The Harmonic Series gives rise to the Pythagorean Comma, feeding back the differences of which gives the value of Phi at step 12.618

Nature's self-referential Phi-dynamics at the 4 dimensional birth of space-time: - reference the *'well-tempered void'* - Genesi:Guido Tonelli

The rates & ratios of the Harmonic-Series integrate, generating Phi at step 12.618 of the Pythagorean Comma differences fedback on themselves. This curve is identical to the curve arising from the 'stringularity' of the harmonic series.

The angles of 15° 18° & 22.5° & the ratios of tetragons, pentagons & hexagons arising when circumscribed within the same circle, also generate Phi.

1:2:3 = Hemiola - Dao:Pi:Phi (Golden Angle - 137.5°)

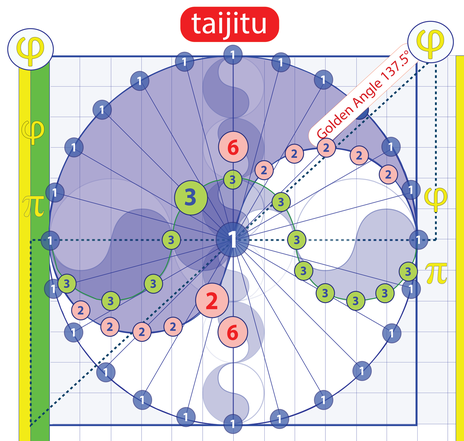
4-D rates & ratios Pi:Phi (0.618):Harmonic-Series

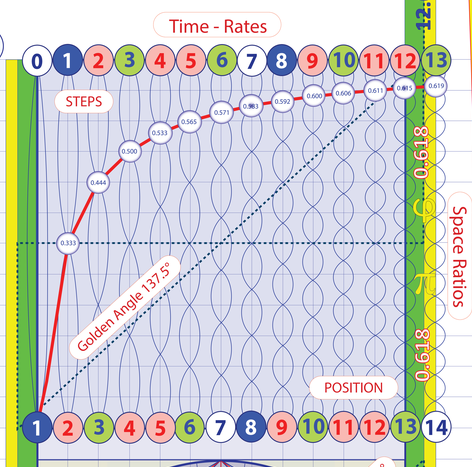
Pythagorean Comma = differences between 12 Perfect & 12 Well Tempered 5ths in the time of 7 Perfect Octaves (doublings). Phi-derivation comes from these differences fedback on themselves.

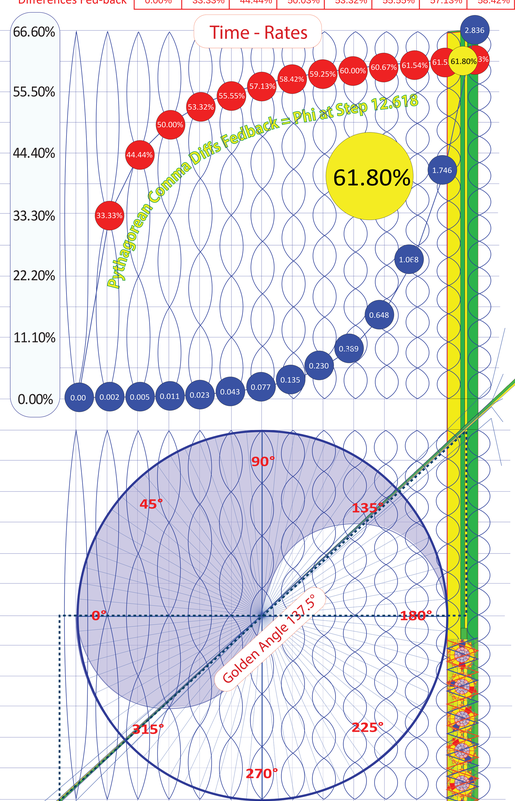
https://vimeo.com/manage/videos/737067813

