Nucleosynthesis of ^{60}Fe and constraints on the nuclear level density and γ-ray strength function

D. Richman[a], A. Spyrou[b] and A. Couture[c]

[a]*Michigan State University, NSCL,* [b]*NSCL, MSU,* [c]*Los Alamos National Laboratory*

^{60}Fe is created by neutron capture in massive stars prior to core collapse supernova. This isotope is one of only a handful whose gamma-rays from β-decay indicate ongoing nucleosynthesis in the Galaxy. For this reason the reactions involved for the creation and destruction of ^{60}Fe in this environment must be well understood. Due to the short half-life of ^{59}Fe it is challenging to perform a direct capture reaction experiment to determine the cross section of ^{59}(n,γ)^{60}Fe. Instead we used the β-decay of ^{60}Mn to populate states at all energies in the ^{60}Fe nucleus. The resulting γ-rays were collected using a 4π total-absorption spectrometer, SuN (Summing NaI(Tl) detector), at the NSCL. With this data the β-Oslo method can be applied to extract the nuclear level density and gamma-strength function needed for statistical models to calculate the reaction rate using experimentally constrained nuclear structure parameters. Preliminary results from the ongoing analysis will be presented.