Essentials of Quantum Movement

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Abstract

This is a concise list of the main points of "Continuity Equation for Quaternionic Quantum Fields"

Essentials of quantum movement

For an introduction, see: Essentials of the Hilbert book model[1].

The movements of quanta[2] can be described by continuity equations. Dirac was the first to put the equation of motion of free electrons in the form of a continuity equation. However, he used a complex format and he used spinors and Dirac matrices in order to represent the quaternionic behavior of fields. Majorana followed him with a similar equation for Majorana particles. Both equations can be converted into quaternionic format and then they become a much easier interpretable form. It appears that the continuity equation contains a source/drain term that contains another quaternion sign flavor[3] of the main transported field.

The general format of the equation that describes the free movement of quanta appears to be:

$$\nabla\psi^{x} = m\,\psi^{y}$$

Here the quaternionic nabla operator is the transporter. ψ^{x} is the transported quaternionic field sign flavor. ψ^{y} is the coupled quaternionic field sign flavor and m is the coupling factor.

The ordered pair $\{\psi^{x}, \psi^{y}\}$ identifies a quantum type.

Two independent switch operations together determine four field sign flavors. The local coordinate system acts as a reference.

The first switch operation $\psi \Longrightarrow \psi *$ switches the sign of all three imaginary base vectors of the quaternion values. In imaginary quaternion space this operation works isotropic.

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[1] http://www.crypts-of-physics.eu/HilbertBookModelEssentials.pdf

[2] Quantum = observable of elementary particle

[3] Sign flavor relates to fields; flavor relates to particles

The second switch operation $\psi \Longrightarrow \psi^1$ switches the sign of only one imaginary base vector of the quaternion values. In imaginary quaternion space this operation works anisotropic.

Both switch operations switch the handedness of the quaternion external vector product.

The four sign flavors differ in the sign of one, two or three imaginary base vectors. Two of the field sign flavors are right handed, the other two are left handed.

The sign flavor of the nabla operator equals the sign flavor of the local coordinate system of which the values act as parameters for the distributions that form the considered fields.

With each quantum that fulfills this scheme exists an anti-quantum.

That anti-quantum is formed by the pair $\{\psi^{x*}, \psi^{y*}\}$ and obeys the equation of movement:

$$\nabla^* \psi^{x*} = m\, \psi^{y*}$$

The real part of ψ^x represents a "charge" density distribution. The imaginary part of ψ^x represents a "current" density distribution. The "charge" for which the dynamics is described by the continuity equation stands for the switch event $\psi^x \Longrightarrow \psi^y$ in case of the quantum and stands for the switch event$\psi^{x*} \Longrightarrow \psi^{y*}$ in case of the anti-quantum.

If in a switch event the handedness is switched, then this involves an electrical charge. The strength of the charge and its sign is determined by the number of imaginary base vectors that switch and on the direction in which this switch takes place. This results in a variety of electrical charges $(\pm e, \pm ⅓\, e \text{ and } 0.)$. Apart from electrical charges the quanta can be afflicted with color charge. This characteristic relates to the direction of the anisotropic switch. The charge $\pm ⅔\, e$ cannot be realized by an elementary particle.

Quanta exist for which the coupling factor is zero. They obey different equations of motion.

If the transported field ψ^x is isotropic and the coupling factor not equal to zero, then the quantum concerns a fermion. Otherwise, it's a boson.

From the equation of motion another equation can be derived, from which via integration the coupling factor m can be calculated from the fields.

$$\int_V (\psi^{y*} \nabla\, \psi^x)\, dV = m \int_V (\psi^{y*}\, \psi^y)\, dV = m \int_V |\psi^y|^2\, dV = m\, g$$

g is a real and positive factor. This equation shows that m is a property of the pair $\{\psi^x, \psi^y\}$, which defines the corresponding quantum.

In this way important properties, equations of motion and coupling factors for electrons, neutrinos, quarks, W bosons, Z bosons and their anti-quanta can be derived.

Since photons and gluons are not coupled, apply to them other equations.

This schema determines important characteristics for all known particles from the standard model. It is also contains open places for not yet observed particles.

Tables

Table of sign flavors

Sign flavor	Flip $\psi^x \Longrightarrow \psi^y$	Imaginary base vectors	Handedness	Isotropy
conjugation:	$\psi \Leftrightarrow \psi^{③}$	3	switch	isotropic
double flip:	$\psi \Leftrightarrow \psi^{②}$	2	neutral	anisotropic
single flip:	$\psi \Leftrightarrow \psi^{①}$	1	switch	anisotropic
No flip	$\psi = \psi^{⓪}$	0	neutral	isotropic
②① flip	$\psi^{②} \Leftrightarrow \psi^{①}$	3	switch	anisotropic

Table of couplings

RLrl	e	Diff	Coupling	m		Particle	Multiplet
RL	-1	3	$\psi^{⓪}\ \psi^{③}$	m	fermion	electron	1
LR	1	3	$\psi^{③}\ \psi^{⓪}$	m	fermion	positron	1
Rl	-⅓	1	$\psi^{⓪}\ \psi^{①}$	m_d	fermion	down-quark	3 colors
lR	⅓	1	$\psi^{①}\ \psi^{⓪}$	m_{dr}	boson	?	3?
Lr	⅔	1	$\psi^{③}\ \psi^{②}$	m_u	fermion	?	3 colors
rL	-⅔	1	$\psi^{②}\ \psi^{③}$	m_{ur}	boson	?	3?
Rr	0	2	$\psi^{⓪}\ \psi^{②}$	m_n	fermion	neutrino	3?
Ll	0	2	$\psi^{③}\ \psi^{①}$	m_z	fermion	?	3?
rR	0	2	$\psi^{②}\ \psi^{⓪}$	m_{nr}	boson	?	3?
lL	0	2	$\psi^{①}\psi^{③}$	m_z	boson	Z	3?
rl	-1	1	$\psi^{②}\ \psi^{①}$	m_{W_-}	boson	W^-	3?
lr	1	1	$\psi^{①}\ \psi^{②}$	m_{W_+}	boson	W^+	3?
RR	0	0	$\psi^{⓪}\ \psi^{⓪}$	0	boson	photon	
LL	0	0	$\psi^{③}\ \psi^{③}$	0	boson	photon	
rr	0	0	$\psi^{②}\ \psi^{②}$	0	boson	gluon	3?
ll	0	0	$\psi^{①}\ \psi^{①}$	0	boson	gluon	3?

R, L : right/left handed through isotropic sign difference

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More details can be found in: http://www.crypts-of-physics.eu/Quaternionic_continuity_equation_for_charges.pdf