SACRAMENTO STATE

Department of Physics and Astronomy

SPRING 2023 Colloquium Series

“Exploring the Frontier of Light Dark Matter”

Dr. Claudio Savarese

Princeton University

Transformative discoveries in particle physics are driven by advances in instrumentation. The development of large-mass, low-energy threshold experiments is pushing the frontier of rare event searches. The existence and nature of Dark Matter (DM), one of the most exciting mysteries of modern Physics, might be within the reach of the next generation of detectors.

Noble element Time Projection Chambers (TPC) are leading the exploration of the DM parameter space for heavy candidates. On the other hand, Light Dark Matter is still relatively unexplored. For this reason, there is an outstanding opportunity for discovery with modest experimental exposures.

I will show how noble element TPCs, a mature and proven technology, can achieve unprecedented sensitivity to GeV and sub-GeV DM by solely relying on the ionization signal. I will introduce the unique challenges tied to studying low-energy events when such detectors are operated in "electron-counting" mode and the relative mitigation strategies. Finally, I will discuss a set of ancillary measurements designed to address the limiting factors that currently prevent noble element TPCs from fully exploiting their intrinsic discovery potential.

Thursday, February 16, 2023

4:00 – 5:20PM

MND1015

Open & Free to all students, faculty and public