38th INTERNATIONAL CONFERENCE
ON HIGH ENERGY PHYSICS
AUGUST 3 - 10, 2016
CHICAGO

Contribution ID: **699** Type: **Oral Presentation**

Constraining inflation with dark matter (15' + 5')

Friday 5 August 2016 15:50 (20 minutes)

While the detailed particle physics implementation of inflation and dark matter remains an open question, they are important pillars of the standard cosmological models. Typically these two phenomena are assumed to be unrelated as the early inflationary epoch occurs vastly earlier than the timescales over which dark matter dominates. In this talk I will discuss how the lack of direct observation of dark matter can constrain the shape and functional form of the inflationary potential energy function, without incorporating a direct relationship or coupling between these two sectors.

Ultracompact mini-halos (UCMHs) are sub–galactic-scale dark matter structures that can form from the isolated gravitational collapse of large amplitude curvature perturbations. The annihilation of WIMP dark matter in the core of UCMHs can produce gamma-ray signatures, which are observable by Fermi, and they can also modify pulsar timing data via purely gravitational physics. Consequently, the non-observation of these signatures provides an upper bound on the number density of UCMHs, as well as the likelihood of large-scale fluctuations in the primordial density field. As inflation provides the Universe's initial conditions, this gives an indirect constraint on inflationary physics for scales that are radically smaller than those which can be seen in the CMB. Combining these data with Planck CMB observations, we can get much tighter constraints on the predictions of highly flexible inflation models than is possible using Planck alone.

Based on arXiv:1512.04597

Author: PRICE, Layne (Carnegie Mellon University)

Presenter: PRICE, Layne (Carnegie Mellon University)

Session Classification: Astro-particle Physics and Cosmology

Track Classification: Astro-particle Physics and Cosmology