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An above-ground low-energy measurement of the dominant s-process neutron source: ^{13}C(α,n)^{16}O

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\long\def\TITLE#1{{\Large{\bf#1}}}\long\def\AUTHORS#1{ #1\\[3mm]}
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\begin{document}
{\small \it Nuclear Physics in Astrophysics 8, NPA8: 18-23 June 2017, Catania, Italy}

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\TITLE{An above-ground low-energy measurement of the dominant s-process neutron source: $^{13}$C($\alpha$,n)$^{16}$O}\\[3mm]
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%%% Authors and affiliations are next. The presenter should be
%%% underlined as shown below.
%%%
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%%% Abstract proper starts here.
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The ^{13}C(α,n)^{16}O reaction serves as the dominant source of the neutrons for the slow neutron capture (s-process). Approximately half of the elements from Fe to Bi along the line of β stability are synthesized via stellar nucleosynthesis in asymptotic giant branch stars. Previous measurements are thought to have exhausted above-ground attempts to measure this important cross section near the Gamow window[1]. Presently there is a worldwide effort at many current and future underground laboratories to continue these measurements in a low background environment. In this study, we will present on a recent above-ground measurement using a novel dual readout liquid scintillator approach performed at the Multicharged Ion Research Facility (MIRF) located at Oak Ridge National Laboratory. An ECR ion source located on a 250 kV high voltage platform produced $\sim$ 100 eμA of He^{2+} which was incident on isotropically enriched implanted ^{13}C targets. The measurement was performed using position sensitive liquid scintillator bar-type detectors configured in a barrel array. The use of such detectors permits a quasi-spectroscopic approach where events can be gated according to their recoil ion spectrum measured in the liquid scintillator bars. This effectively improves the signal to background by allowing for discrimination based on kinematics. The dual readout system permits further constraints on position and neutron identification on both pmts. Preliminary results from the recent measurement campaign at MIRF will be presented as well as a discussion on the advantages and challenges of this approach.

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\noindent [1] M. Heil, et al., Phys. Rev. C 78 025803 (2008);

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%%% End of abstract.
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