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Discretized Finsler Structure and Born Reciprocity: An Approach to unify General Relativity and Quantum Mechanics

Aiming at unifying General Relativity (GR) and Quantum Mechanics (QM), we apply Born reciprocity and the Relativistic Generalized Uncertainty Principle (RGUP). A novel estimation of the fundamental tensor in discretized curved spacetime is thereby suggested. To this end, Riemann geometry is extended to incorporate the distance-momentum duality symmetry and implement the minimum measurable length. For a test particle at coordinate x and momentum p in Finsler geometry, we could directly impement the RGUP approach to the Finsler structure so thatn F(x,y)=>F(x,p), from which the metric tensor could be deduced. The resulting metric tensor in discretized Riemann spacetime looks very similar to Weyl tensor. On other hand, this result suggests that the principles of quantum mechanics could be unambiguously imposed on the resulting fundamental tensor. We also calculate the GR's curvature tensors and apply those on 3-sphere. This study preserves classical GR but apparently suggests extending its applicability to incorporate quantum mechanical scales.

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