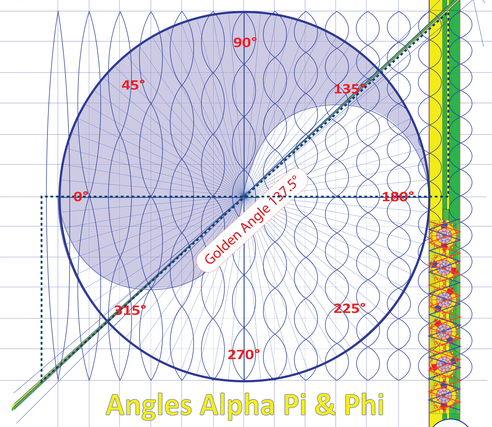
7 Perfect Octaves	1.000	2.000	4.000	8.000	16.000	32.000	64.000	128.000						
12 Perfect 5ths	1.000	1.500	2.250	3.375	5.063	7.594	11.391	17.086	25.629	38.443	57.665	86.498	129.746	194.620
12 Well Tempered 5ths	1.000	1.498	2.245	3.364	5.040	7.551	11.314	16.951	25.398	38.055	57.018	85.430	128.000	191.783
Differences	0.000	0.002	0.005	0.011	0.023	0.043	0.077	0.135	0.230	0.389	0.648	1.068	1.746	2.836
Differences Fed-back	0.00%	33.33%	44.44%	50.03%	53.32%	55.55%	57.13%	58.42%	59.25%	60.00%	60.64%	61.11%	61.57%	61.90%

61.80% φ



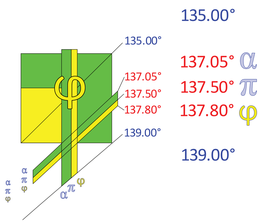






Angles of Pi π Phi φ & Alpha α

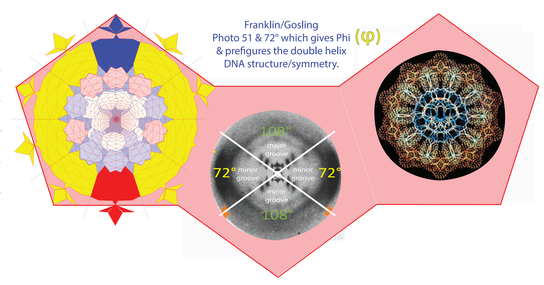
relative to Phi-derivation from harmonic series underlie photo-electricity, photo-synthesis and the double-helix DNA molecule.

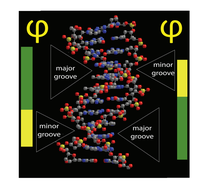


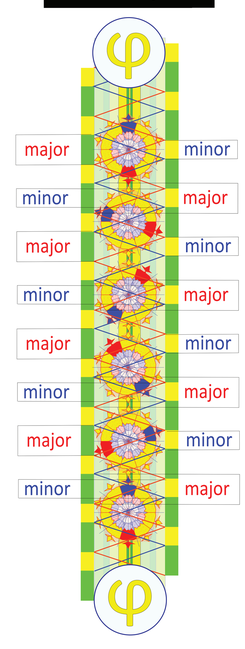
13th Harmonic -139.00°
Divine Ratio (0.618) Phi -137.80° φ
If diameter = 100%, Pi = 104.72% -137.50° π
Fine Structure Constant -137.05° α
12th Harmonic -135.00°

Phi pentagon-defined Double Helix in what will become the DNA molecule

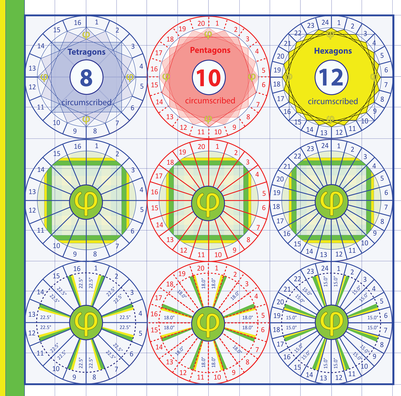
Cross-section & lateral structure showing spirals off-set at Phi major:minor with pentagonally or Phi-governed rotational symmetry.



