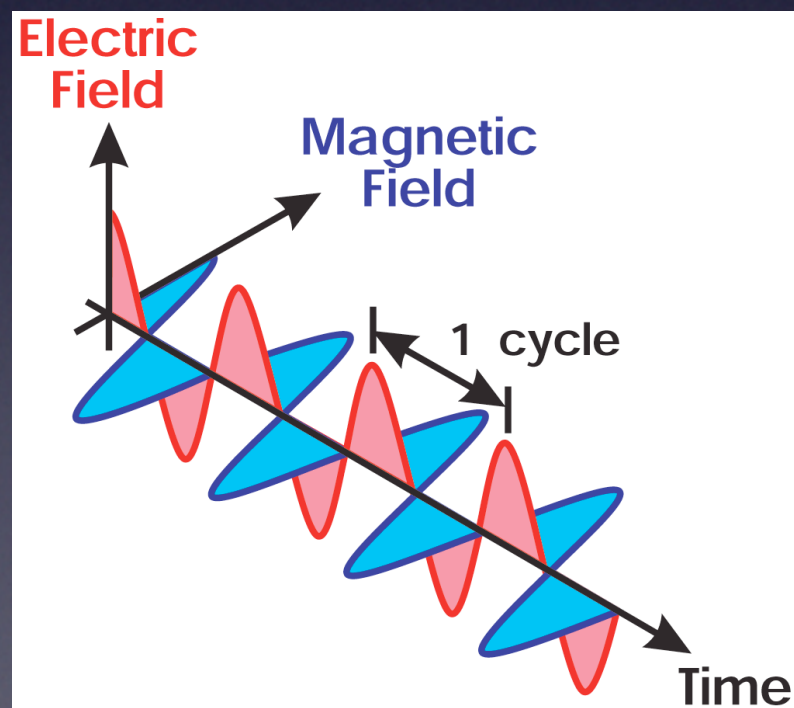




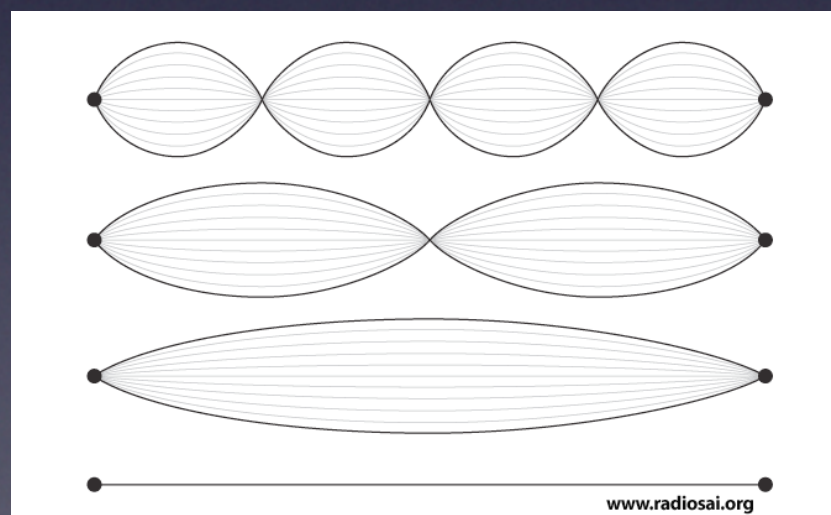
Manta Ray: research and ideas

Vesica Pisces and the geometry of vibration:

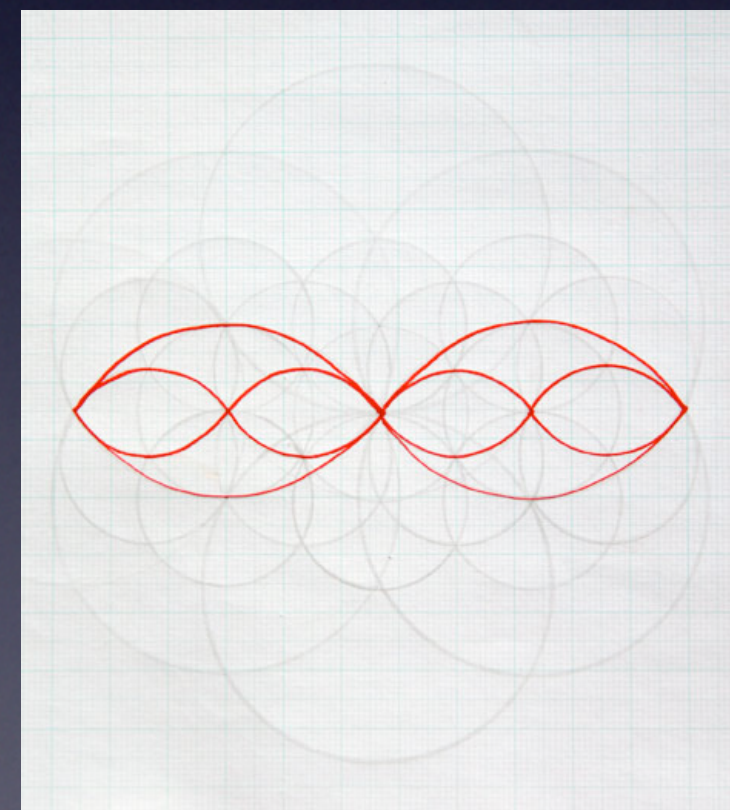
- fractal nature
- transformation from 2D to 3D



