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Constraining Axion-Like Particles with HAWC Observations of TeV Blazars

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Axion-like particles (ALPs) are a broad class of pseudo-scalar bosons that generically arise from broken symmetries in extensions of the standard model. In many scenarios, ALPs can mix with photons in regions with high magnetic fields. Photons from distant sources can mix with ALPs, which then travel unattenuated through the Universe, before they mix back to photons in the Milky Way galactic magnetic field. Thus, photons can traverse regions where their signals would normally be blocked or attenuated.

In this talk, I will present the results, and necessary background, of a paper where we use γ -ray observations of distant TeV blazars, made by the HAWC collaboration, to constrain models of ALPs. We use 7 TeV upper limits provided by HAWC to find new constraints on the ALP parameter space that are competitive with, or better than, leading terrestrial and astrophysical constraints in the relevant mass range.

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