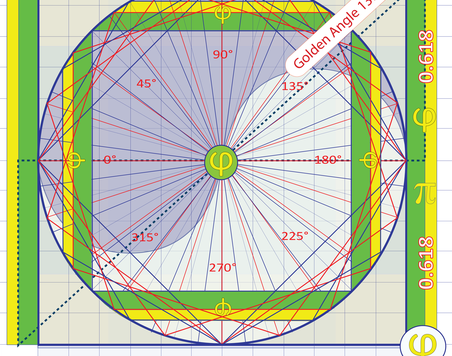




Tetra-Penta-Hexa-gonal φ



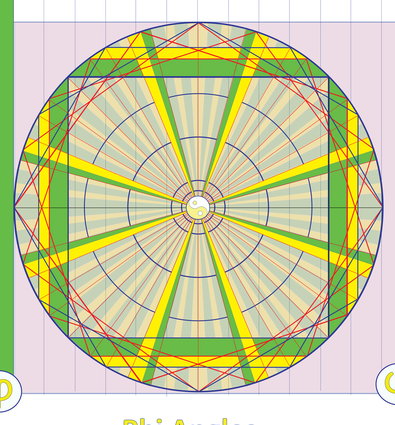
Phi given by Polygons



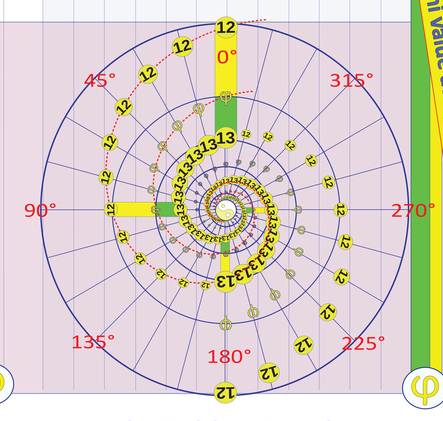
Phi & Square Symmetry

Phi value at Pythagorean Comma step 12.618

Angles Alpha Pi & Phi



Phi Angles & Reflective Symmetry

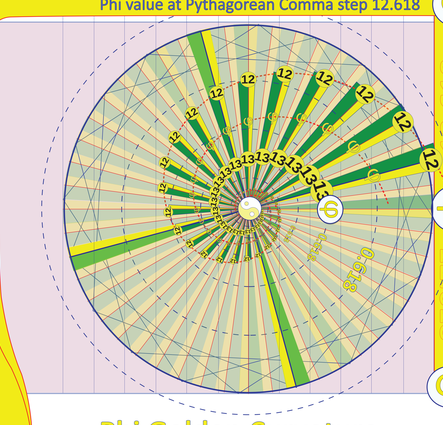


Phi Golden Spiral

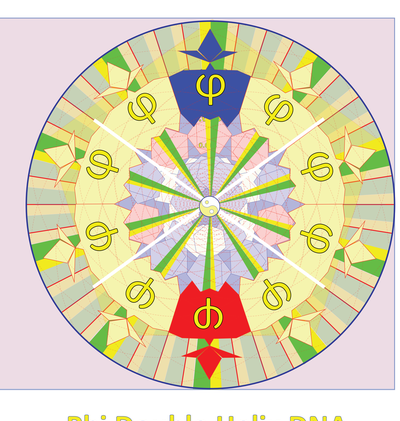
For every 90° anti-clockwise turn the spiral-curve contracts by 0.618

https://vimeo.com/manage/videos/789457961

Phi value at Pythagorean Comma step 12.618



Phi Golden Curvature & Rotational Symmetry



Phi Double Helix DNA

Phi-related major:minor groove-offest of the Double Helix Spiral & the cross section of this Phi defined structure, create a force field that perhaps helps to explain the flexible resilience of the DNA molecule.

Pythagorean Comma step 12.618 gives Phi value