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Justification of a time-space symmetrical bi-cylindrical model for quantum physics with a refined interpretation of the mass hierarchy of charged leptons

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Following a bi-cylindrical geometrical dynamics, we show that a 6D-gravitational equation leads to the geodesic description in an extended symmetrical time-space, which fits Hubble-like expansion on a microscopic scale. As a duality, the geodesic solution is mathematically equivalent to the generalized Klein–Gordon– Fock equations of free massive elementary particles with non-zero spin, in particular, as the squared Dirac equations of leptons. The quantum indeterminism is proved to have originated from 3D local space-like and time-like curvatures. Interpretation of important issues of the quantum mechanical reality is introduced. The lepton mass hierarchy puzzle as a beyond Standard Model (SM) problem of particle physics would be solved by our proposed time-space symmetry based microscopic cosmological model (MCM). According to this model, charged lepton masses are induced from curvatures of hyper-spherical surfaces embedded in a microscopic 3D time-like subspace. In a mass hierarchy of three lepton generations, the tauon mass could be predicted with 2.2% precision for the first approximation, based on two other experimental masses of electron and muon. In a recent study, for the fine-tuning approximations, there are infinite "perturbative" orders of correction added to higher curvatures by minor contributions from lower curvatures. Finally, the calculation of m_τ (MCM-theory) ≡ m_3 (∞) = 1776.40 MeV/c^2 reaches a fairly passable consistency within 3σ to fit the experimental tauon mass m_τ (exp) = 1776.82 ± 0.16 MeV/c^2. From one perspective, this quantity still needs a hyperfine adjustment by any other mechanism for a firm consistency with experiments. From the other perspective, our theoretical quantity is a very encouraging prediction in the light of an explicit geometrical dynamical interpretation, which is in opposition to another alternative prediction based on the Koide empirical formula with m_τ (Koide) = 1776.97 MeV/c^2 (less than 1σ from the experimental). Therefore, a new attempt for upgrading the experimental accuracy of tauon mass is proposed, which would be carried out at available Tauon- or B-factories.

Biography

Vo Van Thuan has completed his PhD in nuclear and particle physics in the year 1983 at the age of 31 years from the International Joint Institute for Nuclear Research, USSR. Co-author of a discovery of extremely strong enhancement of weak interaction in neutron resonance interferences. He had attended seminar courses from1979 to 1984 on the neutrino oscillation theory given by B Pontecorvo in JINR. Being a staff of Vietnam Atomic Energy Commission, he became the director of the Institute for Nuclear Science and Technology, a premier national R&D organization in nuclear physics, high energy research and development of nuclear technology, planning for nuclear power projects in Vietnam. He has published more than 30 papers in reputed international journals and dozens national scientific and technical articles. He has created a Vietnamese team in INST for collaboration with the international Pierre Auger Project searching for extremely high energy cosmic rays. Since 2017 he has joined as a senior researcher to a newly established in Hanoi R&D Office of Duy Tan University. He gave lecture on nuclear and neutron physics to students of Hanoi universities, being advisor to PhD and master theses. He is an executive member of the Vietnam Physical Society.

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