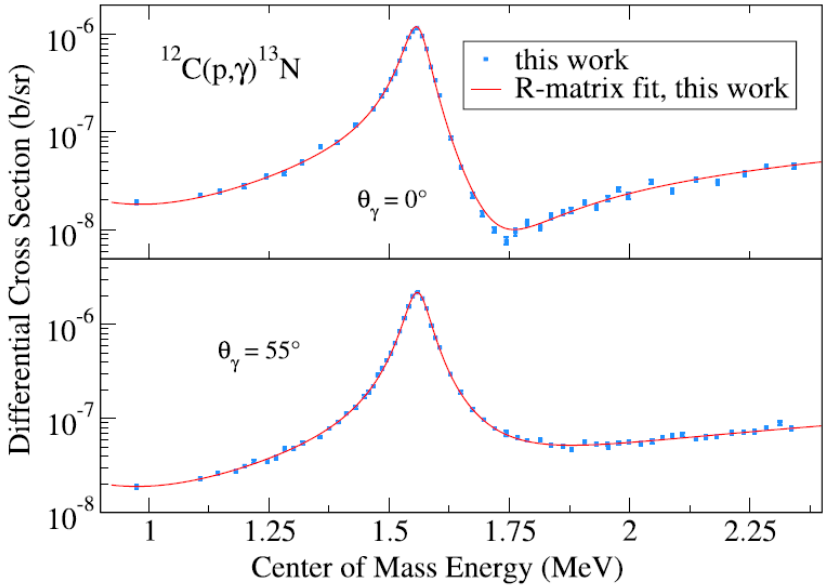
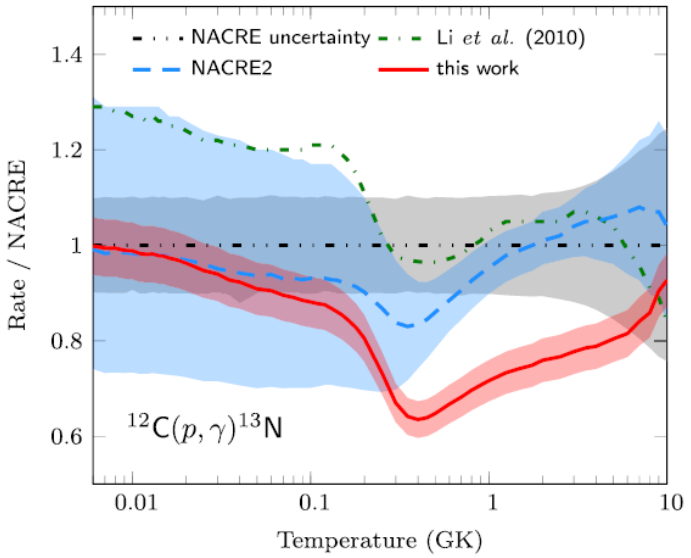
Absolute cross section of the $^{12}C(p,\gamma)^{13}N$ reaction

Solar neutrino measurements have reached a level of sensitivity such that CNO fluxes can now be experimentally determined. While these first measurements are only sensitive to higher energy neutrinos from the β^+ decays of ^{15}O produced by the $^{14}N(p,\gamma)^{15}O$ reaction, future measurements will detect neutrinos from the β^+ decay of ^{13}N from the $^{12}C(p,\gamma)^{13}N$ reaction. This paper reports on a recent measurement of the $^{12}C(p,\gamma)^{13}N$ reaction covering the laboratory energy range between 1.0 and 2.5 MeV. The measurements focused on the determination of the overall





normalization of the absolute cross section and explored the interference effects between the two broad, overlapping resonances and the direct capture to the ground state using a multichannel *R*-matrix analysis. This work takes into account both radiative capture and $^{12}C(p,p)^{12}C$ data, making uncertainty estimations using a Bayesian framework. These new results, and a detailed investigation of the past literature data, suggest that the resonant component of the cross section should be 30% lower than previously accepted.

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