"Quantum Technology Searches for Ultralight Axions"

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Abstract:

In this talk, I will discuss axion-like particles (ALPs) as dark matter candidates in the ultralight mass regime. Starting from the ALP Lagrangian at the UV scale, a consistent quantum field theory treatment is required to derive the relevant low-energy interactions. A wide range of quantum sensor experiments have been proposed to search for such particles, particularly those probing large values of the axion decay constant where running effects become significant. While linear ALP couplings are constrained by their pseudoscalar nature, quadratic interactions are indistinguishable from those of a scalar. As a result, the two types of couplings are probed by distinct experimental strategies. I will present the reach of various guantum sensor platforms, including atomic clocks, optical and atom interferometers, and microwave cavity haloscopes. Finally, I will comment on the nonlinear behaviour of the ALP field near the Earth's surface and identify the classes of experiments that could be impacted by this feature.

Fecha: viernes, 30 de mayo de 2025

Hora: 12:00 horas

Lugar: Seminario de Física Atómica, Molecular y Nuclear

