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Study of axion-like particles with Perseus data of MAGIC

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We present constraints on Axion-Like Particles using very-high-energy gamma-ray data from the MAGIC telescopes in the direction of the Perseus Galaxy Cluster. Axion is envisioned and theorized as a solution to the Strong CP problem of the Standard Model. As a generalization of the axion, axion-like particles are introduced. Depending on the specifics of their production mechanisms in the Early Universe, their properties make them viable candidates for Dark Matter particles. Traveling through the astrophysical environments embedded in magnetic fields, axion-like particles can interact with high-energy gamma rays. Depending on their coupling and mass, this would leave a distinctive signature in their spectra in the form of hardening, softening, or spectral distortions. Using the MAGIC dataset of two sources located in the Perseus cluster, we set constraints on the ALPs mass, reaching several hundred neV and improving the current limits on the strength of their coupling to photons.

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