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Gravitational waves from Cosmic Strings

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Cosmic strings, which are one-dimensional topological defects formed during early universe symmetry breaking, can generate a stochastic gravitational wave background (SGWB) detectable across LIGO, LISA and PTA bands. The SGWB generated by cosmic string networks described by the Velocity-Dependent One-Scale (VOS) model will be explored. We will consider both existing analytical treatments (Sousa et al. 2020) as well as a new numerical scheme. By numerically evolving the characteristic length and RMS velocity through radiation and matter eras, and solving the Boltzmann-type equation for loop number density, the full spectrum of gravitational waves from cosmic strings may be constructed. We will also discuss ongoing extensions such as implementing gravitational back reaction, improved loop production functions and realistic cosmological transitions.

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