

SciNeGHE 2016 High-energy gamma-ray experiments at the dawn of gravitational wave astronomy



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Is there need for axions to explain the signal from blazars? Where do we stand?

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Axions and axion-like particles (ALPs) are a generic prediction of many extensions of the Standard Model. They are attracting growing interest as they are good candidates for cold dark matter, and – in the case of ALPs – they also give rise to very interesting effects in high -energy astrophysics for suitable values of the parameters. In the first place, photon-ALP oscillations considerably enlarge the gamma-ray horizon for $E > 100$ GeV. Besides, for the same choice of the parameters they also solve two open problems: the very-high-energy spectral anomaly of blazars (to be explained in the talk) and why flat spectrum radio quasars (FSRQs) emit up to 400 GeV (conventional physics prevents any emission above 20 GeV). Combining these two results – one occurring in extragalactic space while the other inside a FSRQ – we get a strong hint of the existence of an ALP with mass of about 10^{-9} GeV. Remarkably, this issue will be settled in the near future not only by the CTA but also the laboratory experiment ALPSII at DESY. Finally, for a different choice of the parameters, ALPs would change the polarization of the light emitted by some sources in the ranges (2 – 10) keV and (0.3 – 10) MeV, an effect that could be detected by the XIPE and e-ASTROMAM missions, respectively.

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