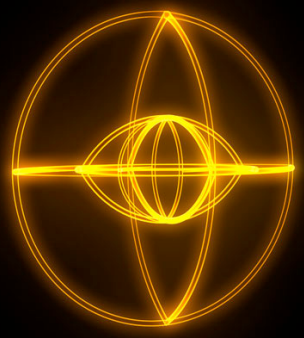
Web, unknown



Vibrating String,



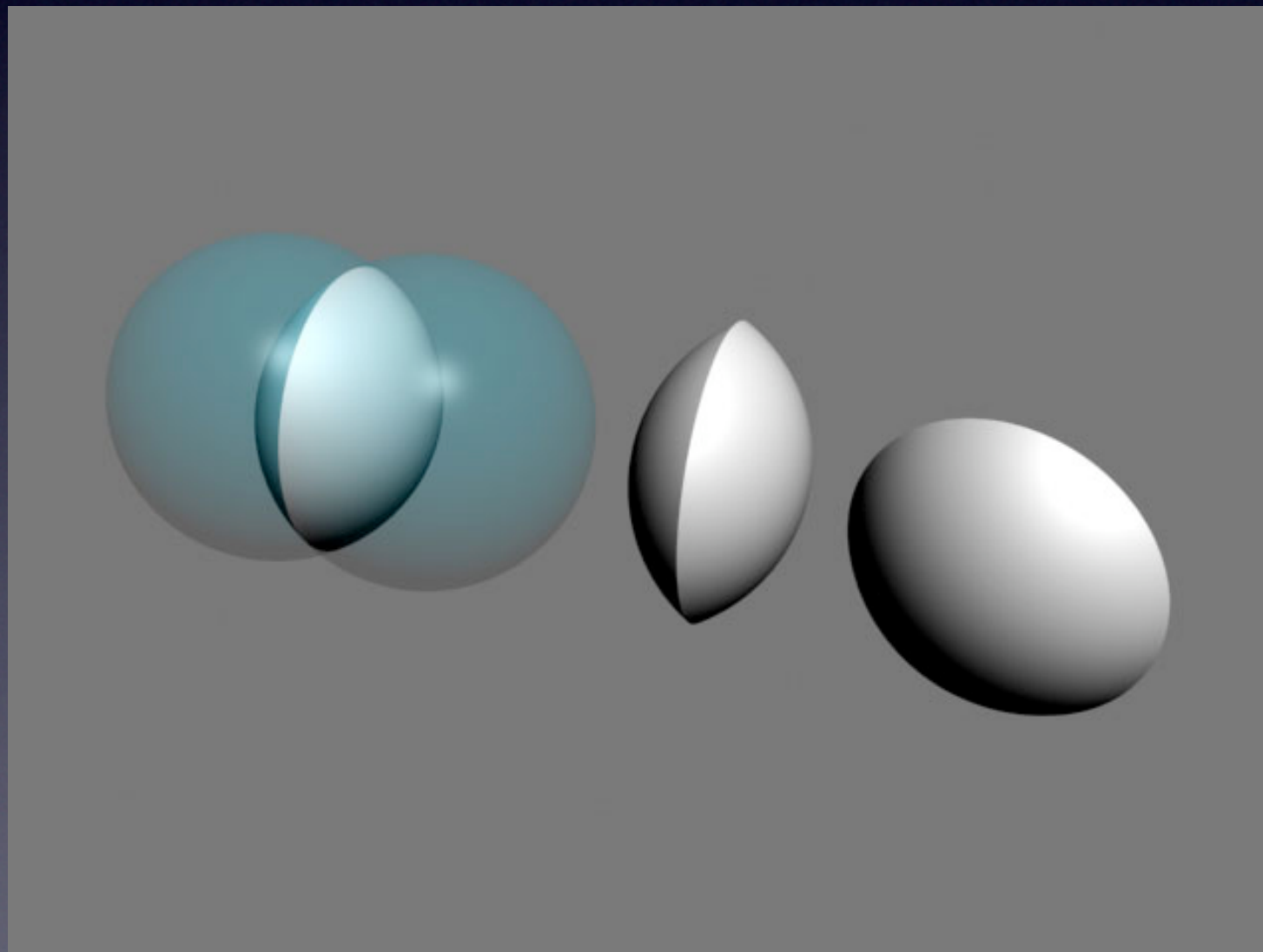
E. Emets: sketch for Manta Ray



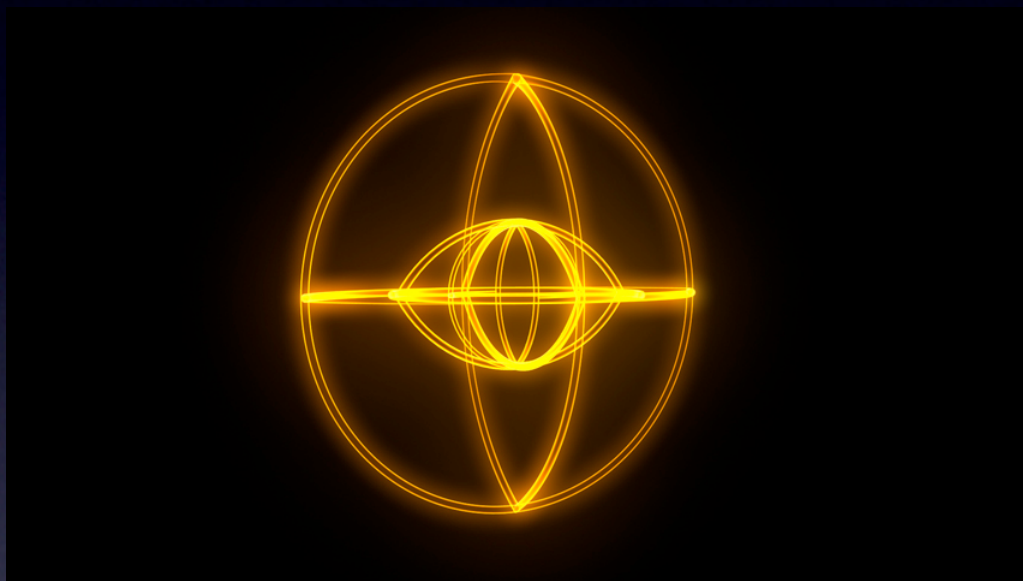
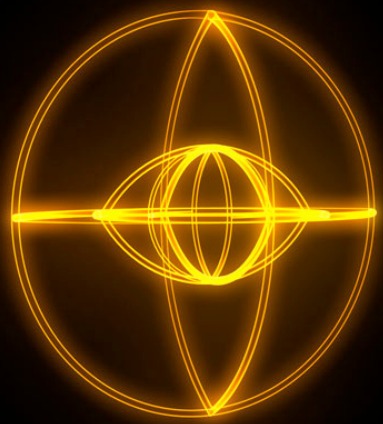
Manta Ray: production

