# III.The HyperGeometrical Universe Cosmogenesis

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## Abstract

This paper presents a totally new Cosmogenesis Model based on the HyperGeometrical Universe Theory. The Cosmogenesis is cast as a dimensional phase transition that occurred when spacetime fluctuations were above the Grand Unification Condition (see paper I).

## Quantum Mechanics has a simple <u>Raison D'Etre</u>:

**Nature does not have certainties. A certainty means something totally well defined and that would mean something that never changes. Our Universe is a process and not a state.**

To better understand the meaning implicit in the statement above, let's perform the simple "Gedanken Experiment". Imagine two racquetball players, playing in a court where there are two ominous holes in their front wall and one is twice as large as the other.

Imagine that the holes diameters are five and ten times the diameter of the balls.

Neglecting the trajectories in which the balls touch the sides of the holes, one would expect that the probability that the balls would be lost through the holes would be four times as large for the larger hole as for the smaller hole, that is, they would scale as the cross-section areas associated with these holes.

That is a fact of life but this is also a **<u>macroscopic quantum mechanical effect</u>**. If the trajectories of the center of mass of the racquetball balls were just lines in the phase space, the cross section of the holes would have exactly the same number of singular points. This is a result of Transfinite Number Theory by George Cantor where infinites are compared and equated by one-to-one mapping.

*That can be easily seem if one imagine lining up the two holes in space and imagine a cone composed of those two holes such that their cross-sections are perpendicular to the axis of symmetry.*

*Now imagine lines starting from any point in those cross-sections and passing through the apex of the conic region. All those lines intersect the two holes' cross-sections at two points, establishing a one-to-one relationship between them.*

*This one-to-one mapping means that the transfinite numbers of points in each cross section is the same. This in turn means that the number of trajectories passing through the larger and smaller holes are the same. Thus the probability*

*of a racquetball ball to pass through the smaller hole should be the same as the probability of it to pass in the larger hole.*

The solution to the conundrum is that the intersection of the ball trajectory and the cross-section of the hole defines a volume, in this case a two-dimensional area. This area is the result of a Fourier description of the volume in the phase space that is occupied by the center of the ball. There is uncertainty in its proper localization of the center of the ball and in its velocities, both forward velocities and lateral velocities. That persistent uncertainty is what allows for this Universe to behave as it does.

Now that we have understood that the model for a particle motion has to incorporate uncertainty, the obvious solution for its representation is a propagating Fourier wavepacket.

Fourier Wavepacket description has built-in uncertainty principle. The larger the bandwidth ($\Delta\omega$) used to describe a wavepacket, the smaller the $\Delta t$ associated with it (Energy-Time Uncertainty Principle - $\Delta\omega\Delta\tau > 0$). Similarly, the larger the k-vector bandwidth ($\Delta k$) used to describe the particle space whereabouts, the smaller the position uncertainty ($\Delta x$). This is the Momentum-Position Uncertainty Principle ($\Delta k.\Delta x > 0$).

## As Heraclitus said, "Nothing *is;* all is *becoming."*

That said, one should remember that HU model makes use of spacetime waves to explain coordinated the motion of 'particles' within the Hypersurface of the Universe and four-dimensional ellipsoids to create those waves. The properties of the ellipsoids are volume and spin along the many combinations of axes. Volume and spin (spin, charm, flavor etc) are interconnected as in a rotating four dimensional quantum double well.

Below is the pictorial display of equilibrium at the incipient Universe (prior to irreversible dimensional phase transition) and the Big Bang irreversible transition.

**Zero Dimensional Universe Fluctuations**

$0 = -1 + 1$

$0 = 2 + -2$

etc

**One Dimensional Universe**

-1  0  1

-2  0  2

etc

**Five Dimensional Universe**

$(N,N,N,N,N) + (-N,-N,-N,-N,-N)$

Etc…

$(2/3,2/3,-1/3,1/2,0,0)$
$+ (-1/3,-2/3,0,-1/2,0,0)$
$+ (-1/3,0,1/3,1/2,0,0)$
$+ (0,0,0,-1/2,0,0)$

