

New Perspectives



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The search for low mass Dark Matter with CCDs

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In recent years, the demand for experimental data in cosmology, direct searches for dark matter and neutrino physics has highlighted the need to explore very low energy interactions. While Charge-Coupled Devices have proven their worth in a wide variety of fields, its readout noise has been the main limitation when using these detectors to measure small signals. The R&D done at Fermilab allowed the creation of a non-destructive readout system that uses a floating-gate amplifier on a thick, fully depleted charge coupled device to achieve ultra-low readout noise. While these detectors have already made a significant impact in the search for rare events and direct dark matter detection (SENSEI), its uses are being expanded to quantum optics, neutrino physics and astronomy. In this short talk I will go over the main principles behind the Skipper-CCD, its novel uses as particle detectors, and the current efforts at Fermilab and around the U.S. for the construction of a large multi-kg experiment for probing electron recoils from sub-GeV DM (OSCURA).

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