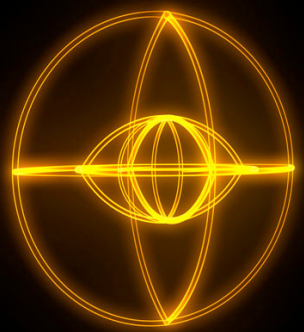
Vesica Pisces: 3D static model

Aim: to create a dynamic evolving interpretation of the geometry in the basis of Vesica Pisces through the means of 3D modeling



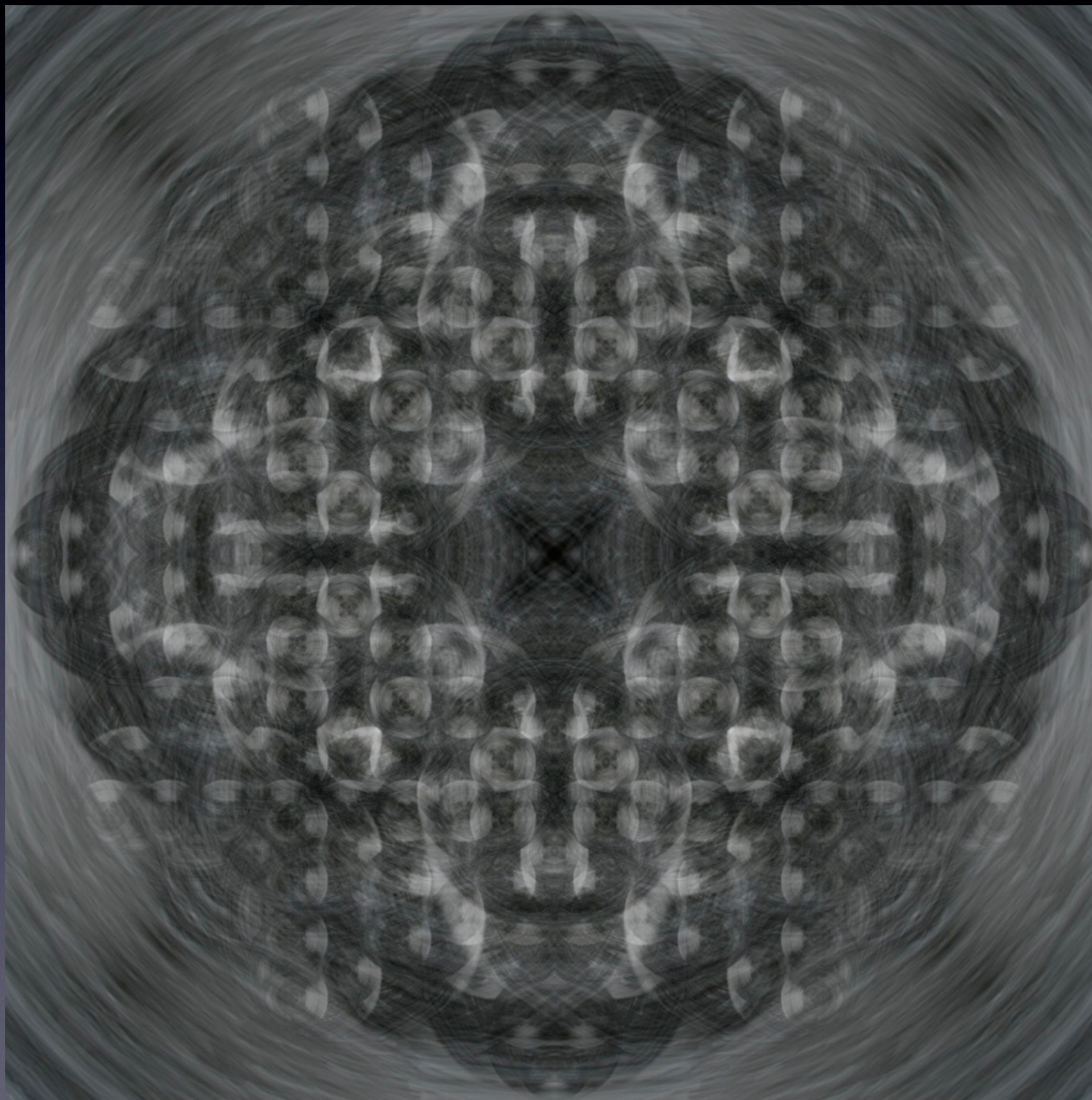
Manta Ray

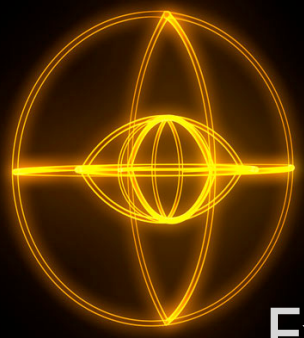




The Echo of Now

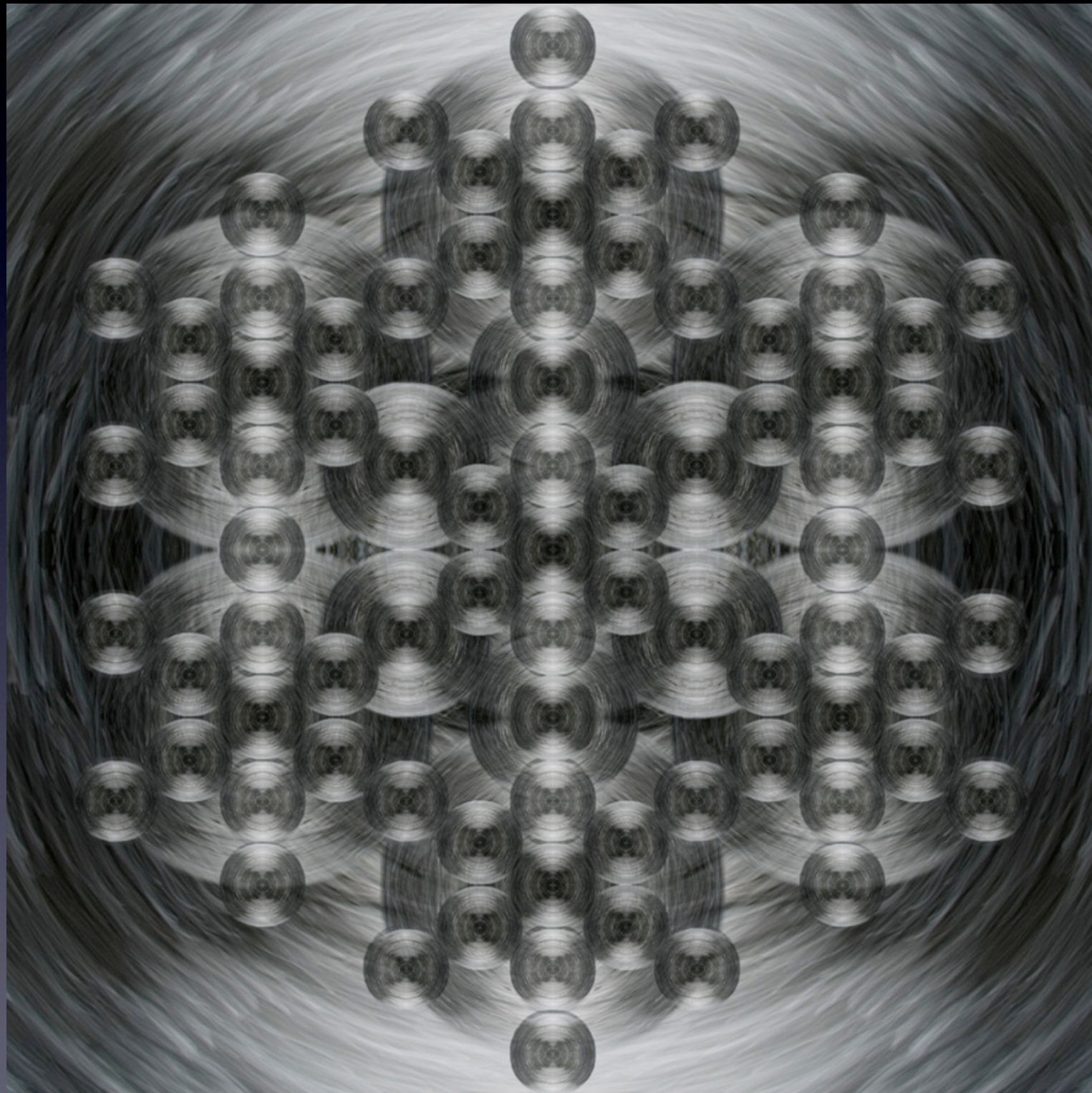
Experiments in optical illusions and fractal geometry in graphic work

