



Old Dominion University

Department of Physics

Colloquium

Thursday, April 13, 2023

"Electroweak processes and nuclei: from cross sections to fundamental"

Dr. Alex Gnech

European Centre for Theoretical Studies in Nuclear Physics

Abstract: Interactions between nuclei and electroweak probes, such as electrons, neutrinos, and beyond the standard model particles, offer valuable insights into the internal structure of the nuclei and the nature of the probes themselves. The experimental cross-sections is the crucial quantity that contains this information. However, the information we want to extract from modern experiments requires increasingly accurate calculations of this quantity. In this colloquium, we will discuss how modern nuclear ab-initio calculations meet this challenge. We will begin with Fermi's golden rule and gradually introduce all the components required for computing the cross-section of an electroweak process. We will then present two specific cases: the calculation of the elastic nuclear magnetic form factor and the nuclear permanent electric dipole moment. In both cases, we will demonstrate how these calculations offer insight into the nature of the nuclear interaction and potentially into beyond standard model physics.

Presentation: **OCNPS 200 @ 3:00 pm**

Refreshments: **OCNPS Atrium @ 2:30 pm**

All interested persons are cordially invited to attend.