Old Dominion University
Department of Physics

Colloquium

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"The Road to Nuclear Physics from Standard Model"

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Abstract: At the core of nuclear physics is to understand complex phenomena occurring in the hottest and densest known environments in nature, and to unravel the mystery of the dark sector and other new physics possibilities. Nuclear physicists are expected to predict, with certainty, the reaction rates relevant to star evolutions and nuclear energy research, and to obtain the “standard” effects in nuclei to reveal information about the “non-standard” sector. To achieve such certainty, the field has gradually started to eliminate its reliance on the phenomenological models and has entered an era where the underlying interactions are "effectively" based on the Standard Model of particle physics, in particular Quantum Chromodynamics (QCD). The few-nucleon systems can now emerge directly from the quark and gluon degrees of freedom and with only QCD interactions in play, using the numerical method of lattice QCD. Few-body observable, such as few-hadron interactions and scattering amplitudes, as well transition amplitudes and reaction rates, have been the focus of this vastly growing field. Once obtained from QCD, and matched to effective field theories, these can advance and improve the nuclear many-body calculations of exceedingly more complex systems. This talk is a brief introduction to this program and its goals, with a great focus on an example with phenomenological importance to demonstrate the roadmap described above.

Presentation: OCNPS 200 @ 2:00 pm
Refreshments: OCNPS Atrium @ 1:30 pm

All interested persons are cordially invited to attend.