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# Searching for Light Dark Matter with Narrow-Gap Semiconductors: The SPLENDOR Experiment

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Understanding the particle nature of dark matter, which makes up approximately 85% of the matter content in the universe, remains one of the biggest open questions in the fields of particle physics and cosmology. After decades of null results in searches for weakly interacting massive dark matter candidates, experimental and theoretical efforts have shifted towards a broad range of masses, including lighter mass dark matter candidates with masses below O(MeV). These light mass dark matter particles present a substantial detection challenge, as their relatively low kinetic energy limits the energy deposited in a target to be sub-eV. The low momentum interactions are also highly delocalized, and a detailed understanding of the collective modes of the target material is critical to predicting DM scattering rates.

The SPLENDOR Experiment (Search for Particles of Light dark mattEr with Narrow-gap semiconDuctORs) is using novel narrow-bandgap single-crystal semiconductors as ionization detectors to search for light dark matter. We have developed a series of magnetic Zintl phase semiconductors with electronic bandgaps on the order of 10-100 meV, which allow for sensitivities to fermionic (bosonic) dark matter with sub- MeV (eV) masses. The materials will are instrumented in a point contact geometry operated at mK temperatures, with the excited charge signal being read out with low-noise cryogenic HEMT based amplifiers. Our prototype charge amplifier has achieved sub-10 electron resolution and its performance is independent of detector material. In this talk I will give an overview of the SPLENDOR project, discuss our recent progress in the material synthesis and characterization, and give updates on our preliminary results.

This presentation is on behalf of the SPLENDOR collaboration and is supported by the Laboratory Directed Research and Development program of Los Alamos National Laboratory.

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