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## Axion-like particles and high energy astrophysics

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Axion-like particles (ALPs) are light, neutral, (pseudo-)scalar bosons predicted by several extensions of the Standard Model of particle physics such as the String Theory and are supposed to interact primarily only with two photons. In the presence of an external magnetic field photon-ALP oscillations may occur and produce sizable astrophysical effects in the very-high energy (VHE) band. Photon-ALP oscillations increase the transparency of the Universe to VHE photons partially preventing the gamma-gamma absorption due to the Extragalactic Background Light (EBL). Furthermore, they have important implications for active galactic nuclei (AGNs) by modifying their observed spectra both for flat spectrum radio quasars (FSRQs) and BL Lacs. Many attempts have been made in order to constrain the ALP parameter space (two-photon coupling, ALP mass) by studying irregularities in spectra due to photon-ALP conversion in galaxy clusters, consequences of ALP emission by main sequence stars and by supernovae but the debate is still open. Future observational data in an extended energy band (like with the Cherenkov Telescope Array) might give an answer.

### Summary

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