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Possible observational consequences of Planckian granularity

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I will argue that discreteness at the Planck scale (naturally expected to arise from quantum gravity) might manifest in the form of minute violations of energy-momentum conservation of the matter degrees of freedom when described in terms of (idealized) smooth fields on a smooth spacetime. In the context of applications to cosmology, such "energy diffusion" from the low energy matter degrees of freedom to the discrete structures underlying spacetime would lead to the emergence of an effective dark energy term in Einstein's equations. We estimate this effect using a (relational) hypothesis about the materialization of discreteness in quantum gravity which is motivated by the strict observational constraints supporting the validity of Lorentz invariance at low energies. Arguments based on a simple dimensional analysis lead to an estimate of an effective cosmological constant agreeing in order of magnitude with its observed value. I will also mention possible implications in the more recent dynamics of the universe.

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