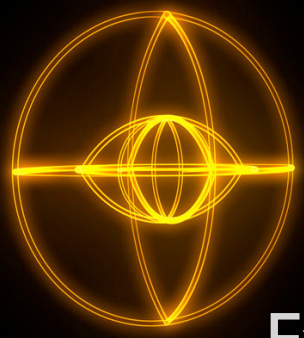




The Echo of Now

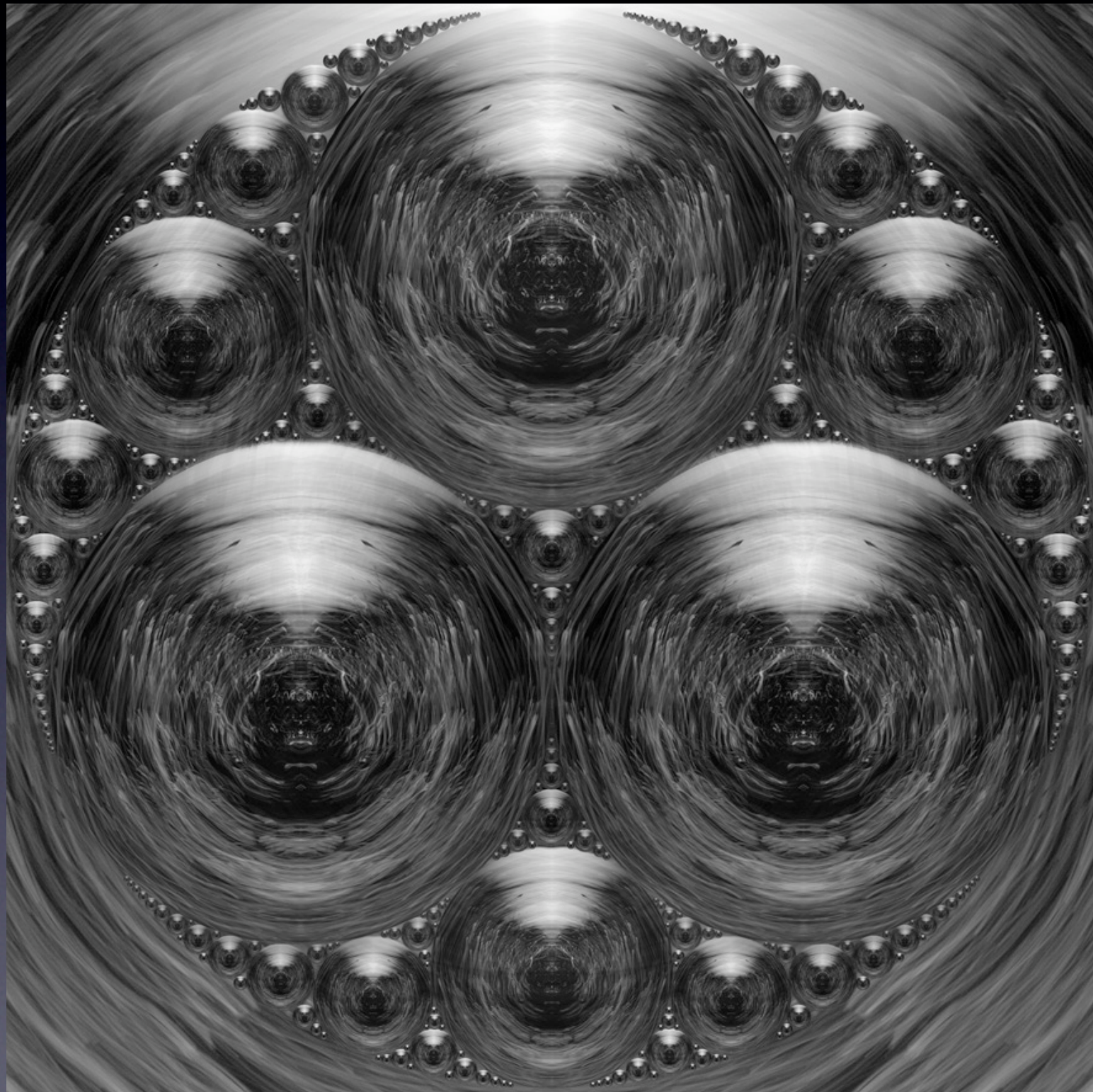
Experiments in optical illusions and fractal geometry in graphic work

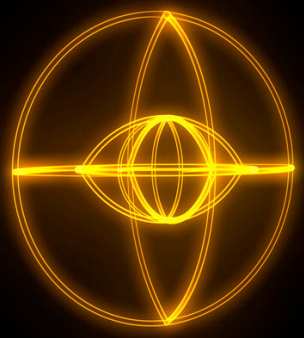




The Echo of Now

Experiments in optical illusions and fractal geometry in graphic work





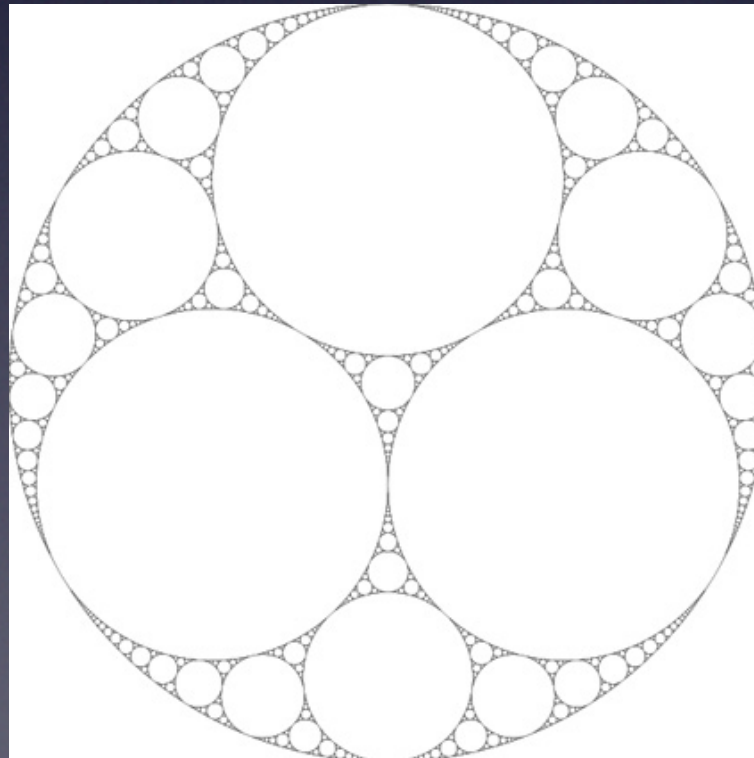
The Echo of Now

Apollonius Gasket fractal:

