

Search for dark matter axion with TASEH

Saturday 1 April 2023 11:30 (15 minutes)

TASEH (Taiwan Axion Search Experiment with Haloscope) devotes to search dark matter axions based on a haloscope setup, consisting of a frequency-tunable microwave cavity detector in a strong magnetic field and a readout amplification chain. The TASEH experiment targets axion searches in the mass range of 10–25 μeV , roughly corresponding to the frequency band of 2.5–6 GHz. In this presentation, we will describe its first physics search, which excludes values of the axion-photon coupling constant $|g_a| > 8.1 \times 10^{-14} \text{ GeV}^{-1}$, a factor of 11 above the KSVZ benchmark model, in the mass range of 19.4687–19.8436 μeV . We will also illustrate our subsequent efforts on improving the detection sensitivity up to the QCD axion-photon coupling limit, including developing a large-volume conic shell-cavity detector and integrating a quantum-limited Josephson parametric amplifier to the readout chain.

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Session Classification: SESSION 18: Direct detection: Light DM & Ultra-Light DM (Axions, ALPs, WISPs) searches-2 (CHAIR: Sebastian Baum- Stanford University)

Track Classification: Non-directional direct dark matter detection