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Prospects of Axion-like Particles searches with the Southern Wide-field Gamma-ray Observatory (SWGGO)

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The Southern Wide-field Gamma-ray Observatory (SWGGO) is a planned very-high-energy gamma-ray observatory that will provide novel and complementary insights about the southern-hemisphere sky thanks to its high sensitivity, wide field of view, and continuous observation capabilities. Centaurus A (CenA) is an Active Galactic Nucleus that has been detected at TeV energies by the H.E.S.S. observatory and has shown complex spectral features, challenging simple explanations based on the synchrotron self-Compton model. Among the proposed explanations for these features is the potential influence of Axion-like Particles (ALPs), hypothetical particles that could oscillate into photons in the presence of magnetic fields, leading to distinctive modifications in the gamma-ray spectrum. If photon-ALP oscillations occur, SWGGO could detect characteristic spectral distortions in CenA's gamma-ray emission. Conversely, the absence of such features would allow SWGGO to set more stringent constraints on the ALP parameter space. This work presents exclusion limits on the ALP parameter space derived from simulated five-year observations of CenA with SWGGO, highlighting the observatory's capability to refine current constraints and contribute to the search for new physics.

Collaboration(s)

The Southern Wide-field Gamma-ray Observatory (SWGGO)

Authors: ALFARO, Rubén (Instituto de Física, UNAM); SERNA FRANCO, José Erandi (Instituto de Física, UNAM); GONZÁLEZ, María Magdalena (Instituto de Astronomía, UNAM); PRATTS MARTÍNEZ, Alvaro Yobain (Instituto de Física, UNAM)

Presenter: ALFARO, Rubén (Instituto de Física, UNAM)

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