

## **CMB limits on decaying dark matter: going beyond the ionization threshold**

The temperature and polarization anisotropies of the cosmic microwave background (CMB) have been used to set constraints on decaying dark matter models down to keV masses. In this talk, I will discuss recent work to extend these limits down into the sub-keV mass range. I will show how we used principal component analysis to estimate the lower bound on the decay lifetime for a basis of different dark matter masses and Standard Model final states, and then how we validated our principal component analysis using Markov chain Monte Carlo methods and Planck 2018 data. I will then show a separate analysis for models decaying into photons below the hydrogen ionization threshold, where the redshift dependence of the effect on the CMB is entirely different. This work constitutes a step towards a complete understanding of the CMB as a probe of exotic energy injection.

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