JOINT TUFTS/MIT COSMOLOGY SEMINAR

How light can dark matter particles be?

Mustafa Amin

Rice

I will argue that if dark matter is produced via processes with finite correlation length in the early universe, then there is a lower bound on the mass of dark matter particles [$m > 10^{-19}$ eV]. For such dark matter, there is both (i) a free streaming suppression and (ii) white-noise enhancement in the dark matter density power spectrum. The absence of these in the existing observational data (for example, Ly-a) provides a bound on the mass. This relatively model independent bound will improve rapidly as observations probe dark matter at even smaller length scales. The bound can also be made stronger by many orders of magnitude if additional model-dependent assumptions are included. Time permitting, I will discuss nonlinear phenomenon resulting from free-streaming and large initially isocurvature perturbations on small scales based on numerical simulations.

Tuesday, October 22, 2024, 2:30 pm
Cosman Seminar Room
Center for Theoretical Physics
Building 6C, Room 6C-442
Massachusetts Institute of Technology