Stochastic control of the universe

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Abstract

In contrast to the approach taken by mainstream physics, the Hilbert Book Model applies stochastic control of dynamic coherence and binding of module components. Each module owns its private stochastic process. All stochastic processes own a characteristic function.

1 Base model

The structure of physical reality has a rather simple foundation. That foundation does not yet contain numbers. It is a set that restricts the kind of relations that exist between its elements. Mathematicians call these structures lattices. The considered lattice is quite like the lattice that defines classical logic. However, the foundation of physical reality is not a logical system. The set of subspaces of a separable Hilbert space has the same lattice structure. This set spans the Hilbert space. Thus, it is sensible to say that the separable Hilbert space emerges from the founding lattice. Mathematicians call this lattice an orthomodular lattice. Separable Hilbert spaces are vector spaces that as an extra feature apply the members of a division ring for the specification of the values of inner product of pairs of vectors. Division rings are versions of number systems. All non-zero members of a division ring own a unique inverse. Only three number systems are division rings. They are the real numbers, the complex numbers, and the quaternions. Depending on their dimension, these number systems exist in many versions that differ in the way that Cartesian and polar coordinate systems can sequence them.

Physical reality mixes all possibilities and puts them on top of an infinite dimensional vector space. It embeds all separable Hilbert spaces into a single non-separable Hilbert space that applies a selected version of the quaternionic number system. It also applies that version together with is coordinate systems as its background parameter space. The separable Hilbert spaces apply their versions of the number system also as their private parameter space and as the eigenspace of a normal reference operator. An orthonormal base of the vector space acts as the set of corresponding eigenvectors.

Quaternionic functions that apply the eigenspace of the reference operator as their parameter space, can specify defined operators by offering their target space as the eigenspace of the new operator, which shares the corresponding eigenvectors of the reference operators.

A real number valued progression defines a subspace that is spanned by eigenvectors of the reference operator of which the real part of the corresponding eigenvalue equals the progression value. The separable Hilbert spaces are supposed to share this scanning subspace. Consequently, this scanning subspace represents the current static status quo of the model. The scanning subspace splits the historic part of the model from the future part of the model.

The resulting base model represents a very powerful modelling platform that combines Hilbert space operator technology with quaternionic function theory and indirectly with quaternionic deferential and integral calculus.

It offers a well-defined progression and spatial domain. The base model acts as a read-only repository that archives its dynamic geometric data in quaternionic storage bins that combine a proper time stamp and a three-dimensional location. The storage bin features an Euclidean format.

2 Hilbert Book Model

The Hilbert Book Model got its name because in the separable Hilbert space the base model steps through the progression domain and at each progression step the scanning subspace represents the current page of the book that describes the full history and future of the universe.

Apart from the floating platforms that the corresponding separable Hilbert spaces represent, the base model does not show dynamics.

In the full Hilbert Book Model, stochastic processes that are private to each of the platforms generate extra dynamics. They do this at every subsequent progression instant by generating a new location for the elementary module that inhabits the separable Hilbert space. Consequently, the elementary module hops around on its platform. The hops form a stochastic hopping path and a dense and coherent hop landing location swarm. The location density distribution of the swarm equals the squared modulus of the wavefunction of the elementary module.

The fact that the stochastic process produces a coherent hop location swarm is far from straight forward. The stochastic process owns a characteristic function that equals the Fourier transform of the location density distribution of the generated hop landing location swarm, which ensures that a coherent swarm is produced. The characteristic function contains an extra gauge factor that acts as a displacement generator. Therefore, at first approximation the swarm moves as a single unit. The geometric center of the swarm stays at the geometric center of the platform. Thus, the gauge factor also controls the dynamics of the platform. The characteristic function also enables the wave behavior of the elementary module. At each progression instant it describes the elementary module as a wave package.

The hop landings are the direct actuators of spherical shock fronts. These excitations integrate into the Green’s function of the affected continuum. The volume of the Green’s function deforms the continuum locally and globally the volume expands this continuum. The local deformation quickly fades away. The global expansion persists. However, the spherical shock fronts that are caused by the swarm overlap. The gravitation potential of the elementary module equals the convolution of the Green's function of the affected continuum and the location density distribution of the swarm. This gravitation potential characterizes the local deformation.

