The Volume Field Model about Strong Interaction and Weak Interaction

Rongwu Liu
San Gabriel, California, USA

Introduction

Phenomenologically, strong interaction and weak interaction seem as if quite different from gravitational interaction and electromagnetic interaction, they have the properties of short-range force, saturating force, non-central force, and non-attenuate force. For a long time, researchers have attempted to describe them by using the paradigm of particle model, but there still exist some problems unsolved, such as the singularities of black hole and universe. This article suggests that, volume field is a form of existence of matter in plane space, it takes volume-changing motion (or volume motion) in the form of non-continuous motion, volume fields have strong interaction and weak interaction between them by overlapping their volume fields.

The complex structure model of atomic nucleus

The complex structure of fundamental body

Fundamental body (such as quark) is the smallest unit of the nature. It is composed of fundamental particle (fundamental matter mass and electricity) and fundamental volume field (fundamental matter flavor and color).

fundamental particle
fundamental volume field
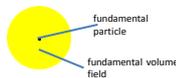
The prediction of dark matter particle

The combination principle of the least intensity: In fundamental body, the sum of interaction intensities of the fundamental matter constituting fundamental body is the least in terms of different number of fundamental matter.

According to "the combination principle of the least intensity", fundamental body is divided into one-in-one (or called single), two-in-one, three-in-one, and four-in-one. The fundamental body one-in-one can account for the formation of dark matter.

	mass	flavor	electricity	color
four-in-one (e.g. quark)	x	x	x	x
three-in-one (e.g. electron)	x	x	x	
two-in-one (e.g. neutrino)	x	x		
one-in-one (or single)	x			

Particle-like fundamental body and volume-field-like fundamental body

The self-motion state of fundamental volume field: According to the absoluteness of volume-changing motion (that is, the state of rest and the state of motion of volume field are absolute), like particle spin, fundamental volume field has two self-motion states of rest and motion (or rest and pulsation).

According to the "self-motion state of fundamental volume field", fundamental body is also divided into particle-like fundamental body which carry static fundamental volume field and volume-field-like fundamental body which carry pulsating fundamental volume field.

(A) Particle-like fundamental body   (B) Volume-field-like fundamental body
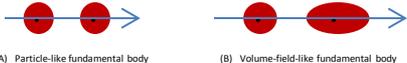
The prediction of volume-field-like quark and volume-field-like neutrino

The condition that volume-field-like fundamental body exists: The sum of action intensities of fundamental volume fields in fundamental body is greater than the sum of action intensities of fundamental particles in fundamental body.

According to "the condition that volume-field-like fundamental body exists", there exist volume-field-like quark which carry pulsating fundamental color field and volume-field-like neutrino which carry pulsating fundamental flavor field in the nature.

The atom-like model of hadron

Like atom, hadron is composed of hadronic nucleus and extranuclear quarks. The hadronic nucleus is just the so-called "hadron" in particle model, it is composed of particle-like quarks which carry static fundamental volume fields; the extranuclear quarks are some volume-field-like quarks which carry pulsating fundamental volume fields.

hadronic nucleus
extranuclear quark
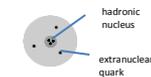
The molecule-like model of atomic nucleus

Like molecule, atomic nucleus is composed of hadrons. Hadrons have interaction between them by overlapping volume-field-like quarks which are around hadronic nuclei, therefore forms color field current in atomic nucleus (like molecular current in molecule).

color field current
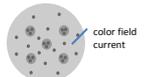
The model of plane space

The concept of plane space

Plane space is a form of space in which volume field exists. The space unit of plane space is infinitely large plane which is directional. Therefore plane space is composed of infinite number of infinitely large planes which are parallel and cross with each other. The position of a plane in plane space is defined as the position of foot point of the perpendicular line drawn from the original point to the plane. The distance between two planes in plane space is defined as the distance between the positions of the two planes (that is, the distance between two foot points). Plane space and point space are isomorphic, each plane in plane space corresponds to a point in point space. In order to show conveniently, in the coordinate systems of one-dimensional and two-dimensional plane space, we can use a transverse line to represent an infinitely large plane.

The classification of plane space

Like point space, plane space is also divided into:

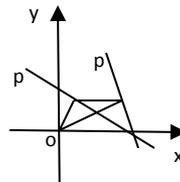**Zero-dimensional plane space** (consists only of one infinitely large plane),
One-dimensional plane space (the planes of this space align in one direction),
Two-dimensional plane space (the planes of this space align in two directions),
Three-dimensional plane space (the planes of this space align in three directions),
Even infinite dimensional plane space.

From the point of view of point space, plane space is a kind of high dimensional space, it has two more dimensions than point space.

