

Exothermic dark matter for XENON1T excess

Friday, 17 July 2020 15:20 (30 minutes)

Motivated by the recent excess in the electron recoil from XENON1T experiment, we consider the possibility of exothermic dark matter, which is composed of two states with mass splitting. The heavier state down-scatters off the electron into the lighter state, making an appropriate recoil energy required for the Xenon excess even for the standard Maxwellian velocity distribution of dark matter. Accordingly, we determine the mass difference between two component states of dark matter to the peak electron recoil energy at about 2.5 keV up to the detector resolution, accounting for the recoil events over $ER=2-3$ keV, which are most significant. We include the effects of the phase-space enhancement and the atomic excitation factor to calculate the required scattering cross section for the Xenon excess. We discuss the implications of dark matter interactions in the effective theory for exothermic dark matter and a massive Z' mediator and provide microscopic models realizing the required dark matter and electron couplings to Z' .

Presenter: LEE, Hyun Min