Origin of the Electron Bubbles, Twisters and Unidentified Electron Objects in Liquid Helium

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Abstract: Here, on base of the lacking part of ultimate theory, i.e. the Everlasting Theory, I calculated sizes and described mechanism of production of the electron bubbles and the quantized vortices/twisters in liquid helium. Calculated size of the electron bubbles is 2.1 nm whereas of the twisters is of the order of an angstrom (0.1 nm). The mechanism of trapping the electron bubbles by the tangles-bundles composed of the quantized twisters (they are the cores of the electron bubbles) is described as well. The Everlasting Theory leads as well to electron bubbles with smaller core (4 times smaller) which exist at very low temperatures and explode at larger pressure. Such objects are referred to as the unidentified electron objects. Obtained results are consistent or very close to experimental data.

1. Introduction

The Everlasting Theory I described in book [1] and 24 papers [2]. This theory is based on two fundamental axioms. There are the phase transitions of the fundamental spacetime composed of the superluminal and gravitationally massless pieces of space (the tachyons). It is the modified Higgs field that I refer to as well as the Newtonian spacetime. The phase transitions follow from the saturated interactions of the tachyons and lead to the superluminal binary systems of closed strings (entanglons) responsible for the quantum entanglement, lead to the binary systems of neutrinos i.e. to the Einstein-spacetime (Es) components, to the cores of baryons and to the cosmic objects/protoworlds that appeared after the era of inflation but before the observed expansion of our Universe. Second axiom follows from the symmetrical decays of bosons that appear on the surface of the core of baryons. It leads to the Titius-Bode law for the strong interactions i.e. to the atom-like structure of baryons. The two first phase transitions are associated with the Higgs mechanism that leads from the modified non-gravitational Higgs field to the Principle of Equivalence and to the initial conditions applied in the General Theory of Relativity. The three first phase transitions concern the particle physics whereas the structure and evolution of the most sophisticated spinor, i.e. the cosmic object/Protoworld, defined by the four phase transitions, leads to the new cosmology.

The complete and mathematically coherent theory of the phase transitions lead to the foundations of the quantum physics i.e. both the confinement that follows from the Mexican-hat mechanism associated with the Einstein-spacetime components, and superluminal entanglement.

Due to the interactions of the Higgs field with the Einstein-spacetime (Es) components, the Es components acquire their gravitational mass [1].

Here, I will show that origin of the electron bubbles and the quantum vortices/twisters in liquid helium follows from the structure of protons and electrons described within the Everlasting Theory [1], [3].

The size of the electron bubbles (in approximation 2 nm) is much too small to be photograph. We can increase the radius applying acoustic pulse. At first, the pulse creates negative pressure and next positive. At first, the size reaches a maximum of about 10 μm and next contracts to its initial size. The spheres in size about 10 μm can be photographed.

2. Calculations

Here [3], you can find Chapter titled "The Mexican-hat mechanism in the Everlasting Theory". In this Chapter, I described how in atoms is produced electric well/bubble. Electrons as well produce such bubbles.

Calculate the sizes of the radiation-mass bubbles produced by proton and electron.

Here [4], I motivated that charged core of proton (its mass is $M_{core\text{-}of\text{-}proton}$ = 727.4401 MeV whereas external radius is A = 0.6974425 fm) simultaneously produces two virtual electron-positron pairs. The radiation mass of the two pairs is $m_{r(two\text{-}pairs)} = 4(m_{electron} - m_{bare\text{-}electron})$ = 0.0023676 MeV, where $m_{electron}$ = 0.5109989 MeV whereas $m_{bare\text{-}electron}$ = 0.510407 MeV [1]. Range of a gluon loop produced on equator of the core of proton is 2πA. On the other hand, range of a particle is inversely proportional to its mass. This leads to conclusion that range of radiation mass of a proton we can calculate from following formula

$$R_{bubble(proton)} = 2\pi M_{core\text{-}of\text{-}proton}A / m_{r(two\text{-}pairs)} = 2\pi L^2 A = 1.35\cdot10^{-9}\ \text{m} = 1.35\ \text{nm}, \quad (1)$$

where L = 554.3. On the other hand, distances between the Es components in electric charge of an electron are L = 554.3 (see formula (16) here [1]) times greater than in electric charge of a proton. **We can see that around proton is created the radiation-mass bubble that size is 2.7 nm**.

