JOINT TUFTS/MIT COSMOLOGY SEMINAR

Observational Constraints on the Primordial Curvature Power Spectrum

Razieh Emami Meibody

Hong Kong U. of Science and Technology

Primordial power-spectrum can be tested using different sets of the observations and at different scales. At large scales, on the one hand, the combination of the CMB temperature fluctuations with that of the galaxy clusters and Lyman-alpha forest could be a good probe of the primordial power-spectrum. At small scales, on the other hand, primordial power-spectrum can be probed using the Primordial Black Holes (PBHs), Ultra Compact Mini Halos (UCMHs) and the CMB spectral distortion (SD). And, they could be complementary to the cosmological probe on the (relatively) large scales. In this talk, we consider the constraints by considering the second category, small scales. As we show, PBHs could probe the primordial fluctuations on very wide range of the scales, though their constraints are very much relaxed unless we consider the SD. UCMHs are very informative and lead to significant constraints on the curvature perturbations. We review the conditions that under which the tighter constraints from UCMHs lead to extremely strong bounds on the fraction of the DM in the PBHs. Failure to satisfy this conditions would lead to over production of the UCMHs which is inconsistent with the observations. We also compare the UCMH bounds coming from those experiments which are sensitive to the nature of the DM, such as gamma-rays, Neutrinos and Reionization, with those which are insensitive to the type of the DM, e.g. the pulsar-timing as well as CMB spectral distortion. We explicitly show that they lead to comparable results which are independent of the type of DM. This is based on arXiv:1705.09924.

Tuesday, September 26, 2017, 2:30 pm

Cosman Seminar Room

Center for Theoretical Physics

Building 6C, Room 6C-442

Massachusetts Institute of Technology