How Universe Began
6th Edition

Abstract

Before multiverse and physical things, only mathematical Ideas (Forms) can exist. Mathematical Ideas include abstract spaces and hypercomplex-number arrays. Abstract spaces and hypercomplex-number arrays can represent mathematical groups and sets of related points. Points have no dimensions and no asymmetries. Relating points can define "point sets", which have dimensions, anti-commutative relations, and anti-symmetries, and quantum-mechanically define particles, fields, space, time, and energy, making all physical things and the multiverse. Universe began from a multiverse point singularity.

Keywords

universe, multiverse, Big Bang, physical, non-physical, Ideas, Forms, number arrays, abstract spaces, anti-symmetry, anti-commutative, mathematical group, points, point sets, space, time, space-time, energy, singularity

1. Universe Beginning

The universe began 13.72 billion years ago, with highest space-expansion rate (Big Bang), at a point in multiverse space-time.

2. Multiverse

Multiverse space-time contains all universes that were, are, or will be, over all time. Multiverse space is infinite. Multiverse-space local regions have all possible dimensions. Multiverse space-time local regions have all possible physical laws and constants.

There is only one multiverse, because multiverse includes all physical things. Outside of multiverse is nothingness and void.

3. Physical Things

Physical things are subatomic and atomic particles, with associated force fields, in space-time. Particles are substances with structures and have states, properties, functions, and processes. Particles have spatial extension, size, and location. Particles are discrete (not continuous). Particles have duration, and particle events have time and order. Particles can move, translate, rotate, and invert. Particles have energy, momentum, intensity, and physical action. Particle aggregates can compress, stretch, and twist.

4. The Non-Physical

Before multiverse and physical things, only the non-physical (non-spatial, non-temporal, and non-energetic) can exist.

The non-physical has no beginning or end because it exists outside of time. Because it is not temporal, the non-physical cannot be before or after multiverse.

The non-physical has no location or extension because it exists outside of space. Because it is not spatial, the non-physical cannot be outside or inside multiverse.

The non-physical has no energy because the non-physical has no substances, structures, properties, states, functions, or processes.

The non-physical has no space, time, mass, force, field, energy, or quanta. The non-physical has no boundaries, phases, or gradients. The non-physical has no changes, movements, translations, vibrations, rotations, flows, or waves. The non-physical has no entropy, because it has no parts, forces, or spatial volume. The non-physical has no information, because it has no code and no channels. The non-physical has no causes, effects, or physical laws.

The non-physical has nothing physical and so has only one type and is homogeneous. The non-physical has no time and so has only one unchanging state. The non-physical has neither parts nor relations and so has unity.

5. Ideas

Plato's Parmenides [Plato, -370] describes non-physical things: the Ideas or Forms. The Ideas are unified wholes that do not move, do not change, have no cause, have no possibilities, and have no purposes. The Ideas are immaterial, indivisible, a priori, perfect, absolute, unqualified, independent, eternal, necessary, and sufficient. The Ideas are abstract and never have concrete symbols or representations.

6. Mathematical Ideas

Before multiverse, there is nothing physical, so Ideas like Chair-ness or Tree-ness cannot exist. Before multiverse, there is nothing mental, so Ideas like Goodness, Beauty, or Truth cannot exist.

Before multiverse and physical things, only mathematical Ideas can exist, so non-physical things can only be mathematical things. Mathematical things are not physical, because they have no location, exist before time, never end, and have non-contingent truth. Mathematical things are abstract, non-physical, non-spatial, non-temporal, and non-energetic.

Mathematical things are not mental, because they exist before brain or thought (and thoughts, language, and pictorial images require space and time).

Mathematical Ideas have reality [Penrose, 2004]. They are not abstractions or concepts that people derive from perception, language, logic, or thought. (However, because Ideas can be both mental categories and object essences, people can discover or intuit mathematical Ideas [Brouwer, 1927].)

7. Number-Array Ideas

Number arrays combine numbers, sets, geometric figures, and mathematical operations. Number arrays are about element relations along (non-spatial) orthogonal or dependent dimensions. Numbers represent array elements. Sets group rows and columns. Geometric figures describe square and other-shape arrays. Mathematical operations make ordered rows, columns, depths, and so on. Number arrays include hypercomplex-number arrays.

7.1. Properties

Hypercomplex-number arrays can represent scalars, vectors, spinors, tensors, and matrices. They can represent relations and relation uncertainties. They can have parts, structures, shapes, and patterns, with symmetries. They can have curvatures, densities, viscosities, and fields. They can be homogeneous or have phases. They have order and entropy.

7.2. Changes

Hypercomplex-number arrays can change numbers, dimensions, orientations, and patterns to represent commutative and non-commutative mathematical linear and non-linear operations, transformations, translations, rotations, spins, inversions, vibrations, and transverse and longitudinal waves. Vibration components have hypercomplex-number abstract frequencies, resonances, and harmonics.

7.3. Dimensions

Hypercomplex-number arrays can have any number and all types of dimensions. Dimensions can be orthogonal or dependent, continuous or discrete, abstract or spatial, finite or infinite, straight or curled up, isotropic or non-isotropic, fractional or whole-number, and static or dynamic. Dimensions can have relative magnitudes, orientations, and direction senses.

7.4. Combinations

Hypercomplex-number arrays can combine, overlap, and interact.

