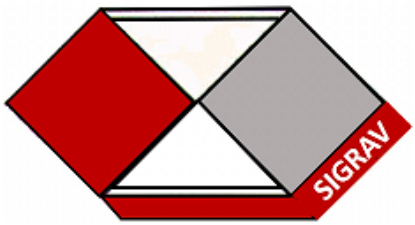

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Spacetime effects on wavepackets of coherent light

Wednesday, September 8, 2021 12:30 PM (15 minutes)

We investigate the interplay between gravity and the quantum coherence present in the state of a pulse of light propagating in curved spacetime. We first introduce an operational way to distinguish between the overall shift in the pulse wavepacket and its genuine deformation after propagation.
We then apply our technique to quantum states of photons that are coherent in the frequency degree of freedom, as well as to states of completely incoherent light. We focus on Gaussian profiles and frequency combs and find that the quantum coherence initially present can enhance the deformation induced by propagation in a curved background. This further supports the claim that genuine quantum features, such as quantum coherence, can be used to probe the gravitational properties of physical systems. The results of this work can be tested with current satellite technologies.

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