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Gravitational Production of Superheavy Dark Matter and Cosmological Signatures

Thursday 24 September 2020 15:00 (20 minutes)

We study the gravitational production of super-Hubble-mass dark matter in the very early universe. We first review the simplest scenario where dark matter is produced mainly during slow roll inflation. Then we move on to consider the cases where dark matter is produced during the transition period between inflation and the subsequent cosmological evolution. The limits of smooth and sudden transitions are studied, respectively.

We also discuss two possible scenarios, namely the curvaton mechanism and the dark matter density modulation, where non-Gaussianity signals of superheavy dark matter produced by gravity can be enhanced and observed. In both scenarios, superheavy dark matter couples to an additional light field as a mediator. In the case of derivative coupling, the resulting non-Gaussianities induced by the light field can be large, which can provide inflationary evidences for these superheavy dark matter scenarios.

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