Calculate now size of the radiation-mass bubble for an electron (for the electron bubble). An electron produces simultaneously one virtual electron-positron pair [1]. By an analogy to formula (1), we can calculate radius of the electron bubble from following formula

$$R_{bubble(electron)} = 2\pi m_{bare\text{-}electron}\lambda\!\!\!^{-}_{bare\text{-}electron} / m_{r(one\text{-}pair)} = 1.05\cdot10^{-9}\ \text{m} = 1.05\ \text{nm}, \quad (2)$$

where $\lambda\!\!\!^{-}_{bare\text{-}electron} = 3.8661\cdot10^{-13}$ m is the reduced Compton length of the bare electron [1].

We can see that size of the electron bubble is $2R_{bubble(electron)}$ = 2.1 nm. The obtained result is very close to the data presented here [4].

According to the Everlasting Theory, from the Es components can be produced loops. They have internal helicity so they are the quantum twisters. Just the spins of the Es components rotate in planes perpendicular to the loop – they are the rotons. Probability of creation of the loops/twisters in stable states is highest. Since radius of the first Bohr orbit in hydrogen atom is $0.529\cdot10^{-10}$ m so size of such twister is in approximation 0.1 nm. Size of a tangle/bundle composed of such twisters should be of the order of an angstrom (0.1 nm). Mass of the loops is directly proportional to their radius [1] (see Chapter "Reformulated Quantum Chromodynamics"). It leads to conclusion that smaller tangles/bundles are more stable (it results from following formula: $Mc^2T_{lifetime} = \hbar$) i.e. they should explode at larger pressures. We can see that during a contraction of a vortex, we should observe a vortex multiplication – it follows from the fact that mass of a vortex is directly proportional to its radius.

Size of a twister produced in the ground state in liquid helium is 0.025 nm = 0.1/4 nm, whereas for the shell n = 2 and l = 0, we obtain 0.1 nm i.e. the same as for the ground state in hydrogen atom. The last result is consistent with the data at nonzero temperatures presented here [6].

The electron bubbles with the cores 4 times smaller (i.e. for the ground state of liquid helium, i.e. at very low temperature of liquid helium), I identify as the unidentified electron objects. I motivated that such objects are more stable so they should explode at larger pressures.

Centre of bare electron [1] (it is the centre of the electron bubble as well) can overlaps with a point of a twister so they interact weakly – it is because electrons and twisters are built up of the Es components. We can see that electron bubble can be trapped by a vortex/twister so by a tangle/bundle of twisters as well.

3. Summary

Here, on base of the lacking part of ultimate theory, i.e. the Everlasting Theory, I calculated sizes and described mechanism of production of the electron bubbles and the quantized vortices/twisters in liquid helium. Calculated size of the electron bubbles is 2.1 nm whereas of the twisters is of the order of an angstrom (0.1 nm). The mechanism of trapping the electron bubbles by the tangles-bundles composed of the quantized twisters (they are the cores of the electron bubbles) is described as well. The Everlasting Theory leads as well to electron bubbles with smaller core (4 times smaller) which exist at very low temperatures and explode at larger pressure. Such objects are referred to as the unidentified electron objects. Obtained results are consistent or very close to experimental data.

Smaller twisters live longer i.e. are more stable. The unidentified electron objects have smaller core so they should live longer i.e. they should explode at lager pressures. Lifetime of the electron bubbles without core composed of twisters should be shortest.

References

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