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Radiation screening using Germanium detectors

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One of the main challenges in rare event searches is interference from background radiation. We can travel deep underground where we experience a reduction of a factor 1 million in cosmic rays, but that still leaves background from radioactivity intrinsic to the materials we use to build these detectors. A solution to this problem, is to create a radioactive background model for these detectors: if we know the specific activity of these materials, and how much of these materials we use, we can model an expected background against which we can compare rare event search data.

To fill this demand for finding radioactive properties of materials, at the Boulby Underground Laboratory we have the Boulby Underground Screening (BUGS) Facility. One of the components within BUGS is our range of ultra-low background germanium detectors which allow us to assay gamma-ray energies from a few keV to approximately 3 MeV. This means we are sensitive to all gamma-rays associated with naturally occurring radioactive material (NORM) and a number of relevant cosmogenic and anthropogenic radioisotopes. This poster will discuss the various detectors and the steps we take to able to provide world class assay services for next generation low background rare event search experiments.

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