



Contribution ID: 152

Type: **Parallel session talk**

SPLENDOR's Modular Detector System Designed for meV Charge Signals with Novel Semiconductors

Wednesday 8 October 2025 15:00 (20 minutes)

SPLENDOR is a cross-discipline collaboration—involving theorists, condensed matter physicists, and low energy-threshold instrumentation specialists—focused on developing narrow-gap semiconductors to search for Sub-MeV dark matter. SPLENDOR has developed a novel modular detector system that offers adaptability to incorporate newly developed semiconducting materials into an experimental package with two-stage HEMT charge readout technology. Recently, SPLENDOR published projected dark matter search sensitivity that has the potential to probe athermal relic dark matter. The projection is based on using a 800 mg crystalline, ~ 60 meV bandgap sample of $\text{Eu}_5\text{In}_2\text{Sb}_6$ synthesized by SPLENDOR collaborators at Los Alamos National Laboratory. In parallel with synthesizing this narrow-gap semiconductor, SPLENDOR developed a world-leading cryogenic charge amplifier with a resolution of 20 ± 7 electrons that should achieve single electron energy resolution in the coming year. This talk will provide the CPAD community with an update on SPLENDOR's recent progress, highlighting our efforts in amplifier calibration and outlining the next steps and future technologies.

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Session Classification: RDC 7 Low-Background Detectors

Track Classification: RDC 7 Low-Background Detectors