



Contribution ID: 7

Type: **Oral Presentation**

Confronting the radiological screening challenges for next-generation rare event detectors

Tuesday, June 14, 2022 11:30 AM (20 minutes)

Over the past few decades, the scale and mass of rare event search experiments have increased by several orders of magnitude. To maintain background-free large fiducial-volume searches, the radio-purity requirements of the materials from which these devices are constructed have improved by similar factors.

High-purity germanium spectroscopy has long-been the workhorse of material screening and selection, providing information on trace radioactive gamma-ray emitting impurities in the bulk of materials. The next generation of direct dark matter and neutrinoless double beta decay experiments demand the development of additional assay techniques to provide a more complete understanding of the full uranium (U) and thorium (Th) decay chains, including knowledge of alpha-emitting surface depositions.

In this talk I will highlight the challenging radiopurity requirements for the next generation of rare event search experiments, as well as the extensive UK-based material assay infrastructure in place to address these demands. Where requirements exceed current capability, additional R&D is needed. I will summarise where this R&D is already underway across the UK.

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Session Classification: LRT 2022 - presentations

Track Classification: Screening Facilities