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QUEST-DMC: Superfluid bolometer development for dark matter direct detection

Monday 7 April 2025 17:30 (15 minutes)

QUEST-DMC aims to utilise the tiny (10^{-7} eV) energy gap in superfluid helium-3 to perform a low threshold dark matter search, capable of probing the lowest particle dark matter masses. The detector consists of a superfluid bolometer cell, instrumented with nanowire resonators - which measure quasiparticle damping forces from energy deposits. The nanowires are read out using quantum sensors, essential for achieving low noise and energy thresholds. A bolometer with SQUID readout of two nanowires was operated for 6 months in 2024, at temperatures down to 0.3mK. Here, results of the nanowire characterisation, bolometer operation and development of energy calibration schemes will be presented.

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