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Origine of geometrized quantum mechanics

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The study is based on fundamental math structures represented by subsets of exclusive algebras of hypercomplex numbers. Thus, written in matrix units, a complex number is originally represented as a "conic gearing mechanism", and a similar fractal ("square-root") object, a 2D-cell, is introduced as a surface local area built on the dyad spinor vectors. Square combinations of the dyad vectors give a full set of quaternion units forming, in particular, a vector basis in 3D space. It is shown that the 2D-cell's simplest distortions, a phase change, and conformal stretching, have as a result a metric defect in the 3D space with violation of the product law of the exclusive algebras of real, complex and quaternion numbers. The metric defect is cured by introduction of natural conditions providing the algebras safety (a normalization integral) and stability (the integral's constancy with respect to a free parameter). This entails continuity-type equation for dyad vectors as functions of coordinates of an abstract space; an arbitrary "propagation" vector emerges in the equation. Choice of the propagation vector as the gradient of the 2D-cell's phase leads to the appearance of a simpler fractalized equation; written in physical units (the Compton-wave length) the equation becomes precisely the Schrodinger equation of quantum mechanics. The procedure of this deduction has definite geometric bases, all involved math objects admitting clear visualization. In particular, the dynamic picture of oscillating fractal 2D-cell loaded with relative mass semi-density (as an image of a particle's wave function) is demonstrated, as well as its 3D embodiment, a spinning point-like particle. The Bohm procedure applied to the fractalized algebra stability condition brings (under natural assumptions) the equations of classical mechanics. As well it demonstrates that the 2D-cell's phase has a physical sense of the mechanical action; moreover, a transparent motivation arises for the minimal action (phase) conjecture giving birth to the dynamic equations of classical mechanics. Finally, it is shown that the model of a fast-spinning point-like particle and a helix-type image of its trajectory results in the unconventional geometric derivation of basic relations of the relativistic mechanics, while the slow-velocity approximation gives theoretical grounds for De Broglie's wave-function postulates. As a whole, the study formulates an original version of "General theory of particle's mechanics" arising from the pure mathematical consideration.

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