Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Direct and Indirect Techniques for Determining Reaction Rates
ERIC JOHNSON, Florida State University, ANASEN COLLABORATION — Astrophysically important reactions have been studied through indirect techniques for many years due to their prohibitively small cross sections at Gamow window energies. Indirect techniques, such as α-transfer reactions, constrain the reaction cross section of interest in the astrophysically relevant energy range. Recently, we determined the contribution of the 3^- state at 6.4 MeV in ^{18}O to the ^{14}C(α,γ) reaction rate through the indirect α-transfer reaction ^{14}C(^{7}Li,t) at the John D. Fox Superconducting Accelerator Laboratory at FSU. Using the same experimental data we were able to determine the asymptotic normalization coefficient (ANC) of the 1^- state at 6.2 MeV in ^{18}O. This state is a mirror of the 6.15 MeV state in ^{18}Ne, which dominates the ^{14}O(α,p) reaction rate at temperatures of Novae and X-ray bursters. An experimental apparatus which will allow for direct measurements of the astrophysically important (α,p) reaction rates in the Gamow window, the LSU-FSU Array for Nuclear Astrophysics Studies with Exotic Nucelei (ANASEN), is now under construction. I will discuss our recent results on the ^{14}C(α,γ) and ^{14}O(α,p) reaction rates and the current status of the ANASEN project.

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Date submitted: 30 Jun 2009 Electronic form version 1.4