NUCLEUSHUB.ORG: A PLATFORM FOR COLLABORATION AMONG ASTRONOMERS, NUCLEAR ASTROPHYSICISTS, AND PLANETARY SCIENTISTS. Bradley S. Meyer. Department of Physics and Astronomy, Clemson University, Clemson, SC 29634-0978, USA (mbradle@clemson.edu)

Introduction: The discovery of exoplanets has been one of the most exciting developments in all of science in the last few decades (e.g., [1]). The finding that planets around other stars are common, not rare, dramatically challenges our perspective on our Solar System and our place within the Universe. Scientifically, it directly links study of our own planetary system with study of planetary systems around other stars.

In a similar vein, presolar grains (e.g., [2]) and isotopic anomalies (e.g., [3]) in primitive meteorites are instances of the incomplete dissolution of the original building blocks of the Solar System. Those building blocks are interstellar dust grains, many of which are direct condensates from stellar outflows. As those dust grains traveled through the Galaxy, they sputtered and re-accreted, gradually homogenizing their isotopic abundances. Isotopic homogenization in the Galactic interstellar medium and in the early Solar System was not complete, however, and isotopic signatures in presolar grains and other primitive phases in meteorites record memory of the stellar processes that created them. A proper understanding of these effects thus requires connecting planetary science with the study of stellar evolution, element formation in stars, and Galactic chemical and isotopic evolution.

From these examples, it is evident that advances in planetary science will require increasing collaboration among astronomers, nuclear astrophysicists, and planetary scientists and cosmochemists. Such collaboration will benefit greatly from effective means of sharing information among these fields and, perhaps more importantly, of allowing the different fields to instruct each other in terminology, key ideas, and new discoveries.

A Hub for Collaboration: In order to facilitate collaboration among astronomers, nuclear astrophysicists, and planetary scientists, the author and collaborators are developing an experimental collaborative platform nucleushub.org. This site is built on HUBzero.org technology, which includes a powerful content management system to support scientific activities. Users are able to blog, participate in discussion groups, work together in projects, publish datasets and computational tools with Digital Object Identifiers (DOIs), and make these publications available for others to use.

A particularly powerful aspect of HUBzero is the ability to publish simulation and modeling tools that can be run on cloud resources. Middleware allows already existing tools to be deployed on the web with minimal modification. The Rappture toolkit is the infrastructure that allows developers to focus on their core algorithms when developing online simulation tools. The simplicity of development with Rappture means that students, even at the undergraduate level, can contribute useful tools to an operating HUB with a small amount of training.

Current Tools: The author's group is primarily interested in nuclear physics, nuclear astrophysics, stellar evolution, and Galactic chemical evolution and their implications for cosmochemistry. The group is developing a number of tools related to these topics and deploying them at **nucleushub.org** to illustrate key concepts. These tools include a nuclear partition function tool, a Solar abundances tool, and a simple Galactic chemical evolution simulator. The group hopes these tools will provide examples that other users can follow to contribute their own tools, and the author is actively recruiting collaborators around the world in a variety of fields to develop and contribute such tools. The hope is that **nucleushub.org** can evolve into a valuable platform linking planetary science to related fields of astronomy and nuclear astrophysics.

References: [1] Author A. B. and Author C. D. (1997) *JGR, 90,* 1151–1154. [1] Mayor M. and Queloz D. (1995) *Nature, 378,* 355-359. [2] Clayton D. D. and Nittler L. R. (2004) *Ann. Rev. Astron. Astrophys. 42,* 39-78. [3] Dauphas N. et al. (2004) *E&PSL, 226,* 465-475.