Particle model vs volume field model

	Particle model	Volume field model
Basic concepts in kinematics	Particle, point space, zero-dimensional mass point (or one-dimensional string), displacement motion, continuity, relativity, motion state (described by coordinate and momentum), duality of wave-particle, and so on	Volume field, plane space, one-dimensional field, volume motion, non-continuity, absoluteness, rest state (described by coordinate and density), duality of pulsation and volume motion, and so on
Basic concepts in dynamics	Mass, electricity, gravitational field, electric field, magnetic field, long-range force, exchange force, superposition, central force	Flavor, color, flavor field, color field, chi field (defined in volume field model), short-range force, overlap force, saturation, non-central force
Basic relationship of displacement motion and basic relationship of volume motion	$v = \dfrac{r}{t}$	$\rho_n = \dfrac{Q}{V_n}$ or $\rho_n = \dfrac{C}{V_n}$ (1)
Duality of wave-particle and duality of pulsation and volume motion	$\lambda = \dfrac{h}{P}$	$\lambda_n = \dfrac{h}{\rho_n}$ (2)
Newton second law of particle and deformation force of volume field	$F = ma$	$F_n = -kx_n$ (3)
Electric field force and color field force	$F_e = \dfrac{1}{4\pi\varepsilon_0}\dfrac{q_1 q_2}{r^2}$	$F_c = \pm \dfrac{1}{\varepsilon_0}\dfrac{C^2}{S}$ (4)
Magnetic field force and chi field force	$F_m = \dfrac{\mu_0}{4\pi}\dfrac{I_1 dl \times I_2 dl}{r^2}$	$F_{ch} = \mu_0 \dfrac{I_1 I_2}{S}$ (5)

The model of space-time conversion

The collision of volume fields and the energy conversion between particle and volume field

Like particle collision, in volume field model collision also occurs between volume fields. During the collision of volume fields, energy conversion takes place between particle and volume field and the form of space-time is also converted by merging and rupture.

When two volume fields (such as two protons) collide, their volume fields overlap with each other and have strong interaction. At this time the two protons enter into plane space-time from point space-time, the overlapping volume fields of them take volume-changing motion. According to volume field model, in plane space volume field takes volume-changing motion in the way of periodic jump (or pulsation), the speed of each jump is infinitely great, or to say, greater than speed of light. According to relativity, when the speed of particle exceeds the speed of light, the mass of particle will turn into imaginary number. This indicates that, when the speed of particle exceeds the speed of light, the mass of particle will turn into zero. If two volume fields (such as two protons) have strong interaction by means of collision, when overlapping volume fields jump with super speed of light, the mass m compatible with volume field will turn into zero, when the overlapping volume fields are at rest, the mass m will restore to rest mass m_0. Where does the energy corresponding to the mass Δm (the increment of mass) go? This article suggests that, when two volume fields (such as two protons) have strong interaction through collision, the kinetic energy of particle will convert to the chi potential energy of volume field.

If kinetic energy of particles is large enough before collision in point space-time, the chi potential energy of overlapping volume fields converted from the mass Δm of particles will be large enough in plane space-time, too, correspondingly the deformation potential energy of the overlapping volume fields converted from chi potential energy will also be large enough. As a result, overlapping volume fields will rupture inevitably. At this time, the system consisting of overlapping volume fields enter into point space-time from plane space-time.

The classification of space-time conversion

(1) The conversion from point space-time to plane space-time
This type of conversion is realized by the merging of volume fields. The physical cases of this kind of conversion mainly include: the formation of black hole, resonance particle, artificial elements, and atomic nuclear fusion.

(2) The conversion from plane space-time to point space-time
This type of conversion is realized by the rupture of overlapping volume fields. The physical cases of this kind of conversion mainly include: nuclear fission, radioactive decay of atomic nucleus, particle decay, and the Big Bang.

(3) The conversion from point space-time to plane space-time, then to point space-time
This type of conversion is realized by the merging and rupture of volume fields. The physical cases of this kind of conversion mainly include: the collision of high energy hadrons.

Conclusions

Atomic nucleus is another material world existing in plane space, it is a volume field motion system. The phenomena of "quark confinement" and "asymptotic freedom" of particle-like quarks in hadronic nucleus result from the combination of deformation force and color field force. The nuclear force between hadrons in atomic nucleus attributes to the combination of deformation force and chi field force. Point space-time and plane space-time convert each other by means of merging and rupture, the process of collision of high energy hadrons, the formation of black hole, and the Big Bang of universe are three different kinds of space-time conversions. Black hole doesn't collapse into a singularity because of the resistance of chi potential energy and dark energy (or dark matter), instead, it has an equilibrium state with horizon as its boundary (inside of horizon is a volume field motion system, outside of horizon is a particle motion system). The universe didn't explode from a singularity, instead, it exploded from a huge volume field under the repulsive forces of chi field and dark matter (or dark energy).

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