

DPF-PHENO 2024

Contribution ID: 723

Type: **not specified**

Recycling: A New Mechanism for Producing Ultra Heavy Particle Dark Matter

Tuesday 14 May 2024 15:00 (15 minutes)

We outline a new production mechanism for dark matter that we dub “recycling”: dark sector particles are kinematically trapped in the false vacuum during a dark phase transition; the false pockets collapse into primordial black holes (PBHs), which ultimately evaporate before Big Bang Nucleosynthesis (BBN) to reproduce the dark sector particles. The requirement that all PBHs evaporate prior to BBN necessitates high scale phase transitions and hence high scale masses for the dark sector particles in the true vacuum. Our mechanism is therefore particularly suited for the production of ultra heavy dark matter (UHDM) with masses above $\sim 10^{12}$ GeV. The correct relic density of UHDM is obtained because of the exponential suppression of the false pocket number density. Recycled UHDM has several novel features: the dark sector today consists of multiple decoupled species that were once in thermal equilibrium and the PBH formation stage has extended mass functions whose shape can be controlled by IR operators coupling the dark and visible sectors.

Mini Symposia (Invited Talks Only)

Authors: SINHA, Kuver (University of Oklahoma); XU, Tao (The University of Oklahoma); GEHRMAN, Thomas (University of Oklahoma); SHAMS ES HAGHI, Barmak (University of Texas at Austin)

Presenter: GEHRMAN, Thomas (University of Oklahoma)

Session Classification: Dark Matter

Track Classification: Dark Matter