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INPP Seminar | Electronic Sum Rules and Response Functions from the Symmetry-adapted Nocore Shell Model, Sept. 12

Ohio University College of Arts & Sciences

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The Institute of Nuclear and Particle Physics (INPP) presents Robert Baker of Ohio University on, “Electronic Sum Rules and Response Functions from the Symmetry-adapted No-core Shell Model”, on Tuesday, Sept. 10, at 4 p.m. in Edwards Accelerator Lab, Roger W. Finlay Conference Room.

Abstract: Recent developments in ab initio nuclear structure have provided us with a variety of many-body methods capable of describing nuclei into the medium-mass region of the chart of nuclides. One of these, the symmetry-adapted no-core shell model (SA-NCSM), capitalizes on inherent symmetries of the nucleus and is well-suited to examine the underlying physics of dynamical quantities, such as sum rules and response functions. I will discuss work with the ab initio SA-NCSM to examine these quantities in up to and including intermediate-mass, open-shell nuclei from a first-principle perspective. Specifically, by combining inputs from the SA-NCSM with the Lanczos sum rule method and the Lanczos reponse function method, we are able to calculate these quantities in light nuclei and our results show to be in good agreement with existing exact methods. Expanding toward intermediate-mass nuclei, calculations for the response functions of ^{16}O and ^{20}Ne reveal the advantages of the SA-NCSM when examining giant resonances and I will briefly point to applications for nuclear compressibility staring from these microscopic calculations of response functions.