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Spinfoams, γ -duality and Parity Violation in Primordial Gravitational Waves

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There has been an expectation that the presence of the *Barbero-Immirzi* parameter (γ) in Loop Quantum Gravity (LQG) results in a quantum correction to the classical theory of gravity in the form of parity violation in primordial gravitational waves. In this paper, we show that a discrete symmetry of the Spinfoams action, γ -duality, constrains the form of the effective action for gravitational perturbations. As a consequence, tensor perturbations with different helicities evolve differently, and their circular polarization depends explicitly on γ . In this manner, the observation of primordial parity violation together with the mechanism that we propose would provide a way to set a bound on the value of the Barbero-Immirzi parameter, and therefore on the scale of discreteness of geometrical observables, such as the area and volume of a quantum chunk of space.

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