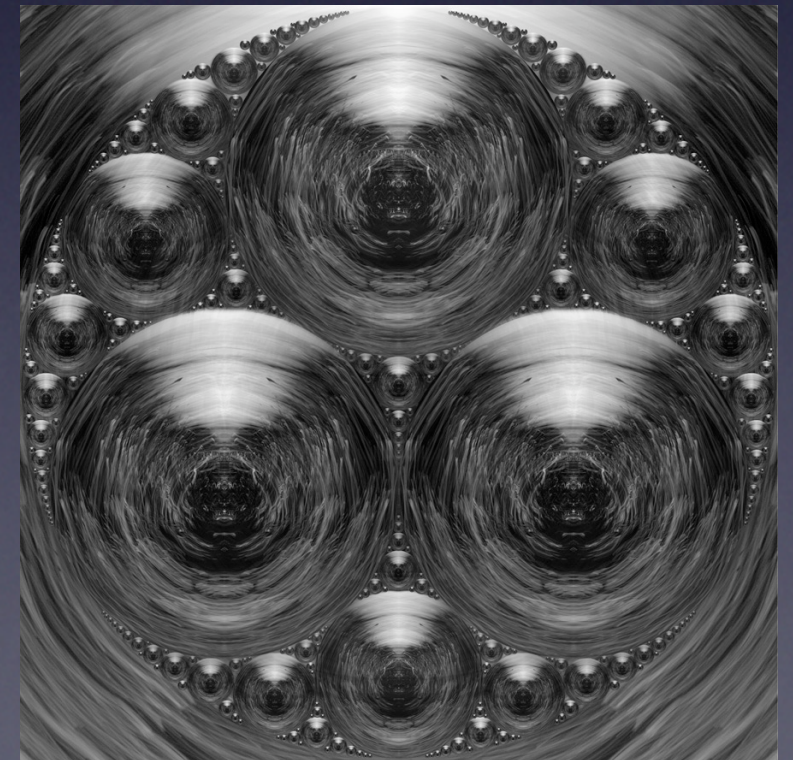
- ◎ symmetrical static model
- ◎ photograph used as a sample for building the structure through laying over the existing template matrix
- ◎ creating optical illusion via variation of scale



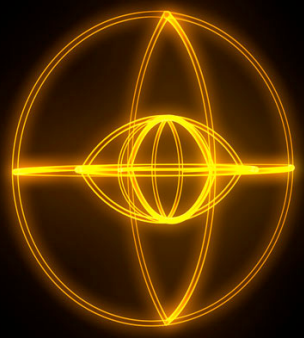
Eugenia Emets, Sample fragment, 2009



Alexander Bondarenko, graphic construction for The Echo of Now, 2009



Eugenia Emets, The Echo of Now, 2009



Apollonian Gasket: research

Aim of Project and Research:

- developing an immersive interactive installation with public participation
- investigate possibility of creating an interactive true 3D animation based on Apollonian Gasket
- creating a personalized experience for the participants through use of complexity inherent to Apollonian Gasket fractal
- integrating learning element through interaction

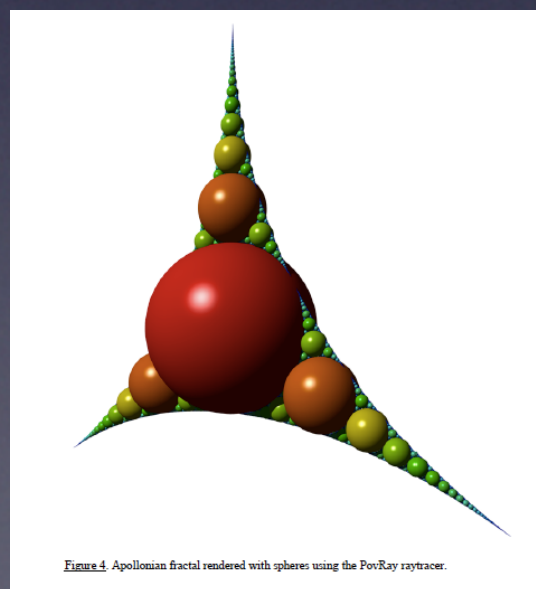


Figure 4: Apollonian fractal rendered with spheres using the PovRay raytracer.

An Introduction to Apollonian Fractal, Paul Bourke

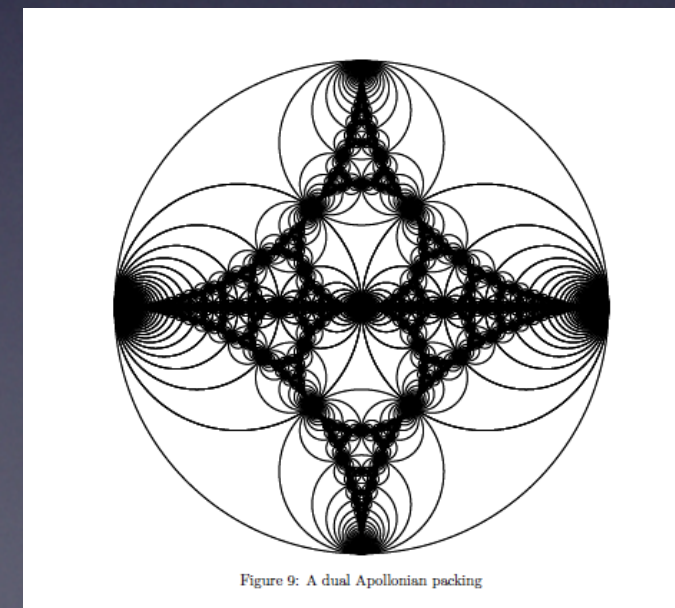
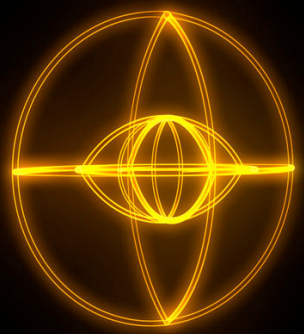


