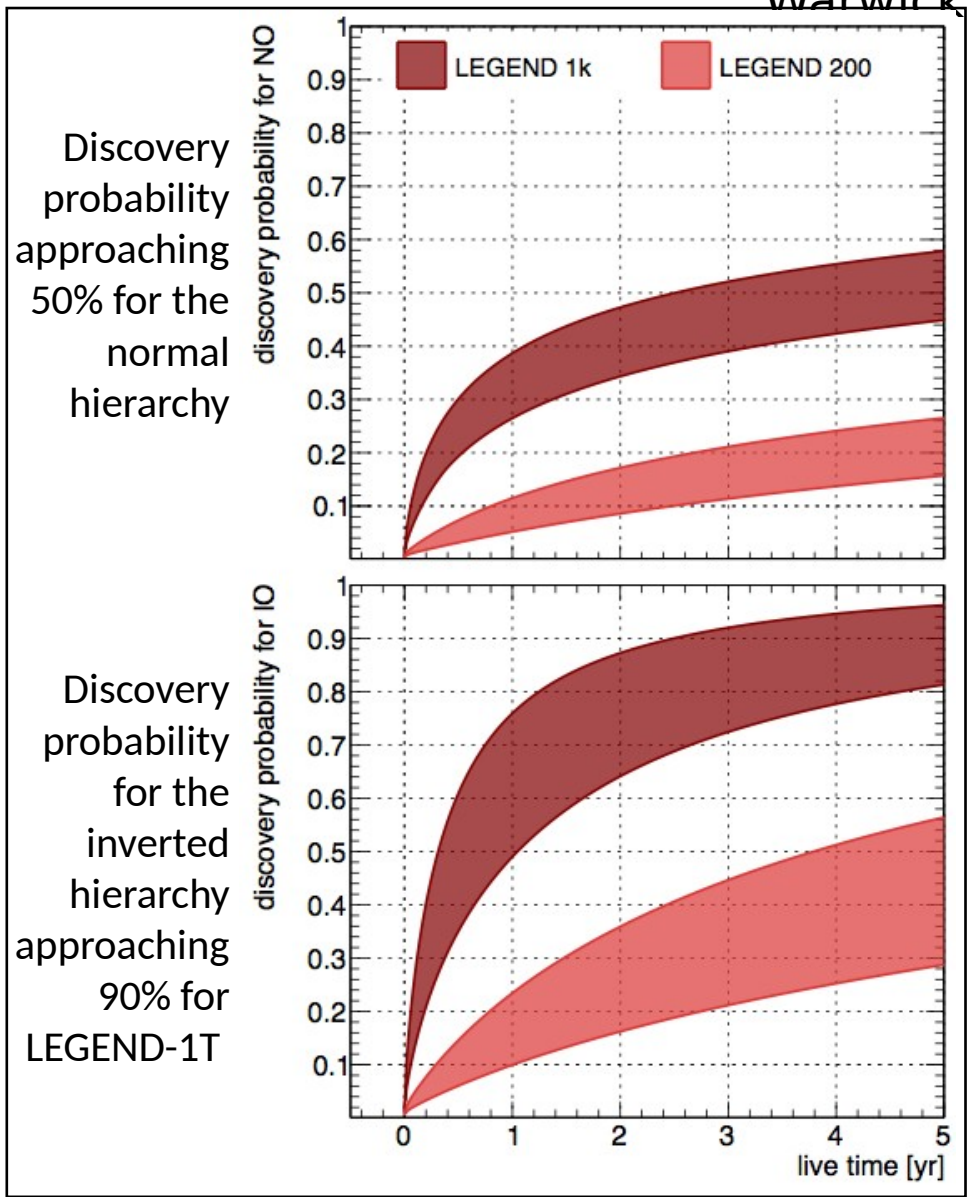
LEGEND Large Enriched Germanium Experiment for Neutrinoless ββ Decay

Neutrinoless Double-Beta Decay and Germanium Detector Technology

University of Liverpool, University College London, Lancaster University, University of Warwick

- Physics motivation: address the fundamental nature of the neutrino by pursuing a next-generation **neutrinoless double-beta decay** experiment with **high discovery potential**. The target for the next generation of experiments is to have a **discovery potential** for effective neutrino masses ($m_{\beta\beta}$) above **18 meV**
- The UK engagement will build on :
  - Expertise in HPGe detectors, novel scintillating materials, low-background physics, software and simulations
  - Previous investment in both the Nuclear and Particle Physics communities
  - Will position the UK to play a **leading role in LEGEND**, and explore **broader applications** of the HPGe detector technology that we will be developing
- The LEGEND collaboration has recently been formed, with the goal of building a 1-tonne experiment with the discovery reach specified above, which translates into a half-life sensitivity for ^{76}Ge of $\sim 10^{28}$ yr. **Funding to consolidate early UK leadership**.

