

# Ultralow Background Counting at LBNL and SURF

## Content

The Berkeley Low Background Facility (BLBF) at Lawrence Berkeley National Laboratory (LBNL) provides a variety of low background gamma spectroscopy services to a variety of projects and experiments. It operates HPGe spectrometers in two unique facilities: a surface low background lab at LBNL, constructed of carefully selected low background aggregate materials, and a deep underground (4300 m.w.e.) site at the Sanford Underground Research Facility (SURF) in Lead, SD. A large fraction of the measurements performed by the BLBF are for ultralow background experiments concerned with trace amounts of primordial radioisotopes (U, Th, K), manmade radioactivity ( $^{60}\text{Co}$ ,  $^{137}\text{Cs}$ ), or even cosmogenically-produced isotopes in candidate materials to be used to construct sensitive detectors, such as those studying dark matter or neutrinos. Experiments such as these are studying extremely rare events or processes and, in order to achieve their targeted sensitivities, must control radiopurity in detector components to minimize internal backgrounds that could otherwise mimic events or limit detector sensitivities. Most assays are performed using large ( $>2\text{kg}$ ) HPGe detectors with standard low background shielding in use including layers of pure copper, old or ancient Pb, and nitrogen purging for Rn exclusion for passive counting. For some materials, active counting via neutron activation analysis is required to achieve required sensitivity for U or Th. A general overview of the low background counting instruments, activities, techniques, and facilities will be presented; including updates on recently relocated and installed HPGe low background counting stations in a new dedicated facility at the Black Hills Underground Campus on the 4850L of SURF. This new underground facility contains several instruments that provide a large amount of critical screening for the LUX-ZEPLIN (LZ) dark matter experiment, so an overview of the U.S. portion of the joint U.S. and U.K. material screening program for this project will be discussed including coordination and cross calibration efforts. The BLBF and BHUC are available to collaboration and screening on a variety of projects and experiments.

This abstract is part of a coordinated submission by the LZ collaboration.

## About the Presenter

Keenan Thomas is a specialist at UC Berkeley/LBNL and operates the Berkeley Low Background Facility at LBNL and SURF.

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