

Abstract Submitted
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HabaNERO: A new experimental tool for the study of (α, xn) reaction rates in the weak r-process SUNGHOON AHN, Texas AM University, F. MONTES, N. RIJAL, H. SCHATZ, Michigan State University, Z. MISEL, Ohio University, HABANERO COLLABORATION COLLABORATION — Recent sensitivity studies have proposed (α, xn) reactions are the main production mechanism of $Z=38-47$ abundances in early nucleosynthesis, so called the weak r-process, with the condition of $(n, \gamma) - (\gamma, n)$ equilibrium and temperatures between 3.5 and 5.5 GK. While the uncertainty of (α, xn) reaction rates was critical to change the production yield of elements, they are relatively large due to little experimental data existed for (α, xn) cross sections involved in the nucleosynthesis calculation. We have developed the HabaNERO neutron detector to study (α, xn) compound reactions of neutron-rich nuclei near $Z=26-40$ region including $^{75}\text{Ga}(\alpha, xn)$. The HabaNERO is a neutron long counter system which consists of ^3He and BF_3 gas-filled proportional tubes in the polyethylene matrix optimized to obtain a high average neutron detection efficiency as constant as possible in the wide neutron energy range ($E_n = 0.1-19.5$ MeV) that corresponds to the neutron energies of interest. Details of the detector design and its commissioning result will be presented.

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