Experimental support for a deBroglie-Bohm-Post interpretation of microphysics from the evidence of quantum interference in the femtometer scale.

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Abstract:

This short note supplements a recent paper by the author (http://vixra.org/abs/1710.0236). In that paper it is shown from detailed data analysis that rest energies and magnetic moments for baryons can be related in terms of the existence of coherent or incoherent currents in the femtometer scale. We argue that such evidence brings support to the kind of microphysics proposed by Louis de Broglie, David Bohm and Evert Post. Rest energy is concentrated in a core. In particular all results in the cited reference can be obtained from Post´s proposal of the determination of dynamical quantities of the core through period integrals involving essentially the phases of “wavefunctions”.

1. **Interpretation of particles wavefunctions**.

Bi-prism " double-slit" interference experiments have been carried out on single electrons in an electron microscope (A Tonomura et al., AmJPhys 57,117, 1989). The most striking result of this experiment was that (in agreement with quantum mechanics conceptual proposal) each individual electron behaves as a wave when on travel and during interactions with the "double slit". When it is captured in a screen it is captured as a particle, that is, either it is caught in a single event or not at all.

The outcome of such experiments suggests that the wavefunction describing the travelling particle can be divided in two parts (de Broglie, Annales de la Fondation Louis de Broglie, 12(4), 1, 1987):

$$\psi = \psi_0 + \psi_t \qquad (1)$$

The theory presented in the AmJPhys paper is concerned only with ψ_t . It was extremely interesting to note the following. The traveling part of the total wavefunction necessarily includes the effect of the double-slit. That is, the restraining surrounding "topology" is inserted in the very function that describes the moving particle(D. Bohm, PhysRev 85, 166 and 180, 1952, proposes the existence of an additional potential term that introduces an extra force acting upon the particle, which accounts for the topology effect). The topology imposes a break in coherence of this traveling wave and an interference of the resulting couple of waves is obtained. At the points in which ψ_t is null due to interference no capture event takes place according to quantum mechanics. It must be put quite clearly that it is not that the particle ceases to exist in these points. From (1) we see that the first term ψ_0 is defined in a different, much finer scale than ψ_t but is always present. In view of such fine scale, it only manifests locally. The capture event, wherever it happens, testifies for the existence of ψ_0 in such a fine scale. Equation (1) seems related with the de Broglie proposal of a particle riding a wave.

Yet, according to de Broglie, ψ_0 in its own scale should be described in the same way as ψ_t. Schilling (http://vixra.org/abs/1710.0236 and his other papers in vixra) has analyzed rest energies and magnetic moments

data for leptons and for the families of baryons. Instead of ψ_0 itself the main quantity studied is the intrinsic current, which is a function of ψ_0 and derivative(but ends up dependent on the wavefunction phase, the other details being left as a phenomenological parameter associated with the proton mass; see below) . Depending on the particle, ψ_0 can either be represented by a coherent loop of waves, or display interference effects due to a loss of coherence akin to those in the double slit experiment. The effect of topogical constraints is analogous in the production of interference. Such femtometer scale interference is manifest through the wave intensity dependence upon the amount of flux confined by the loop of current. For the coherent wave loop the number n of flux quanta confined is necessarily an integer. When interference sets in it is no longer an integer in view of the additional phases imposed by the effects of contraints similar to the effect of the double slit in the microcopy experiment. The constraints are similar to Josephson Junctions (JJ)in this sense(see vixra reference). The JJ break coherence of waves on both their sides but such charge transport remains lossless(although we don't know if particles brief lives are not related to losses due to constraints, with relaxation times on the order of 10^{-12} to 10^{-24} s. ! --- it is rather remarkable that 1 pico second is a typical relaxation time in conducting solids).

The constraints are different in different particles of the leptons and baryons families. Each of these baryons is believed to span a certain irrep of the SU(3) group, so that the constraints must have such geometries.

At least two top scientists, Fred Hoyle and Asim Barut, have associated the proton to all other particles. Schilling has presented evidence that interference effects produce other baryons from a proton "substrate", which would actually be a full proton as proposed by Barut. Hoyle assumes the proton as a fundamental particle in cosmological terms in the origin of the Universe, from which others derive. In the same way as the nucleons with its proton, the other families of baryons have one member characterized by n=3 flux quanta and a coherent wave. The proton is the particle with the minimum mass from all those with n=3. Other members of each family (with same rest energy)are apparently formed by a full proton altered by interference effects from additional surrounding

incoherent currents, involving different constraints and noninteger n, as something like circulating saturn rings around the protonic “planet”..

2. **Other Remarks**.

It must be noticed that the analysis by Schilling can be carried out with no explicit mention to an hypothetical validity of the Schroedinger equation in the femtometer scale. As repeatedly proposed by Post, the entire argumentation by Schilling can be made solely in terms of the continuity of phase around a closed loop, the so-called period integral. Another important detail is that the length scale R is eliminated through its proposed relation to current and moment. Therefore, the final expressions contain only experimentally obtainable parameters alongside constants of Nature. The issue of validity of the treatment depending on scale does not arise and the final variables might even be replaced by vectors or tensors of purely mathematical form.

The reader should consult Schilling´s vixra paper for full references and details.