CSU PHYSICS COLLOQUIUM

"Beam-Dump Dark Matter Search Utilizing a Low-Threshold, Directional Dark Matter Detector (BDX-DRIFT) at Jefferson Lab"

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Monday, Oct. 14th at 4:00 p.m.

120 Engineering (Hammond Auditorium)

Abstract

Light dark matter (LDM) in the context of dark sector theories is an attractive candidate to make up the bulk of the mass of our Universe. This talk presents the LDM discovery potential of a low-pressure, negative-ion, time-projection-chamber detector placed downstream of the Hall A beam-dump at Jefferson Lab receiving 10^22 electrons on target (EOT). As with the approved Beam-Dump eXperiment (BDX) the Directional Recoil Identification From Tracks Beam-Dump eXperiment (DRIFT-BDX) would run parasitically and in parallel with BDX providing additional reach, confirmation potential and different backgrounds all providing a high degree of complementarity. DRIFT-BDX is sensitive to elastic nuclear recoil events with a threshold of ~1 keV/amu recoil energy. Multiple, powerful signatures of LDM interactions are possible with BDX-DRIFT detector. Detailed calculations present cosmic ray and beam-related background estimates. The proposed experiment will be sensitive to large regions of LDM parameter space, exceeding the discovery potential of existing and planned experiments in the MeV-GeV DM mass range.

Biography

Professor Snowden-Ifft earned his Ph.D. in Physics from the University of California at Berkeley. After Post-Doc and adjunct positions he was hired at Occidental College where he has been for the past 22 years. His research focused on the directional detection of WIMP dark matter. He was one of the original PIs on and long-time spokesperson for the Directional Recoil Identification From Tracks (DRIFT) collaboration. DRIFT's directional limits are several orders of magnitude better than other directional limits due, in large part, to the discovery by Snowden-Ifft. He is now exploring the use of this technology to look for light dark matter created in an accelerator beam dump, the subject of his talk. When not doing research or teaching professor Snowden-Ifft has spearheaded several large solar projects, including a 1 MW solar array on the Occidental campus.