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Novel Low Workfunction Semiconductors for Dark Matter, Neutrino Phenomena, and Particle Physics

Thursday, May 27, 2021 6:06 AM (18 minutes)

Weakly bound semiconductor materials, Cs3Sb and Ag-O-Cs (photocathodes), have low electron-hole pair energies=Eg+Ea.These semiconductors in shapes and volumes could be used as detectors for: (1) low energy depositions, with thresholds as low as ~50 eV depositions when cooled to ≤4°K(Ag-O-Cs), and (2) applications of Cs3Sb to calorimetry or tracking, with a pair energy 1.8-2 eV, but with far lower thermal noise than Si since Eg~1.6 eV. Progress in Atomic Layer Deposition has been shown to deliver large area (~m2) films and ~few mm thicknesses. Applications of semiconductor detectors with low pair-energy thresholds range over detecting dark matter interactions, low energy (sub-MeV, coherent) neutrino interactions, neutrino-less double-beta decay, and neutrino interactions from the cosmos or sun. may result. Cs3Sb and Ag-O-Cs materials are radiation resistant for high resolution particle flow sampling calorimeters with more ion pairs and mobility larger than Si.

TIPP2020 abstract resubmission?

No, this is an entirely new submission.

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