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Performance and Applications of the XIA UltraLo-1800 and ICP-MS at Boulby Underground Laboratory

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The Boulby UnderGround Screening (BUGS) facility has significantly enhanced its material screening capabilities by integrating an XIA UltraLo-1800 alpha particle detector and developing an inductively coupled plasma mass spectrometry (ICP-MS) setup. This contribution presents key findings from both techniques, highlighting their importance for minimising background interference in rare-event searches.

Our long-term operation of the XIA UltraLo-1800 demonstrates exceptional stability in energy reconstruction and a substantial reduction in background radiation levels, achieving an average activity of 0.15 ± 0.01 α/cm²/khr. Assay results of copper samples before and after radon exposure showcase the detector's ability to identify and quantify ^{210}Po contamination with enhanced sensitivity. We will present the effectiveness of various cleaning procedures in reducing surface alpha activity.

Furthermore, we will discuss the setup and early sensitivity measurements of the ICP-MS system at BUGS. This technique will enable the identification and quantification of trace radioactive impurities in bulk materials, complementing the surface sensitivity of the XIA UltraLo-1800.

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