

Questions for discussion, Nuclear Lunch, March 1, 2017

Paper: Kisamori et al., “Candidate resonant tetraneutron state populated by the $^4\text{He}(^8\text{He}, ^8\text{Be})$ reaction”, Phys. Rev. Lett. **116**, 052501 (2016).

1. What is the SHARAQ spectrometer? What are its components? **[Gula]**
2. What fragmentation reaction produces the ^8He beam? How do they obtain a 99.3% ^8He beam? **[Som]**
3. Why are we focusing on the tetraneutron but not on di or trineutrons? **[Tyler]**
4. In fig. 3a, they have a component of the spectrum labeled ‘direct decay’. What does direct decay mean here? Are they suggesting the tetraneutron decays to a $2n-2n$ cluster configuration? Does this cluster exist? **[Mamun]**
5. What was the Marques et al. result and why was it not sufficient to establish the existence of a tetraneutron? **[Andrea]**
6. Why is the missing-mass resolution limited to 1.2 MeV? Can it be increased for this experiment? **[Abinash]**
7. What is the beam time based on the cross section and counts for the reaction? **[Shiv]**
8. How is s_i calculated and how does it relate to the number of standard deviations? **[Matt]**
9. What are the differences between RI Beam factory and FRIB? What are their energy ranges and beam intensities? **[Rekam]**
10. Is there any possibility of studying the tetraneutron with other reaction channels? **[Sudhanva]**
11. What are hypernuclei? **[Kristyn]**
12. What is the likelihood ratio test? **[Bishnu]**
13. $E_{4n}=0$ MeV corresponds to the 4 neutron decay threshold. Does this mean that after decay the 4 neutrons will go off in perpendicular directions? **[Taya]**