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Axion Poltergeist

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Axion(-like fields) can explain the cosmological dark matter (DM) abundance and /or the baryon asymmetry of the Universe (BAU). In particular, the axion rotation dynamics, a la the Affleck-Dine mechanism, open up new mechanisms for production of DM and BAU. When the axion rotation energy density dominates the energy density of the universe, a transient matter-dominated (MD) era and a kination era can arise. In this talk, we point out that the quick change of the equation of state in the MD-to-kination transition produces gravitational waves at the nonlinear orders of cosmological perturbation theory (the so-called “Poltergeist mechanism”). The resultant stochastic gravitational-wave background can be observed by future gravitational-wave observatories even if the power of the axion perturbations, the source of the gravitational waves, has the size similar to that of the primordial curvature perturbations, namely, $\mathcal{O}(10^{-9})$.

Secondary category for the parallel session (optional)

BSM Theories

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