

Reconciling a minimal length scale with lack of photon dispersion

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Generic arguments lead to the idea of a minimal length scale in quantum gravity. An observational signal of such a minimal length scale is that photons would exhibit dispersion. In 2009, the observation of a short gamma ray burst seemed to push the minimal length scale to distances smaller than the Planck length. This poses a challenge for minimal length models. Here we propose a modification of the position and momentum operators which lead to a minimal length scale, but preserve the photon energy-momentum relationship $E=pc$. In this way there is no dispersion of photons with different energies. This can be accomplished without modifying the commutation relationship $[x,p]=i\hbar$.

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