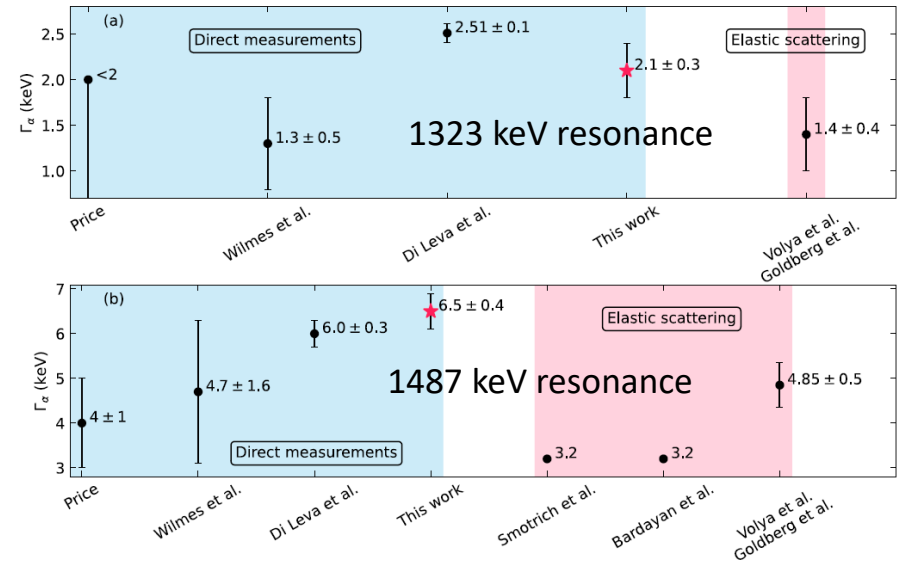
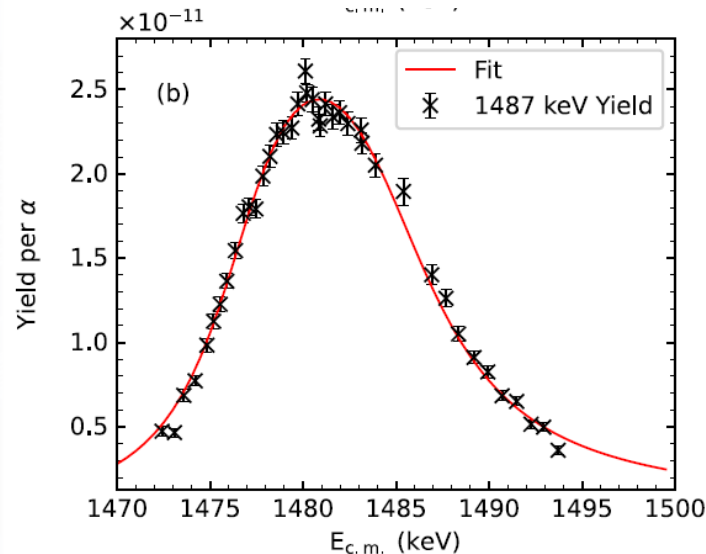


Energy, strength, and α width measurements of 1323 and 1487 keV resonances in $^{15}\text{N}(\alpha,\gamma)^{19}\text{F}$



The $^{15}\text{N}(\alpha,\gamma)^{19}\text{F}$ reaction produces ^{19}F in asymptotic giant branch (AGB) stars, where the low energy tails of two resonances at 1323 ± 2 and 1487 ± 1.7 keV contribute about 30% to the reaction rate. However, recent measurements have shown discrepancies in their level parameters, resulting in an increase in the uncertainty of the rate.



Using an α -particle beam on a Ti^{15}N target, we used γ -ray spectroscopy to remeasure the resonance energies and confirmed them to be 1321.6 ± 0.6 and 1479.4 ± 0.6 keV. We found that the resonance strengths for both were consistent with most in the literature, but a larger α -width was found for the 1487 keV resonance. This leads to an increase of about 15% in the reaction rate at temperatures relevant to low mass AGB stars.



Fang et al. PRC 110, 025806 (2024), NSF Grant Nos. PHY-2011890 and 2310059 and PHY-1430152 (JINA-CEE).

