

LIBNUCNET: A TOOL FOR UNDERSTANDING NUCLEOSYNTHESIS

B. S. Meyer and D. C. Adams. Department of Physics and Astronomy, Clemson University, Clemson, SC 29634-0978, USA. E-mail: mbradle@clemson.edu.

Introduction: With recent advances, the sciences of nucleosynthesis and meteoritics have become increasingly intertwined (e.g., [1]). This is true in particular for the study of presolar grains (e.g., [2]) and the study of extinct radioactivities in primitive meteorites (e.g., [3]). Such intergrowth of the two sciences is calling for increased sophistication on the part of practitioners in either field regarding the details of the other.

Libnucnet: In order to help facilitate an understanding of nucleosynthesis by the broadest possible community, we are releasing libnucnet, our code module for computing yields from nuclear reaction networks. Libnucnet is free software written in the C programming language. It is available at

<http://www.webnucleo.org/home/modules/libnucnet>

Libnucnet is built on top of other freely available and well-tested code modules—libgdome and gsl (the GNU Scientific Library). We provide tutorials and over twenty code examples that demonstrate how to download, install, and use libnucnet.

The API: While one goal of our release of libnucnet is to allow students and professionals to gain a better appreciation of nucleosynthesis theory by running their own calculations, another is to provide a useful module for modelers to incorporate into their own codes. The libnucnet Application Programming Interface (API) is straightforward to use and is documented online at the webnucleo.org web site. Libnucnet's flexibility and capacity to handle multiple excited states within a single nuclear species and multiple physical zones in an astrophysical model should make it an excellent choice for many applications.

References: [1] Meyer B. S. and Zinner E. 2007. In *Meteorites and the early solar system II*, p. 69. [2] Clayton D. D. and Nittler L. R. 2004. *Annual Reviews of Astronomy and Astrophysics* 42:39-78. [3] Sahijpal S. and Soni P. 2006. *Meteoritics and Planetary Science* 41:953-976.