

Determination of the Absolute Neutrino Mass with Quantum Technologies

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The Quantum Technologies for Neutrino Mass (QTNM) is a UK-based neutrino mass measurement experiment which aims to leverage advances in quantum technology to develop a new experimental apparatus to determine the absolute neutrino mass.

The neutrino is the most abundant massive particle in the universe, and yet we do not know what its mass is. Measuring it—the last unknown mass(es) in the Standard Model of Particle Physics—will not only give insight into the neutrino mass mechanism, but also impact our understanding of the early universe. Sensitivity to neutrino masses in the $10\text{meV}/c^2$ regime is well motivated by neutrino oscillation measurements, but is out of reach of the current state-of-the-art technology. A forward looking experimental programme incorporating recent technological advances will help us to reach this ambitious goal.

QTNM will use Cyclotron Radiation Emission Spectroscopy (CRES) to measure the beta-decay spectrum of atomic tritium, and hence perform an absolute neutrino mass measurement. The first demonstrator apparatus (CRESDA) pulls together cutting edge technologies: atomic magnetometry, atomic source production and containment, high frequency signal collection and quantum-limited microwave amplifiers

This presentation will give an overview of QTNM, detailing the current status of the proposed detector technologies, forthcoming measurement plans and future experimental outlook.

Collaboration

Quantum Technologies for Neutrino Mass (QTNM)

Role of Submitter

The presenter will be selected later by the Collaboration

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