



Quantum Sensing for the Hidden Sector (QSHS) project is a Science and Technologies Facilities Council (STFC) funded research project which commenced in 2021.

The Sheffield lead is Professor Ed Daw, Department of Physics & Astronomy, University of Sheffield. Together with our collaborators in University College London, University of Oxford, University of Lancaster, University of Cambridge, Royal Holloway University London, National Physical Laboratory and University of Liverpool, we aim to increase major new UK activity in the field of searches for hidden sector particles and hidden sector dark matter. Hidden sector fields could enormously enrich



QSHS Consortium members

particle physics and solve the long-standing dark matter problem. The QSHS collaboration is building a world-class programme in this area, including a UK based search for axions/ other hidden sector particles. Our long-term goal is a large-scale UK facility.

The large-scale Facility will be located at Sheffield and will provide:

- At least 8T magnetic field
- 10mK target temperature
- 20cm bore by 20cm high target volume in field
- Close proximity zero field quantum electronics bay

Target science:

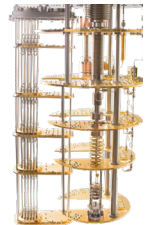
- Tests of ultra-low-noise electronics developed in the collaboration.
- Primary science from a search for QCD axions targeting the mass range 25-40 μeV (micro-electron-volts) during the first phase.
- Resonant feedback circuits.
- Cavity development in partnership with the US ADMX group and testing of tuneable resonator hardware.

Innovative quantum electronics is crucial for success because, by their nature, these particles produce very faint signals. QSHS is active in four device areas: i) bolometers, ii) photon detection using superconducting qubits, iii) SLUG amplifiers, iv) KITWPAs (Kinetic Inductance Travelling wave Parametric Amplifiers). Tunable resonant detectors are usually cavities. Non-cavity resonators have promise to increase the search rate. If you are interested in working with us, please email info@qshs.org. Visit the QSHS website (<https://www.qshs.org>) for further information and related links/organisations.

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Proteox Dilution Fridge
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