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ALPs decay in the cosmic background

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The Cosmic Background (CB) is defined as the isotropic diffuse radiation field with extragalactic origin found across the electromagnetic spectrum. Assuming that dark matter consists of axions with masses on the order of electron volts or higher, we expect a contribution to the CB due to their decay into two photons. Using a model of the astrophysical origin of the CB between X-ray energies and optical wavelengths, we include the contribution of decaying axions. Through a comparison with the most recent direct and indirect CB measurements, we derive novel constraints on the axion parameter space and improve previous limits derived from the CB by roughly an order of magnitude. We also study the contribution of axions decaying in the Milky Way halo and characterize the axion parameters that would explain the excess CB emission observed with the LORRI instrument on-board the New Horizons probe.

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