

Cosmic Archaeology with gravitational waves from (axion) cosmic strings

Monday, July 12, 2021 5:40 PM (25 minutes)

In this talk I will discuss two important aspects of cosmology and particle physics that can be probed with GW signals from cosmic strings: probing the pre-BBN primordial dark age and axion physics. Gravitational waves (GWs) originating from the dynamics of a cosmic string network have the ability to probe many otherwise inaccessible properties of the early universe. In particular, I will discuss how the frequency spectrum of a stochastic GW background (SGWB) from a cosmic string network can be used to probe Hubble expansion rate of the early universe prior to Big Bang Nucleosynthesis (BBN), during the “primordial dark age”. Furthermore I will show that in contrary to the standard expectation, cosmic strings formed before inflation could regrow back into horizon and leave imprints, with GW bursts potentially being the leading signal. In relation to axion physics I will also demonstrate the detection prospect for SGWB from global/axion strings which may provide a new probe for axion-like dark matter models, considering various scenarios of cosmic history. Finally I will briefly discuss the prospect of using frequency domain information to disentangle a cosmologically sourced SGWB such as from cosmic strings vs. astrophysics sourced SGWB, particularly highlighting the impact of a midband GW experiment.

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