

Physics Division Seminar

Remco Zegers

NSCL, Michigan State University

Spin-Isospin Excitations in Nuclei and Applications in Astrophysics

Host: Mike Carpenter

Wednesday, May 1, 2019 – 203, R150, 3:30 PM

Weak interactions play an important role in a variety of astrophysical scenarios and reliable weak interaction rates are important for accurate simulations. The study of spin-isospin excitations of nuclei through charge-exchange reactions is a useful tool for benchmarking, constraining, and guiding the development of nuclear models that are used for estimating astrophysical weak reaction rates. The charge-exchange group has established a weak-rate library that can be used in a variety of astrophysical simulations, and which is continuously updated and improved on the basis of new experimental and theoretical results. In particular, the group has focused on studies of the collapse phase of core-collapse supernovae, in which electron-captures on medium heavy nuclei play a particularly important role. Sensitivity studies have pinpointed key areas of interest in the chart of nuclei (in particular around $N=50$, just above ^{78}Ni), which have been the primary focus on recent experimental, theoretical, and astrophysical studies. The presentation will focus on these recent efforts, and give an outlook for the development of new experimental tools, such as the $(d,^2\text{He})$ and $(p,n+\gamma)$ reactions in inverse kinematics.