

# Probing photon-axionlike particle oscillations from the MAGIC observations of QSO B1420+326

Thursday 18 July 2024 20:40 (20 minutes)

We investigate the effect of photon-axionlike particle (ALP) oscillations in the gamma-ray spectra of fourth most distant blazar QSO B1420+326 measured by Fermi-LAT and MAGIC around the flaring activity in January 2020. We set 95% CL upper limit on the photon-ALP coupling constant  $g_{a\gamma} < 2 \times 10^{-11} \text{ GeV}^{-1}$  for ALP masses  $m_a \sim 10^{-10} - 10^{-9} \text{ eV}$ . Assuming the hadronic origin of very-high-energy photons, we also estimate the expected neutrino flux and the cumulative flux from QSO B1420+326-like FSRQs at sub-PeV energies. Furthermore, we study the implications of photon-ALP oscillations on the counterpart gamma-rays of the sub-PeV neutrinos. Finally, we investigate a viable scenario of invisible neutrino decay to ALPs on the gamma-ray spectra and diffuse-ray flux at sub-PeV energies. Interestingly, we find that for the choice of neutrino lifetime  $\tau_2/m_2 = 10^3 \text{ s eV}^{-1}$ , the gamma-ray flux has a good observational sensitivity towards LHAASO-KM2A.

## Alternate track

1. Dark Matter Detection

## I read the instructions above

Yes

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**Session Classification:** Poster Session 1

**Track Classification:** 08. Astro-particle Physics and Cosmology