Figure 9: A dual Apollonian packing

Apollonian Circle Packings: Geometry and Group Theory
I. The Apollonian Group, J. Lagarias et al



Apollonian Gasket: research

History:

● 3 century bc: The problem of Apollonius (greek Apollonius of Perga, Tangencies) is to find a circle that is simultaneously tangent to three circles

● 1643 Descartes theorem relating the radii of any four mutually tangent circles:

$$(a + b + c + d)^2 = 2(a^2 + b^2 + c^2 + d^2),$$

where $a=1/r_1$, $b=1/r_2$, etc. are the curvatures of the corresponding circles (reciprocals of radii)

● 1936 Frederick Soddy rediscovers theorem and publishes poetic version in Nature: The Kiss Precise

● Apollonius tangency problem for 3 circles:

http://www.gogeometry.com/circle/apollonius_problem_circle_1.htm

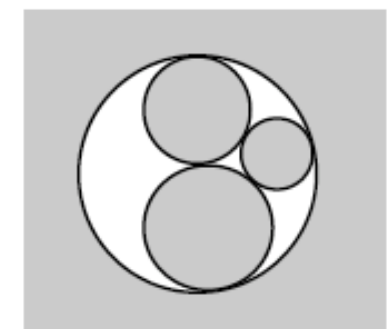
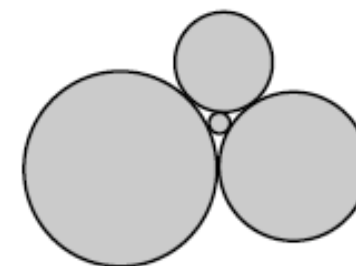
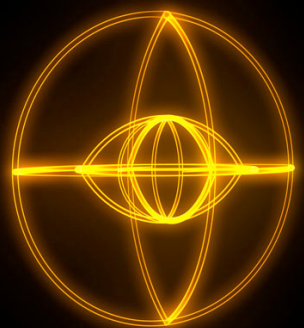


Figure 5.2: Descartes configurations reconsidered

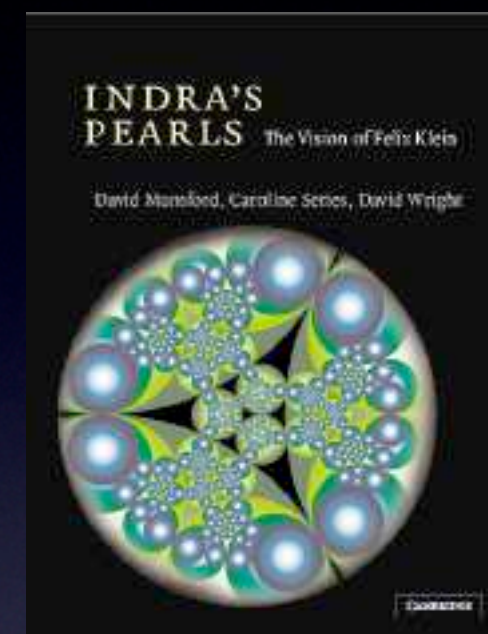
Illustration by Jerzy Kocik

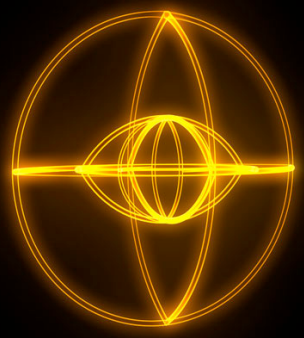


Apollonian Gasket: research

Main references:

