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High-resolution calibration of string modelling

Monday, 5 July 2021 16:30 (20 minutes)

The canonical velocity-dependent one-scale (VOS) model for cosmic string evolution contains a number of free parameters which cannot be obtained ab initio. Therefore it must be calibrated using high resolution numerical simulations. We exploit our state of the art graphically accelerated implementation of the evolution of local Abelian-Higgs string networks to provide a statistically robust calibration of this model. In order to do so, we will make use of the largest set of high resolution simulations carried out to date, for a variety of cosmological expansion rates, and explore the impact of key numerical choices on model calibration, including the dynamic range, lattice spacing, and the choice of numerical estimators for the mean string velocity. This sensitivy exploration will show that certain numerical choices will indeed have consequences for observationally crucial parameters, such as the loop chopping parameter. To conclude, we will also briefly illustrate how our results impact observational constraints on cosmic strings.

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