The stochastic process is a combination of a Poisson process and a binomial process. The binomial process is implemented by a point spread function that conforms with the location density distribution of the swarm

2.1 Creator

The base model of the Hilbert Book Model acts as a read-only repository. This repository archives all dynamic geometric data that are stored as a combination of a proper time stamp and a three-dimensional spatial location in a quaternionic storage bin that is part of the eigenspace of a dedicated normal operator. The Hilbert Book Model impersonates a creator. For the proper functioning of the model it is important that the instant on which the creator the data archives, precedes the timestamp that is contained in the concerning storage bin. For simplicity, the model assumes that all data are generated and stored at the instant on which the creator created the model. After this step the creator leaves his creation alone. We define the storage view as the view that the creator has at the instant of the creation

2.2 Modules and modular systems

Together the elementary modules form all modules and some of the modules form modular systems.

Also, modules own private stochastic processes. The characteristic functions of the modules equal a superposition of the characteristic functions of the components of the module. The superposition coefficients act as dynamic gauge factors that determine the internal locations of the components. An overall gauge factor acts as displacement generator for the module. Therefore, the module also moves as a single unit.

Modules and modular systems can act as observers and can figure in observed events.

Observers travel with the scanning subspace. They can only retrieve data with an historic time stamp.

The data is transferred from the storage bin to the observer via vibrations and deformations of a continuum that is stored in an eigenspace of a dedicated defined operator that resides in the non-separable Hilbert space. A quaternionic function that describes the living space of the observers defines this operator.

The information transfer affects the format and the content of the perceived information. The observers perceive in spacetime format. The hyperbolic Lorentz transform describes the format conversion. The deformations affect the information path. This affects the content of the information.

2.3 Views

The Hilbert Book Model offers two views. The first view is the creators view. It is also the storage view. The second view is the observers view. It is also the experimenters view.

3 Dark quanta

The model contains two categories of super-tiny quanta. These objects are shock fronts that are triggered by point-like actuators. One category concerns spherical shock fronts that are triggered by isotropic point-like actuators. These objects integrate into the Green's function of their carrier. For that reason, they locally and temporarily deform and globally and permanently expand their carrier. Consequently, these objects temporarily carry an amount of mass that locates at the trigger location.

The second category concerns one-dimensional shock fronts that are triggered by one-dimensional emitters. During travel, these objects keep the shape and the amplitude of the front. Thus, they can travel huge distances without losing their integrity. These objects carry a standard bit of energy.

In free space these shock fronts travel with 'light speed'. They don't feature a frequency. In separation these shock fronts cannot be detected. However, when gathered in huge numbers the ensembles become noticeable. Huge dense and coherent swarms of spherical shock fronts are detectable as elementary particles. Long strings of equidistant one-dimensional shock fronts that obey the Einstein-Planck relation implement the functionality of photons.

4 Platform properties

The platforms differ in the sequencing of their parameter spaces. They may also differ in the behavior of their resident. This resident is an elementary module. The elementary module inherits the properties of its platform.

The sequencing of the platform determines the symmetry flavor of the platform. The difference between the sequencing of the parameter space of the platform and the sequencing of the background parameter space determines the symmetry flavor of the platform. The procedure that determines this difference requires that the axes of Cartesian coordinate systems are parallel to each other. The procedure only accounts for the difference of the directions of the sequencing along the parallel axes. This significantly reduces the number of possible symmetry flavors.

The symmetry flavor determines the symmetry related charge of the platform. The charge locates at the geometric center of the platform and floats with that platform. The symmetry related charges act as sources or drains of symmetry related fields.

5 Basic fields

The geometric center of the platform connects the continuum that embeds the hop landings with the symmetry related fields.

In this model three main kinds of players determine the kinematics of the model. The stochastic processes control the coherence of the assemblies of super-tiny mass carriers. They also control the bonding of the components of modules. The embedding field and the symmetry related fields install long range influences.

One-dimensional shock fronts transport energy between modules. This energy transport also transfers information. Other vibrations and deformations can transfer additional information.

References

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