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A high quality factor dielectric Fabry-Perot cavity for detecting dark matter axions

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The axion, as well as being a proposed solution to the strong CP problem, is a well-motivated candidate for dark matter [1]. The Quantum enhanced Particle Astrophysics (QuEPA) project at Imperial College London looks to detect axions with a microwave cavity and trapped electrons. Towards this goal, a dielectric Fabry-Perot cavity has been developed as a dark matter haloscope to convert axions to microwave photons when the cavity is placed in a strong, homogeneous magnetic field [2]. The goal is to explore in the 125-250 μeV (30-60 GHz) mass range. In this talk, I will present the motivations and benefits of using this type of cavity for a dark matter axion search and the latest experimental results in the characterisation of this cavity. [1] D. Marsh, Physics Reports 643 (2016) P1-79 DOI: 10.1016/j.physrep.2016.06.005. [2] I. G. Irastorza and J. Redondo, Progress in Particle and Nuclear Physics 102 P89-159 (2018) DOI:10.1016/j.ppnp.2018.05.003.

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