



University of Crete
Department of Physics

Physics Colloquium

Thursday, 13 February 2025 | 17:00 – 18:00, Seminar Room 3rd Floor

Quantum sensing of axion dark matter

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ABSTRACT

Axions are hypothetical particles which do not belong to the standard model and are considered as good candidates to explain the dark matter in the Universe. As first proposed by P. Sikivie in 1983, it may be possible to detect them using a microwave cavity under a large magnetic field. Such a device is called a haloscope. After reviewing the recent efforts and developments regarding conventional haloscopes, I will describe a new type of haloscope which we have recently developed. It combines a superconducting quantum circuit, an antiferromagnetic crystal in addition to the microwave cavity. It aims to detect the axion signal by measuring a phase shift of the microwave signal. Furthermore, the antiferromagnetic crystal provides a tunability, enabling in principle a large mass scanning range. It is expected to have an unprecedented figure of merit and mass scanning range. I will present both the concept and the first experimental results of our haloscope.



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