

New Windows on Fundamental Physics: from tabletop devices to large scale detectors



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The RADES Experiment - Status and Future

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The Relic Axion Detector Exploratory Setup (RADES) collaboration works on the development of new techniques for axion searches. Axions are hypothetical pseudoscalar pseudoNambu-Goldstone bosons that appear as part of the solution to the the strong CP problem of QCD. At the same time they could also be the answer to one of the most puzzling questions on cosmology, the Dark Matter problem.

In RADES we focus on haloscope detectors, a well-established technique that exploits the axion-photon conversion in strong magnetic fields and resonant cavities. Over the past years, we pioneered the development of novel microwave resonator arrays in order to reach a region of the parameter space very difficult to access for conventional haloscopes, and performed two consecutive data takings with high temperature superconducting (HTS) cavities at the SM18 magnet testing facility at CERN.

Our current efforts are directed toward integrating quantum metrology technologies to significantly improve sensitivity. Specifically implementing superconducting transmon qubits as part of our readout system, these sensors would allow the detection of single microwave photons generated by axion conversion.

In this talk I will present an overview of the RADES collaboration and briefly summarize our developments on the implementation of a quantum-limited axion search.

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