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Searching for axions: a new SRF cavity-based programme at CERN

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As part of the Quantum Technology Initiative (QTI) at CERN, a programme to develop a novel SRF cavity for axion searches has been launched. This Axion Detector Demonstrator (QTI_ADD) is based on the heterodyne approach to axion detection, and uses a dedicated SRF cavity design with overlapping, quasi-degenerate modes to search for axion-induced photon conversion from a driven, resonant cavity mode (pump mode) to a second, distinct mode (signal mode), with the frequency spacing between them being proportional to the prospective axion mass.

Whilst the programme is its initial stages, the conceptual design of a suitable cavity and signal acquisition system has been outlined. Of particular interest are the constraints which arise from the anticipated measurement setup, with a sub-Kelvin cryogenic detector volume now foreseen, and axion mass scans to be performed using a non-mechanical tuning system. Key design choices and implications for the expected axion search reach are discussed, and the envisioned timeline for this QTI_ ADD facility and its first measurement programme are addressed.

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Yes

Footnotes

Funding Agency

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