

UNIVERSITY OF NOTRE DAME  
DEPARTMENT OF PHYSICS

# NUCLEAR SEMINAR

Monday, May 1

## *Local chiral potentials with $\Delta$ intermediate states and the structure of light nuclei*

Dr. Maria Piarulli  
Argonne National Laboratory

We present quantum Monte Carlo calculations of light nuclei using local two-nucleon (NN) and three-nucleon (3N) interactions derived from chiral effective field theory retaining pions, nucleons and  $\Delta$  isobars as explicit degrees of freedom. The calculation of the NN potential is carried out by including one- and two-pion-exchange contributions up to next-to-next-to-leading order (N2LO) and contact interactions up to next-to-next-to-next-to-leading order (N3LO). The low-energy constants (LECs) multiplying these contact interactions are fitted to the 2013 Granada database up to laboratory energies  $E_{\text{lab}}=200$  MeV, the deuteron binding energy and  $nn$  singlet scattering length. The 3N potential includes a two-pion-exchange interaction, a one-pion-exchange-contact interaction, and a 3N contact interaction up to N2LO, and the two LECs multiplying the contact interactions are obtained by fitting the binding energy of  ${}^3\text{H}$  and  $nd$  scattering length.

**4 pm – 5 pm**  
**Nuclear Science**  
**Laboratory**  
**124 Nieuwland**  
**Science Hall**

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All interested  
persons are  
cordially invited  
to attend

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Refreshments will be  
served prior to the  
seminar in room 124