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Photoneutron calibration of SuperCDMS cryogenic dark matter detectors

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A compelling set of diverse astrophysical observations points to the existence of dark matter, motivating the quest for its direct detection. The most widely accepted dark matter candidates are weakly interacting massive particles (WIMPs). SuperCDMS, the advanced successor of the Cryogenic Dark Matter Search, is designed to directly observe galactic WIMPs via keV-scale nuclear recoils in semiconductor detectors. The sensitivity to WIMPs depends on understanding the nuclear recoil energy scale. This understanding can be achieved by calibrating the detectors with photoneutron sources that emit quasi monoenergetic neutrons of known energy after nuclear excitation by hard gamma radiation. After a short introduction to the detection principle of SuperCDMS, I will describe the Sb/Be and Y/Be calibration sources and method applied to the Ge detectors. I will also present SuperCDMS photoneutron data taken at Soudan and summarize the status and plans for the photoneutron calibration efforts.

Author: Dr VON KROSIGK, Belina (University of British Columbia)

Co-authors: Dr HSU, Lauren (FNAL); Dr OSER, Scott (University of British Columbia)

Presenter: Dr VON KROSIGK, Belina (University of British Columbia)

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