

## Nuclear Lunch Questions for December 1<sup>st</sup> 2021 Discussion

### Paper:

*"An increase in the  $^{12}\text{C}+^{12}\text{C}$  fusion rate from resonances at astrophysical energies"*

Tumino et al. Nature **557**, 687 (2018)

**Moderator:** Yenuel Jones-Alberty

Format: *Question (Person to Answer)*

1. What is  $R$ -matrix? How is it used in the paper? (**Ibrahim**)
2. What are the criteria for using the Plane Wave Approximation vs. the Distorted Wave Born Approximation? (**Mahesh**)
3. What do the two terms with different energy dependencies in the exponent of the modified  $S$  factor represent? Where do their coefficients come from? (**Alexandra**)
4. Regarding the  $\Delta E$ - $E$  plot, what are  $\Delta E$  and  $E$ , and what does this plot tell us? Is there an explanation for the unlabeled group of events in the bottom left-corner? (**Justin B.**)
5. What theory/method/procedure was used to predict the 1.5MeV resonance? Why did Cooper et al. not also predict the resonance observed at 0.8MeV? (**Brad**)