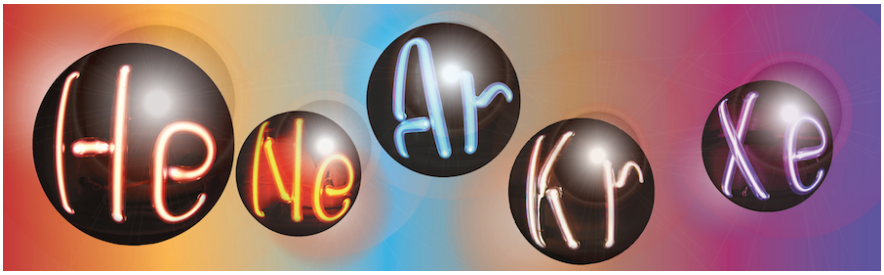

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Optical modeling of pixelated digital SiPMs for ARGO

Thursday, 23 October 2025 10:40 (20 minutes)

ARGO is a proposed liquid argon (LAr) dark matter direct-detection experiment to be built at SNOLAB in the coming decade. It will have leading sensitivity to heavy dark matter particles above 50 GeV/c² and will also provide excellent sensitivity to detect core-collapse supernova neutrinos and make high-precision measurements of solar neutrinos. ARGO will use pixelated digital silicon photomultipliers (SiPMs) with fast photon timing that will enable excellent position reconstruction and novel hit-pattern-based event discrimination. However, the optical crosstalk (oCT) in SiPMs may impact the electron/nuclear recoil pulse-shape discrimination and distort the spatial/temporal photon hit distributions, potentially limiting the background rejection performance. To evaluate these effects, we have developed a full Monte Carlo simulation of a pixelated SiPM system, including oCT, that has been benchmarked against available measurement results. In this talk, I will present results from this model, focusing on how oCT influences the detector energy threshold and event position reconstruction. I will also briefly discuss a small-scale ARGOlite prototype at SNOLAB and two digital SiPM technologies that are being evaluated for building its 2 m² pixelated photosensor array.

Primary author: MOHARANA, Asish (Carleton University, Ottawa, Canada)

Presenter: MOHARANA, Asish (Carleton University, Ottawa, Canada)

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