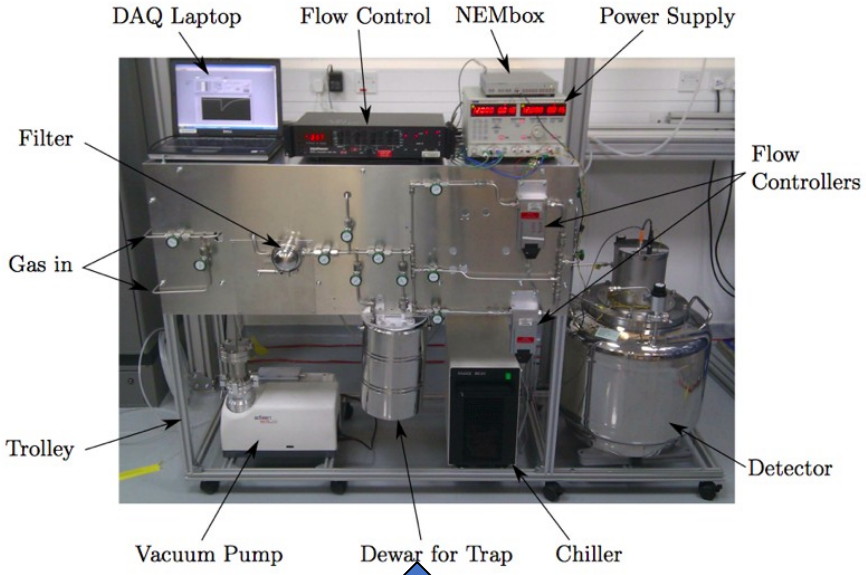


LEGEND
Large Enriched
Germanium Experiment
for Neutrinoless ββ Decay

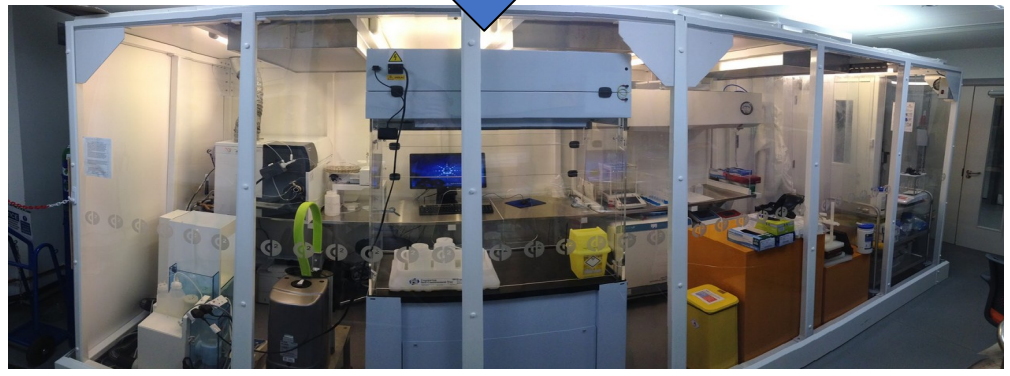
Neutrinoless Double-Beta Decay and Germanium Detector Technology

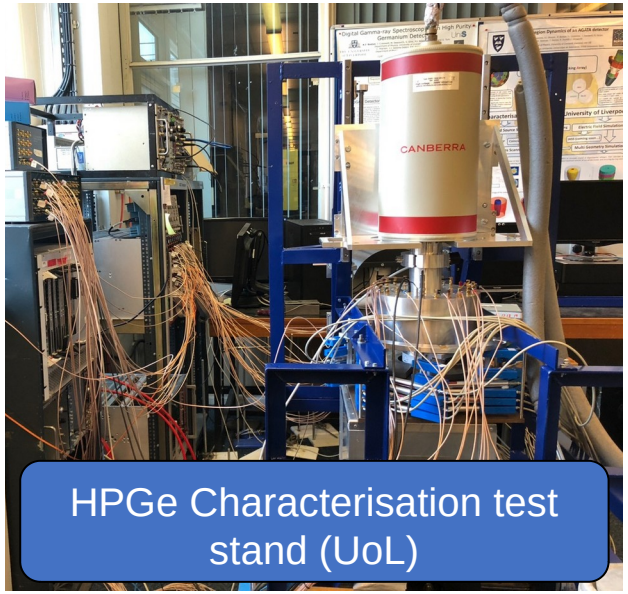
University of Liverpool, University College London, Lancaster University, University of Warwick

- Funded research Plan:
  - WP1 HPGe Characterisation and Technology Development
  - WP2 Simulation Studies for Tonne-Scale 0νββ Experiments
  - WP3 Radio-purity Assay Campaign for LEGEND
  - WP4 Novel Scintillating Material Development for LEGEND
- LEGEND-design HPGe detectors have a broad range of applications (environmental monitoring, ^{210}Pb dating, nuclear decommissioning) Working in collaboration with Mirion Technologies these applications will be explored.



Radon Concentration Line & ICP-MS facility (UCL)





HPGe Characterisation test stand (UoL)

Proposed new detectors for LEGEND:
P-type Inverted-Coaxial Point Contact
Larger mass : > 2 kg/detector