$(-2/3,-2/3,1/3,1/2,0,0)$
$+ (1/3,2/3,0,1/2,0,0)$
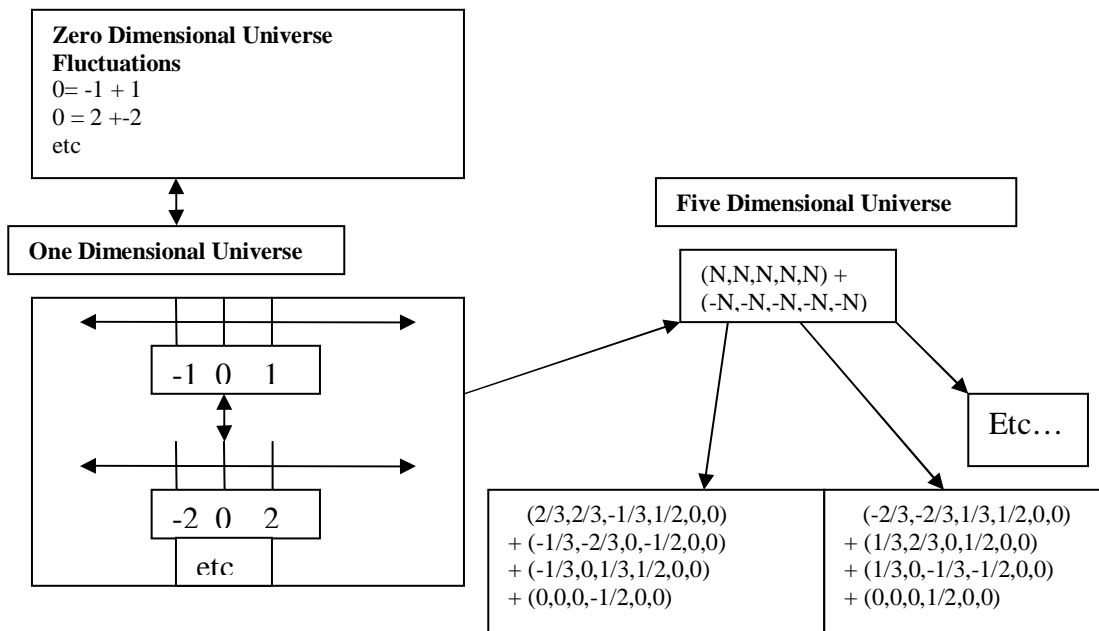$+ (1/3,0,-1/3,-1/2,0,0)$
$+ (0,0,0,1/2,0,0)$

Figure 10. This figure displays the Dimensional Transitions associated with the proposed beginning of the Universe. Single headed arrows indicate irreversible transactions, while doubly headed arrows indicate initial equilibrium fluctuations.

## Description of the Time Prior to the Big Bang

## 0D Universe

In the beginning there was a Zero Dimensional Uncertain Universe and the Cosmological Time. Universe property would oscillate between degenerated states of 0 as the Universal Time moves forward and backwards. At this configuration, time flows in both directions. This 0D Universe also transmute into the 1D Universe as part of possible reversible fluctuations of space.

## Big Bang Transition

## 1D Universe

At time Zero, when the Unidimensional Universe was in the excited state of NULL = 4N + (-4N), a dimensional transition occurred and the five dimensional spacetime was created.

This transition is irreversible (the vectors are now perpendicular to each other) if the total size of the initial Big Bang particles (N,N,N,N) and (-N,-N,-N,-N) is larger that the

symmetry breakdown threshold mentioned in Appendix G (Supersymmetry Threshold). At that point, electromagnetism is stronger than gravitation and the Hyperspherical Universe is placed in motion.

## 5-D Hadronic-Charm-Charge-Spin HyperGeometrical Universe

Initial large spacetime distortions then decayed into a myriad of nuclear particles (most likely mostly neutrons and anti-neutrons). This is the time for intense nuclear chemistry.

The symmetry of the Big Bang particle indicates the possibility that the present Universe could contain both matter and anti-matter in equal proportions. The here proposed anti-gravity aspect associated with anti-matter support that hypothesis. Antigravitational anti-matter would be difficult to spot, since anti-matter galaxies wouldn't be spectroscopically distinguishable from matter galaxies. Anti-gravitational repulsion to matter would make it less likely for them to collide and to generate the tremendous matter-antimatter explosions. The fact that antigravity and gravity were much stronger at earlier times would make it possible for the formation of these non-interacting galaxies in a much shorter time span than one would expect using present values for the gravitational constant G.

The future of the Expanding Universe should culminate with the total relaxation of all spacetime distortions, followed by the dimensional collapse and the Beginning of a New Cycle. The exact description of the recycling processes will be presented elsewhere.

Gravitation will become weaker as time goes by and eventually electrostatic interactions will prevail. Neutral matter will be stuck into the fabric of spacetime and probably relax into oblivion as expansion continues.

In principle, an infinite number of hyperspherical expanding Universes would be possible, since they could march ahead undisturbed by each other. This possibility is not likely since the creation of matter (spacetime perturbation) is associated with the dimensional transition and a dimensional transition should occur only once per Universe cycle.

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