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Toward ~eV resolution phonon mediated detectors for SuperCDMS SNOLAB low mass Dark Matter search and beyond

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Using Neganov-Luke phonon amplification in very low temperature germanium detectors, CDMSlite is reaching unprecedented RMS resolution of 14 eVee and currently the most sensitive experiments for WIMPs of mass < 5 GeV/c^2. However to further improve the Neganov-Luke phonon gain, CDMSlite is currently limited to an applied electric field < 24 Volts/cm. Our recent studies points to the electrode/absorber interface and carrier leakage through that interface as the main source of this limitation. In particular, we demonstrated x2 improvement in resolution using improved electrode contacts. I will discuss, our recent R&D to improve SuperCDMS HV electrode interface and expected resolution gain. Concurrently, we are designing new phonon sensor geometry to improve SuperCDMS threshold independently from the Neganov-Luke gain. The combination of the two methods will result in detectors with beyond SuperCMDS SNOLAB expected performance.

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