The Holographic Principle in the Hilbert Book Model

By J.A.J. van Leunen

Last modified: 4 september 2019

Abstract

Several characteristics of the Hilbert Book Model support a kind of holographic view on the universe

1 Elementary particles

The base model of the Hilbert Book Model applies a huge number of quaternionic separable Hilbert spaces that share the same underlying vector space. Each of these separable Hilbert spaces manages a private version of the quaternionic number system in the eigenspace of a special reference operator. This eigenspace acts as a private quaternionic parameter space of the Hilbert space.
One of these separable Hilbert spaces has infinite dimensions and acts as a background platform. It provides the background parameter space. The other separable Hilbert spaces float with the geometric center of their parameter space over the background parameter space. The difference between the symmetries of the floating parameter spaces and the background parameter spaces causes sources or sinks that belong to symmetry related charges at the geometric centers of the floating parameter spaces.

The HBM does not provide creation or annihilation mechanisms for the floating platforms. Thus, the number of floating platforms is fixed. Each floating platform carries an elementary particle.
A special footprint operator archives the footprint of the particle as an ongoing hopping path. A private stochastic process generates the content of the eigenspace of the footprint operator. The hopping path recurrently regenerates a coherent hop landing location swarm. The characteristic function of the stochastic process ensures that the same location density distribution describes the hop landing location swarm. The characteristic function is the Fourier transform of the location density distribution. Thus, the shape of the hop landing location swarm is controlled via Fourier space.

1.1 Pair production and annihilation

In the Hilbert Book Model pair production and pair annihilation events do not create or annihilate the elementary particle. Instead the events signal time travel reversal of a single particle. Thus, a particle can turn into its anti-particle or vice versa by switching the direction of its time travel.
The HBM generates the floating platforms of elementary particles during the creation phase of the model. Elementary particles never die.

2 Black holes

The background platform owns a unique quaternionic non-separable Hilbert space that embeds its separable companion. This Hilbert space supplies operators that offer continuums as their eigenspace. These continuums behave as dynamic fields and can be described by quaternionic functions. A reference operator manages the continuum private parameter space of this Hilbert space. One of the operators manages the universe as its eigenspace.
The universe is a continuum, but it may encapsulate non-continuous regions that are surrounded by a minimal surface. These regions deform the surrounding continuum. Consequently. These regions own an amount of mass. The surrounding surface will be covered by a densely packed set of

elementary particles that each reside on their floating platform. Each of these elementary particles are controlled by the characteristic function of their private stochastic process that recurrently regenerates the footprint of the particle.

A black hole has a surface that represents the densest packaging of EPs.

3 The holographic principle

The holographic principle states that the description of a volume of a region of the universe can be thought of as encoded on a lower-dimensional boundary to the region.

The relation between an encapsulated volume and the encapsulating surface is also treated by the Stokes theorem and the Gauss theorem. The solutions of second order partial differential equations differ between odd and even participating dimensions.

A hologram uses the head plane of an imaging aperture or lens, which acts as a Fourier transforming surface.

If the surface of a black hole represents the densest packaging of the description of the region, then the fact that the elementary particles form a dense coverage of this surface, states that the information contained in these elementary particles together form the full description of the region.

Consequently, the elementary particles that are contained in a volume, together represent all information that is contained in that volume. Each elementary particle or better said its platform forms an elementary patch of physical information.

This view is in correspondence with the fact that all elementary particles are elementary modules and together they constitute all modules and modular systems that occur in the universe.

This view neglects that photons and free one-dimensional shock fronts can carry information.

4 Composed modules

The definition of the composition of a composed module is set by a series of superposition coefficients that define the characteristic function of the composite as a superposition of the characteristic functions of the components in Fourier space. These superposition coefficients act as displacement generators for the components. Each component owns one such superposition coefficient. The composite owns a displacement generator that controls the movement of the composite.
These superposition coefficients can be archived in the platforms that constitute the components. In that case, the collection of the platforms of all elementary particles archive all dynamic geometric data of all massive objects that exist in the universe.

5 Conclusion

Apart from the information that is carried by photons, the information about massive objects that occur in the universe is carried by the floating platforms that carry the elementary particles. These platforms may cling together into atoms or molecules or still higher order modules or they cling together at the surface of a black hole. Some of these floating platforms move freely in space. Also spherical shock fronts may stay freely, but they quickly fade away.
The surfaces on which the elementary particles cling together have some similarity with holograms. But the likeness is not very large.
The patch of information that is contained in an elementary particle comprises its electric charge, its color charge, its spin, its mass and the variables that describe the shape of its location density

distribution. Thus, these patches are not single bits as is suggested by many pictures of the holographic principle.