

Gravitational Wave Probes of Physics Beyond Standard Model 2

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Emission of gravitational waves by superconducting cosmic strings

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Content :

We study the gravitational radiation emission efficiency Γ of superconducting cosmic strings. We demonstrate, by using a solvable model of transonic strings, that the presence of a current leads to a suppression of the gravitational emission of cusps, kinks and different types of loops. We also show that, when a current is present, the spectrum of emission of loops with cusps is exponentially suppressed as the harmonic mode increases, thus being significantly different from the power law spectrum of currentless loops. Furthermore, we establish a phenomenological relationship between Γ and the value of the current on cosmic strings. We conjecture that this relation should be valid for an arbitrary type of current-carrying string. We use this result to study the potential impact of current on the stochastic gravitational wave background generated by cosmic strings with additional degrees of freedom and show that both the amplitude and shape of the spectrum may be significantly affected.

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