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Constraints on Axion-Like Particles from X-ray Point Sources

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Axion-like particles (ALPs) can induce localised oscillatory modulations in the spectra of photon sources passing through astrophysical magnetic fields. Chandra and Persesus observations of quasars or AGNs located in or behind galaxy clusters represent a dataset of extraordinary quality for ALP searches. We use this dataset to search for X-ray spectral irregularities in the point source spectra. The absence of irregularities allows us to place leading constraints on the ALP-photon mixing

parameter $g_{a\gamma\gamma} < 10^{-12}$ GeV⁻¹ at 95% confidence for ALP masses $m_a < 10^{-12}$ eV. We also comment on expected bounds from future missions such as Athena.

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