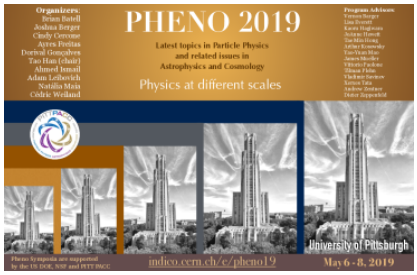

Contribution ID: **781** Type: **parallel talk**

Early-Universe Simulations of the Cosmological Axion

Monday 6 May 2019 15:15 (15 minutes)

Ultracompact dark matter (DM) minihalos at characteristic masses at and below 10^{-10} solar masses are expected to arise in axion DM models where the Peccei-Quinn (PQ) symmetry is broken after inflation. The minihalos arise from density perturbations that are generated through the collapse of the axion-string and domain-wall network during the quantum chromodynamics (QCD) phase-transition, combined with the non-trivial axion self-interactions. We perform some of the highest-resolution simulations of this scenario to date starting at the epoch before the PQ phase transition and ending after the QCD phase transition, once the axion has entered the linear regime. We characterize the spectrum of minihalos that are generated and comment on implications for efforts to detect axion DM. We also compute the total DM density at different axion masses and present a value for the axion mass for which the correct DM density is obtained.

Summary

We perform some of the highest-resolution simulations to date of a cosmological axion starting at the epoch before the PQ phase transition and ending after the QCD phase transition, once the axion has entered the linear regime. We characterize the spectrum of minihalos that are generated and comment on implications.

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