Cyclotron Seminar

Monday, December 3rd
At 3:30pm

Dr. Nathan Cooper
University of Notre Dame

Level Statistics Relevant to the Surrogate Reaction Method

Abstract:

Nuclear reaction cross sections near and far from stability are essential to the study of stellar phenomena and isotopic abundance, as well as reactors and for stockpile stewardship. Measurement of many cross sections, such as (n,g) away from stability, is currently troublesome or impossible due mainly to the short lifetimes of the nuclei involved in the reactions. A method of measuring these cross sections, developed around 40 years ago, has gained renewed interest in their extraction [1]. A collaboration between Lawrence Livermore National Laboratory, Texas A&M University, The University of Richmond, and most recently The University of Notre Dame, has sought to study both nuclear structure as well as the other properties from experiments utilizing the Hyperion array at the Texas A&M Cyclotron Institute. Protons accelerated by the K150 cyclotron to near 25 MeV incident on rare-earth isotopes including samarium, gadolinium, and dysprosium produce outgoing particles and g-rays used to deduce cross sections of other reactions as well as structure information. This talk will center around the challenges and uncertainties of such efforts, focusing on recent data from samarium and gadolinium (p,t) reactions. Statistical model calculations used to deduce spin distributions from the data, important for proper calculation of cross sections using the surrogate method, are compared with those of a semi-classical model. Results indicate that the method may possibly be used to deduce structure properties of the nucleus and aid in the calculation of cross sections using the surrogate method [2].

[1] Rev. Mod. Phys. 84 353, J. Escher et al. (2012)

[2] Phys. Rev. C 98 044618, N. Cooper et al. (2018)

CYCLOTRON INSTITUTE
Room 228

Refreshments will be served at 3:15pm