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Informing dust backgrounds on low-background detector materials using ICP-MS

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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 surrounding rocks 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. In this work, an ICP-MS based methodology for the direct determination of stable and long-lived radionuclides fallout rates from dust particulate depositing on material surfaces is presented. Applications demonstrating the ICP-MS method as a valuable tool to evaluate dust backgrounds on detector materials and validate mitigation procedures will be shown.

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