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Constraints on Heavy Axion-like Particles from Gamma-Ray Bursts

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Gamma ray bursts (GRBs) are one of the most luminous astrophysical sources that can copiously produce axion like particles (ALPs). We delineate the uncertainties in ALP production in the relativistic jets surrounding GRBs. Under conservative assumptions, we find the ALPs produced in the jets can escape and subsequently decay. We show that the decay of axions can produce a secondary fireball for masses $m_a \sim 100\text{MeV}$ and $g_{a\gamma} \sim 10^{-10}\text{GeV}^{-1}$ that can have observable astrophysical signatures.

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