Contribution ID: **419** Type: **Oral**

Detecting Axion-like Particles: Long-Lived Particles and Dark Matter

Monday 25 August 2025 14:20 (20 minutes)

Axion-like particles (ALPs) are hypothetical extensions of the Standard Model, with the potential to account for both dark matter and various astrophysical phenomena. This seminar will explore two distinct detection approaches for ALPs: one focusing on ALPs as long-lived particles and the other considering them as dark matter candidates. The first study (2410.16065) investigates the production of long-lived ALPs in stellar cores, particularly their decay into monochromatic X-rays detectable in nearby stellar systems. Using data from the Alpha Centauri binary system, we establish the most stringent limits on ALP interactions, improving constraints on the ALP-photon coupling by up to two orders of magnitude for masses between 0.25 keV and 5 keV. The second study (2507.07786) examines ALPs as dark matter candidates, exploring their conversion into photons via the Primakoff effect. By analyzing 16.5 years of Fermi-LAT data from the galaxy NGC 1275, we refine exclusion limits on the photon-ALP coupling for masses between 4e-10 eV and 5e-9 eV. We also highlight the potential of the upcoming Very Large Area Gamma-ray Space Telescope (VLAST) to surpass the sensitivity of future observatories like IAXO.

Collaboration you are representing

Author: TSAI, Yue-Lin Sming (PMO)

Presenter: TSAI, Yue-Lin Sming (PMO)

Session Classification: Dark Matter and Its Detection

Track Classification: Dark Matter and Its Detection