Three Neutrinos and Three Quarks Cannot be a Coincidence[1]

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This short note argues that the proton is a 'bound set of three phonon packets attached to a Dirac hole [1]' that exists and travels within the negative-energy Planck vacuum (PV) state [2].

It is argued in an earlier paper [3] that the neutrino is a massless phonon packet traveling within the PV. Lacking sufficient working knowledge of the PV state, the corresponding demonstration utilizes certain ideas from solid state physics [4, pp.128-135] that lead to a reasonable explanation for the three neutrino states (ν_e, ν_μ, ν_τ), and their mixing wherein the neutrino jumps between the three states as it propagates [5, p.452].

Taking the decay of the neutron into a proton and an electron as an example, the calculations in [3] proceed along the following heuristic lines: the sudden appearance of the electron as a decay product sets up a disturbance in the PV from which a phonon packet is created to help conserve energy and momentum during the decay process; then, using a harmonic (quadratic) approximation to the packet Hamiltonian in a linear lattice whose lattice points are separated by the electron Compton wavelength, the packet energy and group velocity are derived in terms of the squared ratio of the effective packet mass to the electron mass; finally, the addition of the cubic, anharmonic, phonon-phonon interaction Hamiltonian as a perturbation to the quadratic Hamiltonian leads to a three phonon-packet process that can be reasonably associated with the three neutrinos and their mixing.

The PV is assumed to be a monopolar vacuum state because the bare Coulomb field (e_*/r^2) of a propagating free charge cannot generate a magnetic field from a bipolar state [2]. Therefore, positive charges do not exist in the PV (the Planck particles in the PV are assumed to have the same negative bare charge, $-e_*$, as the electron). If the proton exists as PV 'hole', however, the positive-charge question does not come up. So, what kind of 'hole' might the proton be? A precise answer to the question requires a substantive model for the PV state that is not available at the present time—it does seem from the previous discussion of the neutrino phonon packets here and in [3], though, that something meaningful can still be said about the PV proton.

In the electron problem the cubic Hamiltonian is assumed to be a small perturbation to the quadratic Hamiltonian. In the proton problem, with its 1800 times smaller Compton radius and its 'hole' aspect, however, it is not reasonable to expect the same simplifying assumption to hold for the proton. One salient

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idea sticks out nonetheless. In the neutrino case the *cubic* approximation leads to the *three* neutrinos. It thus seems reasonable that some type of three-packet process might also exist in the proton case (where the corresponding quadratic and cubic Hamiltonians are combined on an equal basis; i.e., where one is not a perturbation to the other) that leads to the three-quark proton [5, pp.67-68].

If there is any validity to the preceding speculations, the proton-proton measurements to come from the heavy-particle collider experiments [6] will reveal more about the vacuum state than the proton particle as a separate entity. Furthermore, the speculations may lead to a way out of the Standard-Model (SM) lament expressed in the following quote: "It is clear that the large number of parameters and the unexplained existence of three generations, together with the fact that the SM does not include gravitational interactions, are unsatisfactory aspects of the SM. This justifies the widespread opinion that the SM is not the ultimate theory of the physics of elementary particles ... "[5, p.70].

References

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