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CMB and Lyman-α constraints on dark matter decays to photons

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Dark matter energy injection in the early universe modifies both the ionization history and the temperature of the intergalactic medium. In this work, we improve the CMB bounds on sub-keV dark matter and extend previous bounds from Lyman-α observations to the same mass range, resulting in new and competitive constraints on axion-like particles (ALPs) decaying into two photons. The limits depend on the underlying reionization history, here accounted self-consistently by our modified version of the publicly available DarkHistory and CLASS codes. Future measurements such as the ones from the CMB-S4 experiment may play a crucial, leading role in the search for this type of light dark matter candidates

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