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Do axions put out gamma-ray bursts?

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Short gamma-ray bursts (GRBs) are some of the brightest transients in the universe. Heavy axion-like particles (ALPs) can be produced in the hot plasma of GRB fireballs and escape, transporting energy away the from the source. When they decay outside the source, we show that the resulting photon field is too rarefied to re-thermalize, effectively preventing the re-emergence of the fireball, thus dimming or disrupting GRBs. Using existing observations of short GRBs, we place competitive bounds reaching ALP-photon couplings of $g_{a\gamma\gamma} \sim 4x10^{-12} \text{ GeV}^{-1}$ for ALP masses between 200 MeV and 5 GeV.

Collaboration(s)

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