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Quantum dynamics and Weyl's conformal geometry: the Dirac's equation and the mystery of "Quantum Nonlocality"

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A rigorous ab initio derivation of the 4-spinor Dirac's equation for a single spinning particle is presented on the basis of a novel approach, the "Affine Quantum Mechanics" (AQM), which assumes that quantum phenomena originate from the interplay between the motion of a relativistic top and the non trivial Weyl's background geometry acting on its configuration space. The theory, based on the Hamilton-Jacobi formulation is intrinsically nonlinear but is found to be linearized by an "anzatz" solution that can be straightforwardly interpreted as the ′quantum wavefunction'. In turn, this one can be interpreted as a gauge field of a conformal space. By the extension of the AQM theory to the case of two spins, the so far ′mysterious'process of ′quantum nonlocality'which is at the basis of the EPR Paradox, the Einstein's "Spooky action - at - a - distance", and is implied by the violation of the Bell's inequalities, appears to be finally understood.

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