UNIVERSITY OF NOTRE DAME
DEPARTMENT OF PHYSICS
COLLEGE OF SCIENCE

NUCLEAR SEMINAR

Speaker: **Dr. Justyna Marganiec**
EMMI, GSI Darmstadt, Germany

Title: ***Coulomb breakup of ^{17}Ne – from the viewpoint of nuclear astrophysics and nuclear structure***

Date: Thursday, September 27, 2012

Time: **2:00 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

The Coulomb breakup of 17Ne gives us an opportunity to study the time-reversed reaction ^{15}O(2p,γ)^{17}Ne, which could serve as a bypass of the ^{15}O waiting point during the rp process. The rp process takes place in cataclysmic binary systems, where the CNO cycle is linked with the rp process by the α-capture reaction on the ^{15}O core, and moves the initial CNO material towards heavier nuclei. The two-proton radiative capture can be an alternative way for this. The two-proton capture can proceed sequentially [1] or directly from the threebody continuum [2]. And the reaction rate can be enhanced by a few orders of magnitude by taking the three-body continuum into account [2]. The Coulomb dissociation method is only one way to experimentally determine the three-body radiative capture cross section – ^{15}O(2p,γ)^{17}Ne, which is needed to verify theoretical calculations.

A ^{17}Ne is a proton-dripline nucleus that has raised interest in nuclear structure physics. It is often considered to be a 2-proton-halo nucleus [3], lacking concluding experimental quantification of its structure. The presenting experiment can answer this question.

The experiment has taken place at the LAND-R^{3}B setup at GSI. The secondary ^{17}Ne beam has been produced by fragmentation reactions of ^{20}Ne. The incoming beam and reaction products have been identified by a system of detectors. This project was supported by the German Federal Ministry for Education and Research (BMBF), EU (EURONS), ExtreMe Matter Institute EMMI.

References

[1] Görres J et al. 1995 Phys. Rev. C **51** 392
[2] Grigorenko L V, Zhukov M V 2005 Phys. Rev. C **72** 015803
[3] Zhukov M V, Thompson I J, 1995, Phys. Rev.C **52** 3505