

Physics Division Seminar

Remco Zegers

NSCL, Michigan State University

Gamow-Teller and Other Isovector Giant Resonances in Unstable Nuclei

Host: Daniel Santiago

Monday, March 30, 2020 – 203, R150, 3:30 PM

The development of experimental tools to study isovector excitations in unstable nuclei is challenging. Naturally, experiments must be performed in inverse kinematics and the cross section for charge-exchange reactions are small compared to background channels that are populated as well. Nevertheless, a lot of progress has been made in pursuing (p,n) experiments in inverse kinematics by using a combination of a liquid hydrogen target and neutron detector arrays to measure the recoil neutrons from the (p,n) reaction. Experiments are performed at intermediate beam energies (>100 MeV/u) in order to ensure a simple direct reaction mechanism. First results on Nickel-56, Tin-132, and Carbon-16 are indicative of the power of the method. The experimental results have an impact on astrophysical studies, the nature of pion condensation, as well as macroscopic and microscopic properties of nuclei. There is also a big demand for performing (n,p)-type charge-exchange experiments in inverse kinematics, which is even more challenging. The use of the (${}^7\text{Li}, {}^7\text{Be}$) reaction in inverse kinematics has sever constraints, which is why the ($\text{d}, {}^2\text{He}$) reaction is now considered for this type of experiments. In the presentation, an overview of the scientific motivations will be given, in combination with the results from the first experiments, performed at NSCL and at RIBF.