

## NUCLEAR SEMINAR

- Speaker:** *Prof. Yang Sun*  
*Shanghai Jiao Tong University, China*
- Title:** *Overview of present nuclear physics research in China and progress in development of shell models*
- Date:** Monday, August 27, 2012
- Time:** **4:00 pm EST**
- Place:** Nieuwland Science Hall Room 124

\*Refreshments will be served prior to the seminar in room 124.

---

ALL INTERESTED PERSONS ARE CORDIALLY INVITED TO ATTEND

---

We will give a brief review of the present nuclear physics research in China. A representative example is the research with the newly-constructed Cooler Storage Ring in Lanzhou. This unique facility has so far been successful in measuring nuclear masses of very proton-rich nuclei, and has made important contribution for the understanding of the N=Z waiting points along the path of rp-process in type-I X-ray bursts as well as for testing the isobaric multiplet mass equation (IMME) in fp-shell nuclei.

It is an interesting practice to combine detailed nuclear structure information into astrophysical models and simulations. For this reason, precise shell model calculations are necessary. We have made progress in development of nuclear shell models, both the large-scale shell model based on a spherical basis and the projected shell model based on a deformed basis. By using the large-scale shell model, the structure of neutron-rich nuclei with a few particles or holes around  $^{132}\text{Sn}$  is investigated. For a considerably large model space including neutron core excitations, a new effective interaction is determined. The model provides a systematical description for energy levels of  $A\sim 130$  nuclei up to high spins, and reproduces available data of electromagnetic transitions. The suggested feature of magnetic rotation in  $^{135}\text{Te}$  occurs in the present shell-model calculation.

There have been recent developments in the projected shell model. Now it becomes possible for a full three-dimensional angular momentum projection with inclusion of multi-quasi-particle configurations in the model space. This has opened up possibilities for applications when the triaxial degree of freedom is involved. It also becomes possible to apply a projected Generate Coordinate Method, with which one can describe soft nuclei in transitional regions. All these efforts to improve the shell model description for heavier nuclei can contribute to the matrix element calculation for the nuclear astrophysical interests.