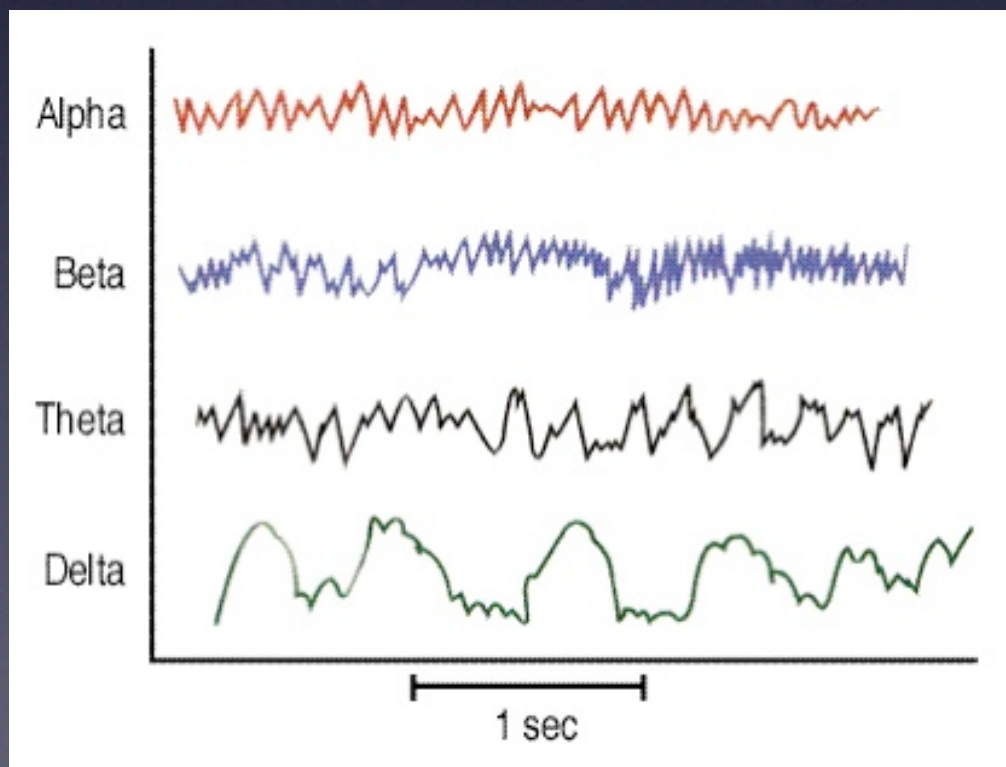
- Paul Bourke: An Introduction to Apollonian Fractal
<http://local.wasp.uwa.edu.au/~pbourke/papers/apollony/apollony.pdf>
- David Mumford: Indra's Pearls
- Papers on Apollonian Gasket by Jeffrey Lagarias and others
- 'A Tisket, a Tasket, an Apollonian Gasket', Dana Mackenzie, American Scientist
<http://www.americanscientist.org/issues/pub/2010/1/a-tisket-a-tasket-an-apollonian-gasket/2>
- <http://www.cut-the-knot.org/Curriculum/Geometry/ApollonianGasket.shtml>
- <http://www.cut-the-knot.org/Curriculum/Geometry/ApolloniusSolution.shtml>



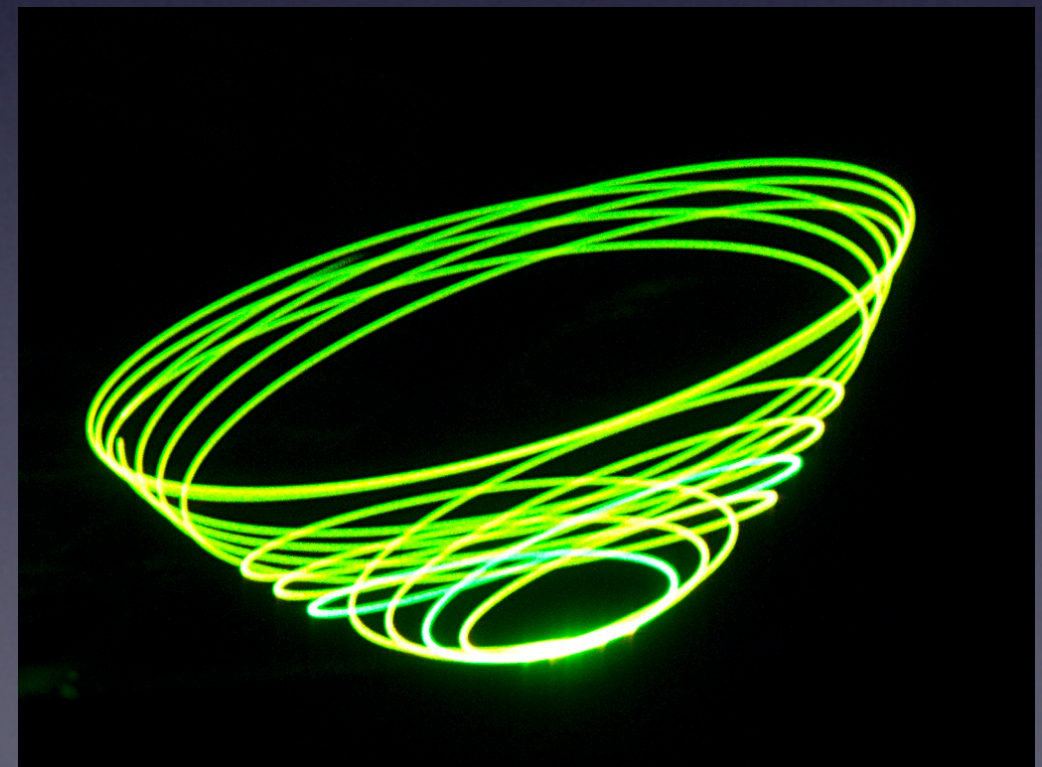


A-Field, 2010

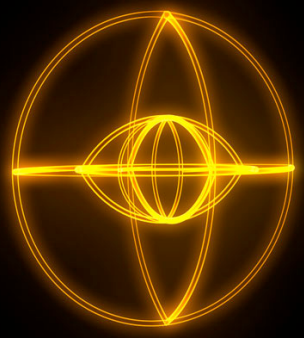
- Externalizing internal experience
- Expressing invisible phenomena
- Use of Lissajous curves (frequency, amplitude, period)
- Use of multiple oscillators



Graphic representation of brain activity



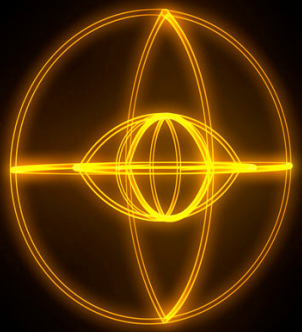
Lissajous curves, from A-Field, Analema Group, 2010



A-Field, 2010



A-Field performance, Market Estate Project, London, 2010, photo by Marta Barszcz



Contacts

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<http://eugeniaemets.blogspot.com/>

<http://analemagroup.wordpress.com/>

Thank you!