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Development and Future Prospects of ZnS Lucas cells

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Rn-222 progeny produce unwanted background events in underground rare-event searches including those for dark matter and neutrinoless double beta decay. ZnS(Ag) 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. Expected topics include novel designs and fabrication methods including ZnS synthesis and doping, Lucas cell efficiency studies, and determination and discrimination of background sources within Lucas cells. Future prospects will be explored including modern materials such as PEEK and PEI thermoplastics, and cryotrapping Radon within Lucas cells.

Keyword-1

Radon

Keyword-2

Scintillator

Keyword-3

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