Stochastic control of the universe

By J.A.J. van Leunen

Last modified: 10 december 2017

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 Physical reality

Physical reality can only be comprehended properly in the realm of a consistent and trustworthy platform. The base model provides this platform. Together with its foundation, the base model describes the lower levels of the structure of physical reality.

1.1 Structure

1.1.1 Foundation

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.

The foundation acts like as seed from which a very complicated system evolves. Narrow restrictions control this evolution.

1.1.2 Numbers

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 the 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.

1.2 Base model

Physical reality mixes many 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.

A real number valued progression defines a subspace. The eigenvectors of the reference operator of which the real part of the corresponding eigenvalue equals the progression value, span this subspace. 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.

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.

The resulting base model represents a very powerful modeling 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 a 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 straightforward. The stochastic process owns a characteristic function that equals the Fourier transform of the location density distribution of the generated hop landing location swarm. This Fourier transform ensures that the stochastic process produces a coherent swarm. 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. Moving wave packages tend to disperse, but the stochastic process recurrently regenerates this 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. Locally, the volume of the Green’s function deforms the continuum and globally, the volume expands this continuum. The local deformation quickly fades away. The global expansion persists. The spherical shock fronts that the swarm causes will 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 deformation corresponds to the fact that the elementary modules owns an amount of mass. This fact also means that the super-tiny spherical shock fronts own a standard bit of mass. The affected continuum is eigenspaces of a special normal operator that resides in the non-separable Hilbert space.

The stochastic process is a combination of a Poisson process and a binomial process. A point spread function that conforms to the location density distribution of the swarm implements the binomial process.

2.1 Creator

The base model of the Hilbert Book Model acts as a read-only repository. This repository archives all dynamic geometric data as combinations 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 at which the creator archives the data, precedes the timestamp that the concerning storage bin contains. For simplicity, the model assumes that all data are generated and stored at the instant at 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.

The module owns a private stochastic process. 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. Consequently, the module also moves as a single unit. Therefore, the private stochastic process binds the components of the module.

2.3 Observers

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 a historic time stamp.

The data is transferred from the storage bin to the observer via vibrations and deformations of a continuum that the model stores 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. Thus indirectly, the deformation affects the content of the information.

2.4 Color confinement

Pairs of quaternions that are each other's inverse can rotate elementary modules, and if the size of the real part of the quaternion equals the size of the imaginary part, then the pair can shift the color charge of a quark to another color charge. Color shift does not affect colorless elementary modules.

The characteristic functions of the modules equal a superposition of the characteristic functions of the components of the module. Color confinement means that color charged elementary modules are bound to bind with other color charged elementary modules into colorless modules. According to this paper, the characteristic function of the stochastic process that generates the footprints of the module does only accept superposition coefficients that result in a colorless result. Thus, these coefficients not only determine the internal positions of the components, but they can also shift the color charge of the components.

3 Views

The Hilbert Book Model offers two views. The first view is the creator's view. It is also the storage view. The second view is the observer's view. It is also the experimenter's view. Some phenomena get different interpretations in different views. For example, the interpretation of pair production in the observer's view will in the storage view change into the interpretation as the zigzag travel of a single object in the direction of progression.

4 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 do not feature a frequency. In separation, observers cannot detect these shock fronts. 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.

5 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 [3]. The procedure that determines this difference requires that the axes of Cartesian coordinate systems be parallel to each other. The detailed explication for this requirement is complicated [4]. The procedure only accounts for the difference of the directions of the sequencing along the parallel axes. This fact 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.

6 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.

The kinetic energy of platforms changes in chunks. Super-tiny one-dimensional shock fronts carry these chunks.

References

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