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Type: **Long Talk (20 mins)**

## Spacetime Charge and The End of Predictability

Friday, December 15, 2023 9:10 AM (20 minutes)

A novel theory has recently surfaced, proposing a generically covariant and anomaly-free canonical modified theory of gravity. This theory posits the emergence of a spacetime line element from phase space variables by ensuring the covariance of the metric components. Besides the holonomy-like correction resembling correction in the effective loop quantum cosmology, anomaly-free condition introduces an extra unfixed function denoted as  $q$ . This function must reverse its sign in tandem with the phase space momenta for the theory to maintain invariance under time reversal. As a result, this formulation brings forth the concept of spacetime charge. The current research demonstrates that in the presence of any non-vanishing spacetime charge, the vacuum solution comprises asymptotes separated by an Euclidean region. Notably, no physical trajectories can penetrate the transition surface, irrespective of its regular characteristics, which indicates the end of predictability. However, the Euclidean radius is replaced by a bouncing surface (minimum radius or wormhole throat), in the limit when the spacetime charge vanishes, which resurrected the black-to-white hole transition picture.

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