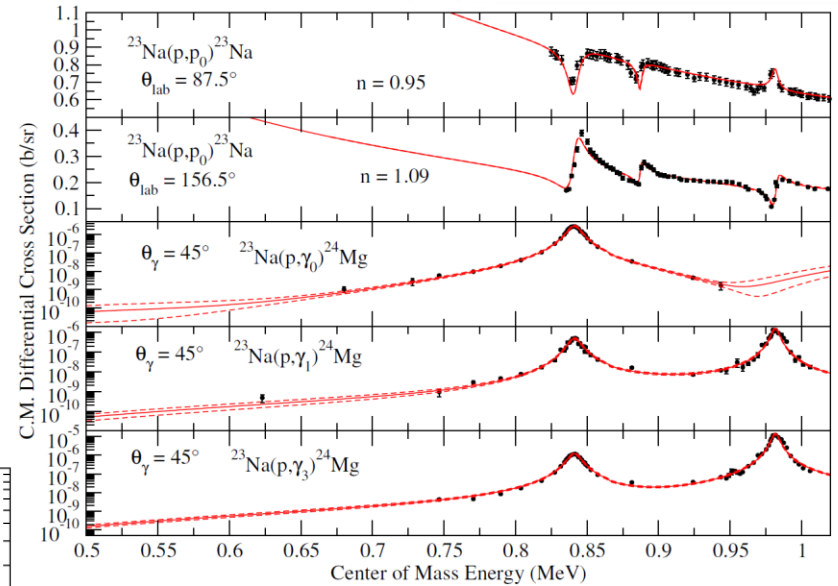
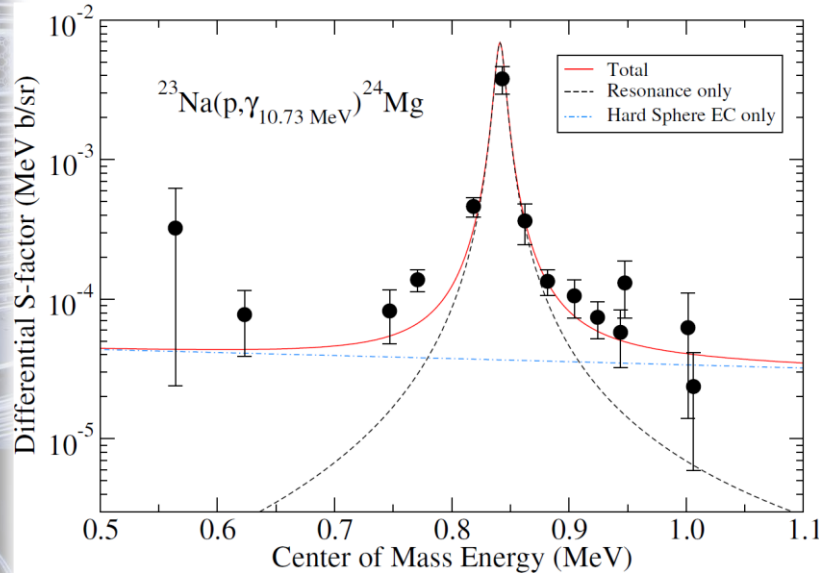


Investigation of direct capture in the $^{23}\text{Na}(p,\gamma)^{24}\text{Mg}$ reaction



The $^{23}\text{Na}(p,\gamma)^{24}\text{Mg}$ reaction plays an important role in the nucleosynthesis environment of asymptotic giant branch stars as a breakout from the NeNa to the MgAl cycle. At temperatures above 0.06 GK, the rate is dominated by narrow resonances, but at lower temperatures non-resonant contributions take over. While the narrow resonances have seen several recent studies, the non-resonant component has seen little study.



At the University of Notre Dame, experimental measurements were made over the energy range from 0.5 and 1.05 MeV, with a focus on the non-resonant cross section. Several transitions were observed. Two broad resonances, whose low energy tails contribute strongly to the low-energy cross section were characterized. In addition, a clear signature of direct capture was observed for the first time in the $^{23}\text{Na}(p,\gamma)^{24}\text{Mg}$ reaction, through the 10.73 MeV transition.

