



Quantum Sensors for the Hidden Sector



I. Bailey
(Lancaster University)
on behalf of
the
QSHS collaboration



- In late 2020, seven “Quantum Technology for Fundamental Physics” projects were funded in the UK (~£31 million).
 - QI - Quantum-enhanced interferometry for new physics
 - QSNET - Atomic clock network
 - QTNM – Neutrino mass measurement
 - AION – Atom interferometry
 - Qsim – Quantum simulators

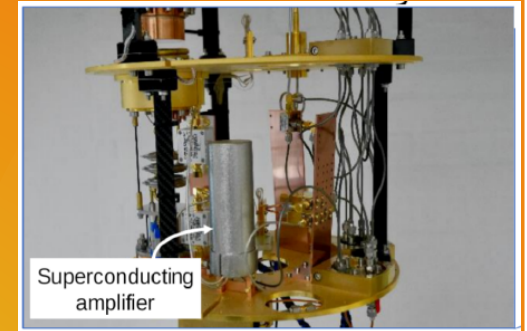




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 - QUEST DMC – Helium-3 bolometry for dark matter
 - QSHS – Quantum Sensors for the Hidden Sector (this poster)





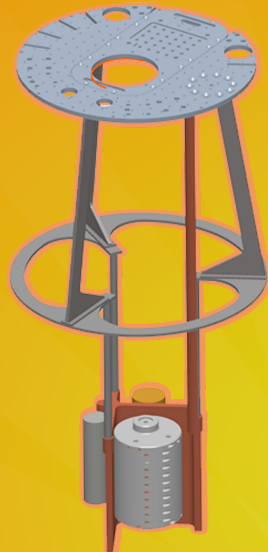
Quantum Sensors for the Hidden Sector



- A diverse community of UK condensed matter physicists, quantum technologists, theorists and (astro) particle physics experimentalists.
- Developing 'quantum' devices with the potential to detect hidden sector particles in the 2 to 25 $\mu\text{eV}/c^2$ mass window.
- Constructing a quantum amplifier / detector test facility which also acts as an axion haloscope at the University of Sheffield.

Sheffield Facility

- An 8T 18.5cm bore magnet, ~10mK test facility at the University of Sheffield
 - Currently being commissioned
 - Cavity cooled last week for the first time ($< 18\text{mK}$)
 - Grand opening yesterday! (16th September)



Devices

- Multi-mode qubit arrays
- Bolometers
- JTWPAs
- SLUGs

