



Contribution ID: 133

Type: **not specified**

Primordial Black Holes and Dark Matter from Axion Inflation

Thursday, 27 April 2017 16:30 (15 minutes)

According to the Standard Model of Cosmology, about 25% of the content of the universe is composed of Dark Matter (DM). From a theoretical point of view, there are many possible alternatives to explain its origin and composition, ranging from ultralight axions to supermassive black holes. However, despite many experimental efforts, the nature of DM is still obscure. One interesting possibility is that DM is composed of Primordial Black Holes (PBHs), arising from high peaks in the matter power spectrum of some inflationary models. In this talk, I will show that models of axion-inflation in which the inflaton is coupled to abelian massless gauge fields can generate peaks in the matter power spectrum, giving rise to the formation of PBHs. I will discuss the possibility that such PBHs compose a fraction of the DM observed in the universe, and I will present some ideas about a possible UV completion of such inflationary model.

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Session Classification: Afternoon session