Argonne NATIONAL LABORATORY

PHY Seminar

Physics Division Seminar

Kristina Launey

Louisiana State University

Emergent Phenomena in Nuclei: Collectivity and Clustering from First Principle

Host: Mike Carpenter

Monday, April 8, 2019 – 203, R150, 3:30 PM

In this talk, I will discuss two central questions in nuclear physics, namely, understanding and predicting diverse nuclear properties from the underlying physics of only two or three nucleons, and the origin of emergent orderly patterns in the intricate nuclear dynamics. In particular, I will address a long-standing challenge, namely, the emergence from first principles of collectivity and clustering in light to medium-mass nuclei, with implications for reproducing enhanced E2 transitions without effective charges; for the formation of alpha clustering; as well as for the description of alpha-capture reactions of interest to nucleosynthesis. This is achieved by using physically relevant degrees of freedom within the symmetry-adapted no-core shell-model framework, which exploits approximate symmetries that, we find, dominate nuclear dynamics.