



Contribution ID: 74

Type: **Invited talk**

When Stars Attack! Live Radioisotopes Reveal Near-Earth Supernovae

Monday, 19 June 2017 09:10 (30 minutes)

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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:
%
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\topmargin 0.305in
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\evensidemargin -0.35in

\def\iso#1#2{\mbox{#1#2}}
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%\renewcommand{\rmdefault}{ptm} % to use Times font

\long\def\TITLE#1{{\Large\bf#1}}\long\def\AUTHORS#1{ #1\[\3mm]}
\long\def\AFFILIATION#1#2{{#1 #2}}
\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.
%%
\TITLE{When Stars Attack! \\\
Live Radioisotopes Reveal Near-Earth Supernovae
}\[\3mm]
%%
%% Authors and affiliations are next. The presenter should be
%% underlined as shown below.
%%
\AUTHORS{Brian D. Fields1,2}
```

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%%
\small \it
\AFFILIATION{1}{Department of Astronomy, University of Illinois}
\AFFILIATION{2}{Department of Physics, University of Illinois}
}
%%
\vspace{12pt} % Do not modify

% Enter contact e-mail address here.

\centerline{Contact email: {\it bdfields@illinois.edu}}

\vspace{18pt} % Do not modify

\end{center}
%%
%% Abstract proper starts here.
%%
Supernovae are major engines of nucleosynthesis, and create many of the elements essential for life. Yet these awesome events take a sinister shade when they occur close to home, because an explosion very nearby would pose a grave threat to Earthlings. We will show how radionuclides produced by supernovae can reveal nearby events in the geologic past, and we will highlight isotopes of interest. In particular, accelerator mass spectrometry has detected live  $^{60}\text{Fe}$  globally in deep-ocean material, and in lunar samples. We will review astrophysical  $^{60}\text{Fe}$  production sites and show that the data demand that one or more core-collapse supernovae exploded near the Earth  $\sim 3$  Myr ago, and explain how debris from the explosion was transported to the Earth as a radioactive rain.” The  $^{60}\text{Fe}$  measurements represent a new tool for nuclear astrophysics: we can now use sea sediments and lunar cores as telescopes, probing supernova nucleosynthesis and possibly even indicating the direction towards the event(s). We will close by reviewing recent work showing that an explosion so close was probably an ear-miss” that exposed the biosphere to intense and possibly harmful ionizing radiation.
%%[1,2].
\bigskip
\small

%%\noindent [1] E. Stark, Phys. Journal of the North 83 045801 (2011);

\noindent
%%[2] O. Martell et al. submitted to Solar Physics Letters (2013).}
%%
%% End of abstract.
%%
\end{document}

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Presenter: Prof. FIELDS, Brian (Departments of Astronomy and of Physics, University of Illinois)

Session Classification: Explosive nucleosynthesis observations

Track Classification: Explosive scenarios in astrophysics: observations, theory, and experiments