Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Measuring the Fusion Cross-Section of ^{18,19}O + ^{12}C with Low-Intensity Beams at Energies Near and Below the Coulomb Barrier[1]
TRACY STEINBACH, JUSTIN VADAS, JON SCHMIDT, VARINDERJIT SINGH, SYLVIE HUDAN, ROMUALDO DESOUZA, Indiana University, LAGY BABY, SEAN KUVIN, INGO WIEDENHOVER, Florida State University, SAIT UMAR, VOLKER OBERACKER, Vanderbilt University — Fusion of neutron-rich light nuclei has been proposed as a heat source that triggers an X-ray superburst in the crust of an accreting neutron star. To investigate this hypothesis the total fusion cross-section for beams of low-intensity, neutron-rich nuclei ($< 10^5$ ions/s) on light targets has been measured at energies near and below the Coulomb barrier. Evaporation residues, resulting from the fusion of oxygen and ^{12}C nuclei, were identified by their energy and Time-of-flight. Using this technique, the fusion excitation function was measured in the sub-barrier domain down to the 2 mb level. Comparison of the measured fusion excitation function with the predictions of a density constrained TDHF model reveals that the experimental data exhibit a smaller decrease in cross-section with decreasing energy than is theoretically predicted. This difference can be interpreted as a larger tunneling probability for the experimental data as compared to the theoretical predictions. To determine if this difference increases in magnitude with decreasing incident energy improvements have been implemented to enable measurement of the fusion cross-section to an even lower level.

[1]Supported by the US DOE under Grand No. DEFG02-88ER-40404

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Date submitted: 07 Jan 2015 Electronic form version 1.4