UNIVERSITY OF NOTRE DAME
DEPARTMENT OF PHYSICS

NUCLEAR SEMINAR

Friday, January 22

Nucleosynthesis in Type I X-ray Bursts: Exploring the αp-Process through High Precision (p,t) Measurements

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Shortly after their discovery in 1979, x-ray bursts were determined to be thermonuclear runaways occurring on the surface of neutron stars in binary systems with H/He rich companion stars. During these explosive events thermonuclear burning is driven by the αp-process (a sequential series of (α,p) and (p,γ) reactions along the proton rich side within the sd-shell nuclei), and the rp-process (a series of (p,γ) and β^+-decays riding along the proton drip line up the A = 100 mass region). Current x-ray burst sensitivity studies have revealed that certain (α,p) reactions along the αp-process have a direct influence on the early rise-time structure of x-ray burst light curves.

Lacking experimental data, most of these (α,p) stellar rates have been calculated using statistical models, such as Hauser-Feshbach. Recently, it has been pointed out that the level density in many of the compound nuclei along the αp-process may be too low to support this statistical approach, resulting in over predictions of stellar (α,p) rates used in x-ray burst models.

In this talk, I will discuss the recent efforts by our group at Notre Dame in trying to indirectly measure important (α,p) reaction rates through high precision (p,t) reaction measurements. More specifically, I will present results from our latest (p,t) experiment at iThemba LABS, where we indirectly measure the ^{26}Si(α,p) and ^{34}Ar(α,p) reaction rates by investigating α-unbound states in the compound nuclei ^{30}S and ^{38}Ca, respectively.

3 pm – 4 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