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Improving SNOLAB Radon counting sensitivity with low-background ZnS

Rn-222 progeny produce unwanted background events in underground rare-event searches including those for dark matter and neutrinoless double beta decay. ZnS(Ag)-coated Lucas cells were used during the SNO experiment to evaluate Radon emanation into light water and continue to be used for ex-situ measurements of Radon concentration in SNO+ and at SNOLAB for materials assays. Support for current and future experiments housed at SNOLAB motivates the development of new Lucas cells to further improve SNOLAB's capabilities for characterizing materials radio-purity with greater precision and sensitivity.
In this presentation, Radon assays are introduced and developments for next-generation Lucas cells will be discussed. Topics include background characterization for Lucas cell components, fabrication methods, and development of ZnS synthesis and doping techniques. Future prospects and current investigations will be shared, including studies into elimination of U-238 chain impurities.

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