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Cosmological Constraints on Dynamical Dark Matter

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Dynamical dark matter (DDM) is an alternative framework to the more typical stable dark matter scenario. Instead of imposing stability of one or several particles that constitute the relic dark matter abundance, we consider many different particles decaying with less stable lifetimes while balancing their respective abundances in order to provide for an ensemble that acts as a phenomenologically viable dark matter candidate. Given an ensemble of particles, each with a unique mass, width and abundance, the total DM density will have a non-trivial time dependence and produce distinct astrophysical signatures. Previous work has investigated DDM constraints for an ensemble embedded within a bulk axion model and DDM signals in the observed positron fraction given a generic ensemble. In this work, we want to generalize cosmological and astrophysical constraints on a generic DDM ensemble.

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