On the hierarchy of objects

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Abstract

The objects that occur in nature can be categorized in several levels. In this collection every level is built from lower level objects. This collection represents a simple model of nature. The model exploits the possibilities that mathematical concepts provide.

The model

I present you my personal view on the hierarchy of objects that occur in nature. Only the lowest levels are presented.

A-- The lowest level is space that is formed by the number system of the RATIONAL quaternions. However, better make it an affine space (a space without an origin). The real part of the quaternions defines progression. Progression conforms to proper time. As a consequence progression steps with a fixed step. Quaternionic numbers exist in 16 discrete symmetry sets

HYPOTHESIS: At its start nature used only one discrete symmetry set for its lowest level objects. This situation stays throughout the history of the model.

B-- The second level is a curved space, called Palestra. The local curvature is defined via the differential of a continuous quaternionic distance function. The parameter space of this function is the first level space (A). Thus the Palestra is a countable set. The distance function may include an isotropic scaling function. The differential of the distance function defines an infinitesimal quaternionic step. The length of this step is the infinitesimal coordinate time interval. The differential is a linear combination of sixteen partial derivatives. It defines a quaternionic metric. Like the first level, this level is an affine space. Like all continuous quaternionic functions the distance function exists in 16 different discrete symmetry sets. The symmetry set of the distance function values may differ from the symmetry set of the parameter space of the distance function. The distance function keeps its discrete symmetry set throughout its life.

C-- The third level consists of a countable set of space patches that occupy the Palestra. Let us call them Qpatches. They are images of the rational quaternions that house in the first level parameter space.

Their charge is formed by the discrete symmetry set of the distance function. The curvature of the second level space relates directly to the density distribution of the Qpatches. The Qpatches represent the locations where next level objects can be detected. Since 16 different distance functions exist, there are 16 different versions of the Palestra. However, these versions may superpose. The name Qpatch stand for space patches with a quaternionic value. The charge of the Qpatches can be named Qsymm, Qsymm stands for discrete symmetry set of a quaternion.

D—Local quaternionic probability amplitude distributions (QPAD's) describe identifiable patterns of Qpatches. They are quaternionic distributions that contain a scalar potential in their real part that describes a Qpatch density distribution. Further they contain a 3D vector potential in their imaginary part that describes the associated current density distribution of Qpatches. Continuous quaternionic probability distributions exist in eight different discrete spatial symmetry sets (sign flavors). However, they inherit the discrete symmetry of their connected distance function. Photons and gluons are oscillating QPAD's. Two photon QPAD's and six gluon QPAD's exist.

E—16 integral QPAD’s exist that together cover all Qpatches. As far as a split is possible, will each of these QPAD’s split into a large number of local QPAD’s that each represent an identifiable pattern. One of the 16 integral QPAD’s acts as reference QPAD. The corresponding distance function and thus this reference QPAD has the same discrete symmetry set as the lowest level space.

F-- Elementary particles are constituted by the coupling of two (local) QPAD's. One of the QPAD's is the quantum state function of the particle. (The other QPAD implements inertia). Apart from their sign flavors these constituting QPAD's form the same quaternionic distribution. However, the sign flavor must differ and their progression must have the same direction. This results in 56 elementary particle types, 56 anti-particle types and 8 non-particle types. The coupling has a small set of observable properties: coupling strength, electric charge, color charge and spin.

HYPOTHESIS: If the quaternionic quantum state function of an elementary particle couples to a local piece of the reference integral QPAD, then the particle is a fermion. otherwise it is a boson. For anti-particles the quaternionic conjugate of the reference integral QPAD must be used. Non-coupled QPAD's are bosons.

G--Elementary particles conserve their properties in higher level bindings. These properties are sources to new fields. Besides the photons and the gluons these fields are the physical fields that we know. These new fields can be described by quaternionic distributions and when they cover large numbers of particles they can be described with quaternionic distributions that contain density distributions like the QPAD's described above. However, their charge carriers are particles and not Qpatches and their charge is a property of the corresponding particle.

Conclusion

This simple model contains extra layers of individual objects. The most interesting addition is formed by the Qpatches.