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General Constraints on Decaying Dark Matter from the Cosmic Microwave Background

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Energy injection from dark matter (DM) between recombination and reionization could affect the ionization and thermal history of the universe, leaving a distinctive imprint on the cosmic microwave background (CMB). Therefore, precise measurements of the temperature and polarization anisotropies of the CMB provide a powerful tool by which to constrain DM. In this talk, I will characterize the possible CMB signatures via principal component analysis (PCA) and set constraints on the DM lifetime and decaying fraction. I will show that in many cases, a single number can be used to parameterize the effect of DM on the CMB. This result yields a simple prescription for detectability and an easy way to set model-independent bounds, which I have validated using Markov chain Monte Carlo methods applied to the Planck likelihood.

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