Constraining eV scale ALP dark matter decay : insights from M87 galaxy

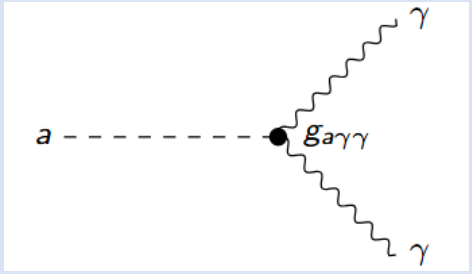
Light Dark World 2025
Madrid , September 16th -19th

Based on JCAP 05 (2025) 100

Pratick Sarkar , Arpan Kar and Sourov Roy
Indian Association for the Cultivation of Science, Kolkata, India, Email:spsps2523@iacs.res.in

Axion Like Particles (ALPs) can be a potential candidate for the observed DM of the Universe.

$$\mathcal{L} = -\frac{1}{4}\, g_{a\gamma\gamma}\, a\, F_{\mu\nu}\, \tilde{F}_{\mu\nu}$$



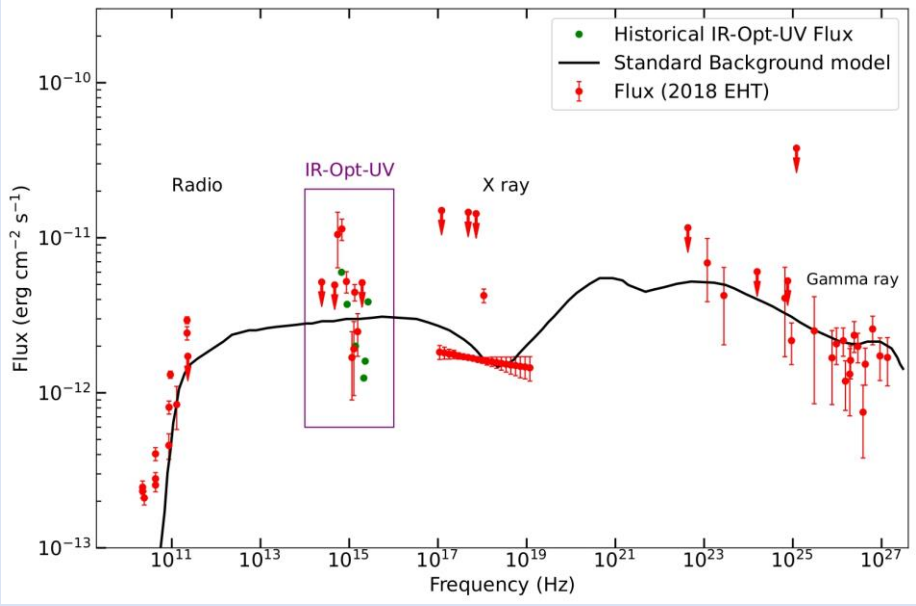
ALP decay width

$$\Gamma_a = \frac{g_{a\gamma\gamma}{}^2 m_a{}^3}{64\pi}$$

Photon flux from ALP decay

$$S_a = \frac{\Gamma_a}{4\pi} \int \frac{\rho_a(r)}{\Delta\nu}\, d\Omega$$

The observed SED of M87



Constraints on ALP-Photon coupling