Contribution ID: **1037** Type: **Invited talk in the parallel session**

Spectral distortion constraints on photon injection from low-mass decaying particles

Thursday, 8 July 2021 17:36 (18 minutes)

Spectral distortions (SDs) of the cosmic microwave background (CMB) provide a powerful tool for studying particle physics. We study the distortion signals from decaying particles that convert directly into photons at different epochs during cosmic history, focusing on injection energies Einj ⊠ 20 keV. We consider the effect of blackbody-induced stimulated decay, which can modify the injection history significantly. Then, we use data from COBE/FIRAS and EDGES to constrain the properties of the decaying particles. We explore scenarios where these provide a dark matter (DM) candidate or constitute only a small fraction of DM. Our model-independent constraints exhibit rich structures in the lifetime-energy domain, covering injection energies Einj ⊠ 10-10 eV - 10 keV and lifetimes τX ⊠ 105 s - ⊠ 1033 s. Finally, we will discuss the constraints on axions and axion-like particles that convert directly into two photons. Future CMB spectrometers could significantly improve the obtained constraints, thus providing an important complementary probe of early-universe particle physics and dark matter.

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