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Background (α,n) reactions at low energies: ${}^{10,11}{\rm B}(\alpha,n){}^{13,14}{\rm N}$

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% % Nuclear Physics in Astrophysics 8 template for abstract % % Format: LaTeX2e. % % Rename this file to name.tex, where 'name' is the family name % of the first author, and edit it to produce your abstract. % \documentstyle[11pt]{article} % % PAGE LAYOUT: % \textheight=9.9in \textwidth=6.3in \voffset -0.85in \hoffset -0.35in \topmargin 0.305in \oddsidemargin +0.35in \evensidemargin -0.35in %\renewcommand{\rmdefault}{ptm} % to use Times font $\label{eq:longdef} $$ \eqref{1}}\ong\def{1}TITLE#1{{\Large{\bf#1}}}\ong\def{AUTHORS#1{ #1\[3mm]}} $$$ $\log\left(\frac{1 \#2}{1 \#2}\right)$ \begin{document} {\small \it Nuclear Physics in Astrophysics 8, NPA8: 18-23 June 2017, Catania, Italy} \vspace{12pt} \thispagestyle{empty} \begin{center} %%% %%% Title goes here. %%% $\label{eq:linear} $$ TITLE{Background } (\alpha,n)$ reactions at low energies: $$^{10,11}B(\alpha,n)^{13,14}N } \ [3mm] $$$ %%% %%% Authors and affiliations are next. The presenter should be %%% underlined as shown below. %%% \AUTHORS{R.J.~deBoer^{1,2}, Q.~Liu^{1,2}, M.~Febbraro³, S.D.~Pain³, R.~Toomey^{3,4}, and M.~Wiescher^{1,2} } %%% {\small \it \AFFILIATION{1}{The Joint Institute for Nuclear Astrophysics}

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New underground facilities like CASPAR and LUNA-MV, which are set to begin operation in the next few years, will push α -induced reaction measurements to record low energies. Of particular interest are the neutron-producing reactions ${}^{13}C(\alpha, n){}^{16}O$ and ${}^{22}Ne(\alpha, n){}^{25}Mg$, which fuel the *s* process. At low energies these cross sections are dominated by their Coulomb penetrabilities. In addition, the relative difference in Coulomb penetrabilities for α -induced reactions on targets with different charge *Z*, is much larger than for their proton-induced counter parts. Yet already small amounts of contaminant material, of lower *Z* than the target material of interest, have been observed to induce large background yields in proton-induced capture reactions. Therefore, the study of low *Z* background reactions is critical for both the planning and interpretation of future low energy measurements of the ${}^{13}C(\alpha, n){}^{16}O$ and ${}^{22}Ne(\alpha, n){}^{25}Mg$ reactions. This is especially true if a counter type detector will be used, e.g. 3 He, that is insensitive to neutron energy. As boron is a common trace material in solid targets, and has already been observed as a contaminant in (p, γ) measurements (e.g. [1]), this paper reports on a new study of the ${}^{10,11}B(\alpha, n){}^{13,14}N$ reactions. Measurements have been performed at the University of Notre Dame's Nuclear Science Laboratory using the Santa Anna 5~MV accelerator. Both a traditional 3 He counter and a new type of deuterated scintillation detector [2], which is sensitive to the neutron energy, have been utilized.

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\noindent [1] A.~Di~Leva \textit{et al.}, Phys. Rev. C {\bf 89} 015803 (2014);

\noindent [2] F.D.~Becchetti \textit{et al.}, Nucl. Instrum. Methods A{\bf 820} 112 (2016).
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