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An ICP-MS based monitoring methodology to inform dust radioactive backgrounds on detector materials

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Rigorous radioactive background constraints are necessary for rare-event search experiments to meet their sensitivity goals. Underground facilities provide ideal attenuation of cosmic radiation, shielding materials around the detectors are used to mitigate backgrounds from soil, and extensive radioassay campaigns are performed to source the most radiopure materials. To reduce the impact of particulate deposition on material surfaces, detectors are assembled and operated in cleanroom facilities. Even so, dust particulate fallout on rare-event detector materials remains a concerning source of radioactive backgrounds. Within the low-background community, much effort is being invested to investigate, inform, and mitigate dust backgrounds. Fallout models and assumed dust composition are typically employed to estimate the impact of dust particulate on low-background detectors. In this work, fallout rates of radionuclides and stable isotopes of interest from dust particulate are directly determined at key locations of the SNOLAB underground facility using an ICP-MS based methodology. Results demonstrate the method as a valuable tool to assess the impact of laboratory activities to material backgrounds from dust particulate fallout and to evaluate mitigation procedures.

Early Career

Yes

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