

## **Nonperturbative quantization of gravitational waves, and their signatures: a model**

We consider the polymer quantization of gravitational waves propagating on a classical cosmological background. The model is flexible in the sense that the background can be chosen to be FLRW, flat, etc. Using this model, we study some of the observational signatures associated with quantum gravity imprinted on such gravitational waves. These include the modification to the dispersion relation, propagation speed and the waveform of the waves. Furthermore, since the classical Hamiltonian of the waves is time-dependent due to the presence of the scale factor, it was unclear how to polymer quantize such a Hamiltonian up until now. To overcome this, we use a novel method, involving the extended phase space, to quantize the system and derive the effective Hamiltonian. To our knowledge, this is the first time this method has been applied to the gravitational waves Hamiltonian.

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