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Simulating the Lyman-alpha Forest in Self-Interacting Dark Matter Models SERGIO GARCIA, ANSON D'ALOISIO, University of California, Riverside — The cold dark matter model successfully accounts for all observations on super-galactic scales. However, it is unclear whether simulations of collision-less dark matter (CDM) can be reconciled with astronomical observations on sub-galactic scales. In addition, null results from terrestrial experiments have motivated the exploration of alternatives to the Weakly Interacting Massive Particle. It has been shown that self-interacting dark matter (SIDM) models in which a dark photon mediates the self-interaction can alleviate the sub-galactic tensions while at the same time evading direct detection experiments. These models generally yield a suppression of cosmological density fluctuations on scales below ˜1 Mpc, making them constrainable by current Lyman-alpha forest observations. Previous studies have constrained SIDM models in an approximate way using cosmological perturbation theory. However, because the Lyman-alpha forest is sensitive to nonlinear scales, obtaining accurate constraints requires the use hydrodynamic simulations. I will discuss results from hydrodynamic simulations of the Lyman-alpha forest in SIDM cosmologies. Specifically, I will discuss the effects of SIDM on the Lyman-alpha forest flux power spectrum and our efforts to obtain accurate constraints from observational measurements.

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