

JOINT TUFTS/MIT COSMOLOGY SEMINAR

Two short tales of axions

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In this talk, I will first discuss how the interaction between the inflaton and the PQ field will modify the QCD axion cosmology. The QCD axion cosmology depends crucially on whether the QCD axion is present during inflation or not. I will show that contrary to the standard criterion, the Peccei-Quinn (PQ) symmetry could remain unbroken during inflation, even when the axion decay constant is (much) above the inflationary Hubble scale. This is achieved through the heavy-lifting of the PQ scalar field due to its leading non-renormalizable interaction with the inflaton. The mechanism opens up a new window for the post-inflationary QCD axion and significantly enlarges the parameter space, in which the QCD axion dark matter with a large decay constant could be compatible with high-scale inflation and free from constraints on axion isocurvature perturbations.

If time allows, I will also show that axions interacting with abelian gauge fields obtain a potential from loops of magnetic monopoles. I will then show the regime in which this potential is important in determining the dark matter relic abundance in a hidden sector containing an abelian gauge group, monopoles, and axions.

Tuesday, October 18, 2022, 2:30 pm

574 Boston Ave, Room 310

Tufts University

Refreshments at 2:00 outside the building, at the corner of
Harvard St. and Boston Ave.