

UNIVERSITY OF NOTRE DAME  
DEPARTMENT OF PHYSICS

# NUCLEAR SEMINAR

Monday, September 19

## *Exploring the properties of resonances for stellar neutron sources*

Yingying Chen

University of Notre Dame

Potential stellar neutron sources for the s-process in massive stars are associated with  $\alpha$ -capture reactions on light nuclei. The reaction  $^{22}\text{Ne}(\alpha, n)$  is of particular importance for the neutron production in massive Red Giant stars during core helium burning and AGB stars during helium shell burning. The cross section of this reaction at stellar energies as well as of the competing capture reaction  $^{22}\text{Ne}(\alpha, \gamma)$  are dominated by the contribution of low energy, natural parity resonances. There are a number of low energy resonances in  $^{22}\text{Ne}(\alpha, \gamma)$  and  $^{22}\text{Ne}(\alpha, n)$  have not yet been well measured because of the extremely small cross sections. This lack of information introduces considerable uncertainties into the reaction rates and can have a significant influence on the nucleosynthesis in massive stars. In order to improve the reaction rate of  $^{22}\text{Ne}+\alpha$ , the levels in  $^{26}\text{Mg}$  about 1 MeV above the  $\alpha$ -threshold, which associated with the potential resonances in the  $^{22}\text{Ne}(\alpha, \gamma)$  and  $^{22}\text{Ne}(\alpha, n)$  reactions have been populated with the high energy resolution by  $^{25}\text{Mg}(d, p)^{26}\text{Mg}$  using the Grand Raiden Spectrometer in RCNP, Osaka, Japan. Also neutron-transfer technique will be used to extract neutron-strength information. The experiment presented in RCNP and the preliminary analysis will be discussed.

**4 pm – 5 pm**  
**Nuclear Science**  
**Laboratory**  
**124 Nieuwland**  
**Science Hall**

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All interested  
persons are  
cordially invited  
to attend

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Refreshments will be  
served prior to the  
seminar in room 124