About twenty new ideas of theoretical physics

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Out of twenty new ideas as mentioned below and described in author's article 'A Non-standard Model of Physics' (available at vixra.org/abs/1806.0197), first three are fundamental assumptions of the new model - a four dimensional model of physics capable of explaining or interpreting successfully a good number of fundamental laws, puzzles or phenomena of modern physics.

1. As per our new model universe is four dimensional filled with two kinds of four dimensional (4D) hyper spherical particles and fundamental particles are created from these 4D particles when four-dimensional space deforms locally.

2. Internal energy of a fundamental particle consists of (i) kinetic energy (ii) hyper gravitational energy that arises from long range attracting forces among 4D particles (iii) hyper surface energy that arises from short range attracting forces among 4D particles.

3. Our new model asserts that fundamental particles have 4D structures described by the equations

$w = \pm a\, exp[(-b(x^2 + y^2 + z^2)]$, where w is the displacement along fourth dimension perpendicular to *x*, *y* and z directions.
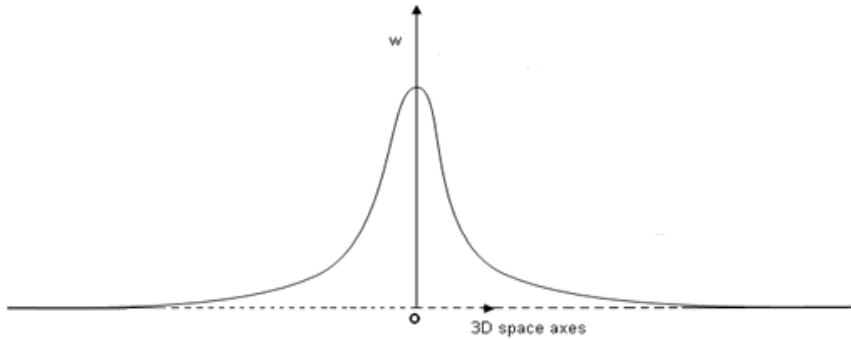

Figure showing structure of fundamental particle

The projection of this structure on its 3D base (that coincides with our conventional 3D universe) is a finite sphere (neglecting the distant parts of structure which are ineffective) which justifies spherical shape of fundamental particles in 3D space.

4. Theoretically fundamental particles as described by above equation have 4D structures of infinite extent which justifies electromagnetic or gravitational influence of one fundamental particle on another at very large distance from it (there is no such device in our 3D model to justify mechanism of action at a distance)

5. Fundamental particles are dynamic and always move as 4D wave pulses satisfying the equation

$w = a\, exp[-b(x - vt)^2]$ **,** where motion described is assumed to be along x-axis.

6. In section '6' of the article it is mentioned why a 4D wave pulse described by above equation is more appropriate to resolve wave-particle duality of matter than that done by a wave packet of 3D model.

7. The above equation of 4D wave pulse is used for a short derivation of de Broglie hypothesis (our traditional physics does not derive this).

8. Section '7' of the article shows how Schrödinger equation is related to structure of fundamental particle. Perhaps this is the reason behind successful applications of Schrödinger equation in physics.

9. Section '8' of the article shows how repulsive Coulomb force becomes attractive strong force as $\frac{d^2w}{dx^2}$ changes sign at the point of inflexion.

Why electron-positron pair annihilates? What prevents electron in falling into nucleus? Why n-n or p-p combination is unstable in spite of strong attractive force? Why n-p combination (deuteron) is stable? These four observed facts are explained by the point of inflexion theory in section '8' and '9' of the article. The same point of inflexion theory will also explains why the attractive binding force between proton and neutron in deuteron becomes repulsive as their separation decreases further.

10. Why there are two kinds of charge? As per our new model our 3D universe is a 3D hyper surface separating two 4D worlds on its two sides (upper and lower). Negative charge and positive charge are formed on upper and lower sides of our universe respectively.

11. How Nature dopes exactly equal amount of charges into particles of different masses?

How charge of an electron concentrates near a point in spite of repulsion among its constituent parts?

Above two questions are answered in section '10' of the article. As per our new model charge is not a quantity that can be distributed over a fundamental particle. Concept of charge arises from the Coulomb force on the fundamental particle which is found to be independent of its size and dependent on its shape. This new concept is responsible for equal magnitude of charges ($\pm e$) of fundamental particles of different masses shape being similar for all).

12. How to deal with infinite Coulomb force when the distance between two fundamental particles approaches zero? As per our new 4D model Coulomb force is a special case of the unified force described by the equation

$F = K\frac{(2bx^2-1)^2}{x^6}\left[1 - exp(-bx^2)\right]$, which is not infinite at $x = 0$ due to its indeterminate form 0/0.

For Coulomb range ($x \gg 10^{-15}$), the above equation reduces to $F_{coul} = K\frac{4b^2}{x^2}$ (for $b \approx 10^{30}$).

13. The net internal energy of the 4D structure of a fundamental particle that is formed satisfying some equilibrium conditions determines it's mass. This is described in section '4'. (If this is true then explanation of origin of mass by Higgs mechanism is not necessary.)

14. A 4D classical technique (*named as spiral transformation*) of converting energy into matter and vice versa is described in section '5'. Standard model does not give us a classical picture of this phenomenon.

15. Addition and removal of matter-energy along a 4D spiral path ensures reversibility of spiral transformation process which explains reversible nature of emission with absorption and pair production with annihilation.

16. Standard model does not give us a classical picture of internal mechanism to show how photons enter or emerge from atoms. A photon entering an atom centrally should produce different result than entering along peripheral direction. In our new model all these directions are equivalent as they coincide with 3D base of 4D structure of atom.

17. Wave model of traditional physics cannot explain instantaneous nature of photo-electric emission. In our 4D model, the rapid process of spiral transformation explains instantaneous nature of photo-electric emission.

18. New model resolves the puzzle (section '6') behind dual nature of radiation by assuming photon as a 4D hyper surface wave of finite length(There is no single classical picture in traditional physics to describe nature of light, because we have to accept both photon model and wave model)

19. New model also hints how neutron is created when high velocity electron is slipped into proton without exhausting field energy.

20. The model gives an idea why 4th quantum number (spin) is due to existence of extra space dimension.

A lot of more outcomes will emerge from this new 4D model when more people take interest in developing or modifying this baby model. Future research on this model will confirm its validity simultaneously confirming the four dimensional nature of space.

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