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Signatures of Primordial Gravitational Waves on the Large-Scale Structure of the Universe.

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Primordial gravitational waves (GWs), beyond their direct detection prospects, can induce second-order scalar perturbations. These tensor-induced scalar modes evolve similarly to standard matter perturbations and leave distinct imprints on the large-scale structure (LSS). In this talk, I will present a detailed study of these effects, including analytical results for the evolution of induced density contrasts across radiation- and matter-dominated eras, and the role of GWs energy density fluctuations as a source. I will also discuss how the resulting non-Gaussianity reflects the nature of the primordial GWs spectrum, ranging from scale-invariant to sharply peaked models. These findings suggest a novel observational avenue to probe primordial GWs using galaxy surveys and LSS data, opening a complementary window to the early Universe beyond traditional GWs detectors.

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