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Neutron capture rates for the astrophysical r process

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\long\def\TITLE#1{{\Large{\bf#1}}}\long\def\AUTHORS#1{ #1\\[3mm]}
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\begin{document}
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\begin{center}
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%%% Title goes here.
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\TITLE{Neutron capture rates for the astrophysical r process}\\[3mm]
%%%
%%% Authors and affiliations are next. The presenter should be
%%% underlined as shown below.
%%%
\AUTHORS{A. Spyrou[1,2,3], S. N. Liddick[1,4,3], A. C. Larsen[5], F. Naqvi[1,3], B. P. Crider[1], A. C. Dombos[1,2,3], M. Guttormsen[5], D. L. Bleuel[6], A. Couture[7], L. Crespo Campo[5], R. Lewis[1,4], S. Mosby[7], M. R. Mumpower[7], G. Perdikakis[8,1,3], C. J. Prokop[1,4], S. J. Quinn[1,2,3], T. Renstr{\o}m[5], S. Siem[5], R. Surman[9] }

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{\small \it
\AFFILIATION{1}{National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing,

Michigan 48824, USA}
\AFFILIATION{2}{Department of Physics \& Astronomy, Michigan State University, East Lansing, Michigan 48824, USA}
\AFFILIATION{3}{Joint Institute for Nuclear Astrophysics, Michigan State University, East Lansing, MI 48824, USA}
\AFFILIATION{4}{Department of Chemistry, Michigan State University, East Lansing, Michigan 48824, USA}
\AFFILIATION{5}{Department of Physics, University of Oslo, NO-0316 Oslo, Norway}
\AFFILIATION{6}{Lawrence Livermore National Laboratory, 7000 East Avenue, Livermore, California 94550-9234, USA}
\AFFILIATION{7}{Los Alamos National Laboratory, Los Alamos, New Mexico, 87545, USA}
\AFFILIATION{8}{Department of Physics, Central Michigan University, Mt. Pleasant, Michigan, 48859, USA}
\AFFILIATION{9}{Department of Physics, University of Notre Dame, Notre Dame, Indiana 46556, USA}
}
%%%
\vspace{12pt} % Do not modify

% Enter contact e-mail address here.

\centerline{Contact email: {\it spyrou@nscl.msu.edu}}

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\end{center}
%%%
%%% Abstract proper starts here.
%%%
The astrophysical r process is responsible for the synthesis of about half of the isotopes of the heavy elements. Despite its importance, the site of the r process is not yet known with certainty. On top of any uncertainties related to the astrophysical conditions and site, there are significant uncertainties in the nuclear input for r-process modeling. The present work focuses on the experimental efforts for providing nuclear input information to help improve our understanding of the r process. One of the important inputs that is practically unconstrained by experiment is neutron capture reactions. The talk will focus on the development of a new technique, the so called β-Oslo method, that was developed recently to experimentally constrain these important (n,γ) reaction rates. This technique uses β-decay to populate the compound nucleus of interest and study the important statistical properties: nuclear level density and γ-ray strength function. These two quantities are then used in statistical model calculations to provide an experimentally constrained neutron capture rate. The relevant experiments were done at the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University using the γ-calorimeter SuN. The validation of this technique and first physics results in the A=70 mass region will be presented.

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Primary author: SPYROU, Artemis (NSCL/MSU)

Presenter: SPYROU, Artemis (NSCL/MSU)

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