**Intra-Ensemble Decays in Non-Minimal Models of the Dark Sector** FEI HUANG, JEFF KOST, SHUFANG SU, KEITH DIENES, The University of Arizona, BROOKS THOMAS, Lafayette College — In non-minimal models of the dark sector such as Dynamical Dark Matter (DDM), the dark-matter candidate consists of a vast ensemble of particles with different masses, mixings, and cosmological abundances. In general, the ensemble is organized in such a way that components decaying earlier are less abundant than components decaying later. However, most previous work on DDM assumes that the intra-ensemble decays of dark-matter particles are negligible compared to decays directly to the Standard Model. While in many cases this is indeed true, there exist cases for which intra-ensemble decays cannot be ignored and have important effects. In this work, we study the intra-ensemble decays of a DDM ensemble consisting of an infinite tower of Kaluza-Klein (KK) states subject to a cubic interaction. Boltzmann equations are used to show the evolution of the distribution functions and the collective equation of state for the ensemble as a whole.

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