

NUCLEAR SEMINAR SERIES

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Monday, January 13

4:00 pm - Rm 184 NSH

Enhancement in the fusion of neutron-rich nuclei both below and above the barrier

The investigation of neutron-rich nuclei both aids our understanding of fundamental nuclear science and provides valuable information for nuclear astrophysics. Of particular interest are the fusion reactions of neutron-rich nuclei which have been hypothesized as the heat source triggering an X-ray superburst. A particularly sensitive tool to address this topic is measurement of fusion excitation functions for isotopic chains.

While radioactive beam facilities provide beams of neutron-rich nuclei, the intensity of these beams is generally low ($<10^6$ ions/s) necessitating highly efficient detector systems for direct measurement of the fusion products. An effective approach to identify evaporation residues produced in fusion reactions is described. This ETOF technique has allowed measurement of the fusion excitation functions for $^{18,19}\text{O}+^{12}\text{C}$, $^{39,41,45,47}\text{K} + ^{28}\text{Si}$, and $^{36,40,44}\text{Ar} + ^{28}\text{Si}$. The experimental results will be presented and compared with the predictions of various microscopic models. Enhancements in the fusion cross-section both below and above the barrier will be discussed.

Measuring the fusion cross-section for the most N/Z exotic beams, which will only be available at the extremely low intensities ($< 10^3$ ions/s), requires a new approach. For these low intensities a **Multiple Sampling Ionization Chamber (MuSIC)** is an effective approach. The status of this new detector **MuSIC@Indiana**, complementary to our existing approach, will be presented.



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