

## **Learning about Nuclei, Supernovae, and Neutron Stars Through Nuclear Collisions**

Nuclei are fascinating objects at the heart of every atom. A fundamental question in chemistry concerns the formation of elements heavier than iron which are all thermodynamically unstable. These nuclei are formed in supernova explosions which occur at the rate of 1-2 per century in our galaxy. To understand supernova explosions, it is necessary to understand how nuclei behave when they are excited, expanded, and deformed. I will describe how one can learn about these issues experimentally. As nuclei consist of two types of particles (neutrons and protons) it is also necessary to learn about the behavior of nuclei with exotic  $N/Z$ . Radioactive beam facilities now make such measurements possible for the first time. I will describe an upcoming experiment to investigate the fusion of neutron-rich nuclei and how it might teach us about the crust of neutron stars and the phenomenon of X-ray superbursts.