8. Abstract-Space Ideas

Abstract spaces combine numbers, sets, geometric figures, and mathematical operations. Abstract spaces are about elements and their relations along (non-spatial) dimensions. Numbers represent space points. Sets group points into lines, areas, and other geometric figures. Mathematical operations translate, rotate, vibrate, and transform points and geometric figures.

8.1. Properties

Abstract spaces have scalars, vectors, spinors, and tensors. They can represent relations and relation uncertainties. They have parts, structures, shapes, and patterns, with symmetries. They have curvatures, densities, viscosities, and fields. They can be homogeneous or have phases. They have order and entropy. They have boundaries, where interactions can occur.

8.2. Changes

Abstract spaces can change points, dimensions, orientations, and patterns to represent commutative and non-commutative mathematical linear and non-linear operations, transformations, translations, rotations, spins, inversions, vibrations, and transverse and longitudinal waves. Vibration components have frequencies, resonances, and harmonics.

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8.4. Combinations

Abstract spaces can combine, overlap, and interact.

9. Hypercomplex-Number Arrays and Abstract Spaces

Abstract spaces and hypercomplex-number arrays both combine numbers, sets, geometric figures, and mathematical operations. They both have elements and element relations, with dimensions. They both have topological features, such as warps, holes, or tears, or crystal-like flaws, insertions, omissions, translations, and rotations. They both have element, set, geometric-figure, topological, and operational changes.

Abstract spaces can have same-dimension point arrays with relative hypercomplex-number coordinates. Abstract spaces and their same-dimension hypercomplex-number arrays represent points, positions, position relations, and position uncertainties. Hypercomplex-number arrays list abstract-space point coordinates. Abstract spaces are geometric representations of hypercomplex-number arrays.

10. Symmetry

Points have no relations, no dimensions, no substances, no structures, no properties, no processes, no states, and no functions. Points have no asymmetries.

Sets of unrelated points have no dimensions, no substances, no structures, no properties, no processes, no states, and no functions.

Sets of points can have relative point motions, translations, vibrations, rotations, periodic chaotic orbits, and harmonic longitudinal and transverse vibrations/rotations, with topological constraints. Mathematical groups can represent sets of points whose relations have symmetries. Hypercomplex-number arrays (and their abstract spaces) can represent mathematical groups.

11. Point Sets and Anti-symmetry

Quantum mechanics has anti-commutative relations. Sets of related points can have anti-commutative relations and so anti-symmetries. These "point sets" follow quantum-mechanical laws and so are substances and structures and have properties, processes, states, and functions.

Point sets have the first spontaneous symmetry breaking.

Point sets have a 3-sphere boundary, with Planck-length-multiple diameter. Point-set points are somewhat like M-theory string endpoints confined to branes.

Point sets, unlike string-theory strings, have no string, no string tension, and no string-vibration modes. Point-set points do not form a compact group.

Hypercomplex-number arrays (and their abstract spaces) can represent mathematical groups with anti-commutative and anti-symmetric relations and so can represent point sets.

11.1. Space-Time Dimensions

Point-set point configurations and motions make extension, direction, and orientation, as well as density, viscosity, and phase, and so define dimensions. Starting from zero dimensions, point sets combine and overlap dynamically to make fractional dimensions and "quantum foam", and later build three independent spatial dimensions and one time dimension, united in space-time. (Because they do not have strings, and so do not have tensions or too many points, point sets can have no net vibration and so can have zero rest mass without using compactified dimensions, with no need for more than three spatial dimensions.)

11.2. Particles and Particle Properties

Hypercomplex-number arrays can be matrices that represent tensors that account for general-relativity mass-energy densities and space curvatures. Abstract spaces have densities and curvatures that account for general-relativity mass-energy densities and space curvatures.

Hypercomplex-number arrays and their abstract spaces can have (quantum-mechanical) waves that account for particle energies and motions and for uncertainty principle. Hypercomplex-number arrays can be quantum-mechanical transition matrices (with matrix mechanics) that account for particle states and physical processes. Abstract spaces have states and trajectories that account for particle states and physical processes.

Point-set points share a wavefunction and so entangle. Point-set relative internal motions have longitudinal and transverse complex-number-frequency vibrations along and across all space dimensions. Discrete wave frequencies represent energy quanta, which account for particle masses, energies, spins, and orientations. Point sets can combine, overlap, and interact (like superposed wavefunctions) to make continuous fields.

Point-set point configurations and motions have symmetries that account for all particles, exchange particles, force fields, and conservation laws. Point sets make particles, space, time, and energy. Point sets combine and overlap to make all physical things. Point-set interactions define physical objects, physical fields, and space-time dimensions.

12. How Universe Began

After physical things and multiverse began, multiverse had new space-time points as space-time singularities. Universe began as a multiverse white-hole space-time singularity, with very high positive radiation (kinetic) energy. (Because total energy there was zero, a paired space-time singularity had negative energy, and a negative-energy universe began.)

According to general relativity and quantum mechanics, smaller spaces have larger energy fluctuations, so the smallest spaces can reach energy levels of any amount. By starting as a space-time singularity, universe began with highest energy level and so highest temperature.

According to thermodynamics and statistical mechanics, the smallest spaces have lowest entropy. By starting as a space-time singularity, universe began with lowest entropy.

Therefore, universe began with smallest volume, highest energy, highest energy density, highest temperature, and lowest entropy.

In those conditions, particles repulse. Because particles have space between them, universe space expanded. Because repulsion was the highest possible, space expanded most rapidly at universe beginning.

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