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Abstract

Physical fields form the solution of nature for the problem that the set of observations is overwhelming the set of underlying variables.

The origin of physical fields.

The Hilbert book model is a simple model of physics that is strictly based on traditional quantum logic and on the lattice isomorphic model; the set of subspaces of an infinite dimensional separable Hilbert space for which the inner product is specified by using quaternions¹.

This restriction results in the fact that all sets of variables are countable. At the same time most observations are taken from a continuum. As a result the set of potential observations overwhelms the set of variables². The situation is comparable to the situation in which the number of equations is far larger than the number of variables that should form the result. Probably, the set of equations will appear to be inconsistent. In order to cure the situation, it is common to assume that the observations are inaccurate. The inaccuracy must be stochastic or with other words the observation result must be blurred.

Nature applies a similar solution, but instead of a simple spread function in the form of a probability density distribution, nature applies a quaternionic probability amplitude distribution (QPAD). This QPAD can be split into a real part that represents a “charge” density distribution and an imaginary part that represents a corresponding “current” density distribution. The “charge” represents the set of properties of the thing that is being observed. The parameter of the distribution represents the location at which the “charge” is observed. The squared modulus of the QPAD represents the probability density of the presence of the “charge” at the location that is specified by the parameter.

¹ See: <http://www.crypts-of-physics.eu/HilbertBookModelEssentials.pdf>

² A continuum has a higher cardinality than a countable set.

This approach transfers the dynamics of the observation into a streaming problem. The equation of motion of the “charge” becomes a continuity equation³.

The properties of particles move according to the above principle. With each elementary particle belong one or more QPAD’s that act as private fields of the particle and that determine its dynamic behavior when it moves freely. However, these fields overlap. In this way these fields and the corresponding particles interact.

A subset of the elementary particles is massless. These particles correspond to a single QPAD. That does not say that their fields cannot overlap.

All other elementary particles are identified by an ordered pair of QPAD’s that are two field sign flavors of the same base field. The coordinate system, whose values are used as field parameter, has its own field sign flavor and acts as a sign flavor reference.

Categories of fields

Two categories of fields exist.

Primary fields

The first category consists of quaternionic probability amplitude distributions (QPAD’s). The QPAD’s may overlap and through this superposition they may form covering fields. The QPAD’s exist in four sign flavors. The same holds for the covering fields. The QPAD’s may interact. When different sign flavors interact the strength of the local interaction is characterized by a coupling factor. The members of this category will be called primary fields.

Secondary fields

The second category consists of administrator fields. These fields administer the effect of interactions on the local curvature of the positioning coordinate system. For all properties that characterize a coupling of sign flavors of primary fields an administrator field exist that registers the influence of that property during interactions on the local curvature.

One of these administrator fields is the gravitation field. It administers the influence of the strength of the coupling between sign flavors of primary fields on the local curvature. The electromagnetic fields administer the influence of the electric charge on the local curvature.

The angular momentum including the spin also influences the local curvature. Also this effect is administered

The members of this category will be called secondary fields or administrator fields.

³ Another name for “continuity equation” is “balance equation”.

Geo-cavities

The massive elementary particles correspond to two shearing QPAD's, which are sign flavors of the same base field. This combination is capable of generating a geo-cavity at the center location of the particle⁴.

Nothing exists in universe, but QPAD's and geo-cavities.

⁴ See: <http://www.crypts-of-physics.eu/OriginOfMass.pdf>