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Detecting Gravitational Waves from Cosmic Strings with LISA

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The detection of a stochastic gravitational wave background (SGWB) by LISA is an exciting prospect, especially in the light of the recent NANOGrav results. One of the many possible sources of cosmological SGWB signals which could be detected by LISA is cosmic strings. An important ingredient in the calculation of this contribution is the loop power spectrum which characterizes the emission from a cosmic string loop of a given length as a function of the harmonic (mode). The existing analytic approximations to the computation focus on certain points on the cosmic string loops and are valid for very high modes. Since these loops span a wide range of lengths from zero to a fraction of the horizon size, we require a formalism to compute the power emitted at different ranges of modes and hence bridge the gap between the numerical methods at low modes and the existing analytical methods at very high modes. In my talk, I will explore a new approach to achieve this which accounts for larger regions of the loop that play an important role in emission at lower modes. Our approach, in combination with the numerical approaches can be used to build a complete model of the loop power spectrum. The calculation can be extended to multiple string loops to model the total contribution to the SGWB. Detection of this signal would not only validate the existence of these exotic objects but would also provide an avenue to explore models in superstring theory!

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