

Whispers from the Dark Universe - Particles & Fields in the Gravitational Wave Era

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WHISPERS FROM THE DARK UNIVERSE – PARTICLES & FIELDS IN THE GRAVITATIONAL WAVE ERA

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Ultrahigh frequency GW backgrounds from cosmic strings

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This talk focuses on gravitational-wave backgrounds (GWB) from cosmic strings that would manifest only at ultra-high frequencies (above kilohertz), that leave no signal at either LIGO, Einstein Telescope, or LISA, and correspond to high-energy scale (beyond 10^{10} GeV) particle physics parameters. Signals from metastable local strings, with amplitude as large as the ΔN_{eff} bounds, offer exciting prospects to probe grand unification physics. Beyond the information of the symmetry-breaking scale, the high-frequency spectrum encodes the microscopic structure of the strings through the position of the UV cutoff. The detection of such cut-off enables the reconstruction of the scalar potential, particularly the scalar self-coupling. We estimate the needed reach of hypothetical futuristic GW detectors to probe such GW and, therefore, the corresponding high-energy physics processes. On the other hand, the GWB from global axionic strings is suppressed even for large symmetry-breaking scales due to the matter era from the associated heavy axions. (Based on Phys. Rev. D 109, 103538 [arXiv:2312.09281])

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