Contribution ID: **328** Type: **Invited Talk**

Understanding Stellar Explosions with Nuclear Physics

Friday, 1 December 2023 14:00 (25 minutes)

Across the periodic table, the majority of the elements are created at least in part in explosive stellar environments. For elements up to mass ~100, explosive nucleosynthesis often occurs through thermonuclear runaway in hydrogen- and helium-rich environments driving events such as classical novae, Type I X-ray bursts, and Type Ia Supernovae, and resulting in the production of exotic proton-rich nuclei. On the other side of the chart of nuclides, more than half of the heavy elements are synthesized through the r-process occurring in neutron-rich explosive environments, such as neutron-star mergers. While for some of these explosive events (e.g. X-ray bursts) a wealth of observational data exists, events such as neutron star mergers have only recently been observed for the first time as we enter the multi-messenger era. However, in all cases to understand these explosions and make comparisons with such observations, accurate nuclear data is required. This includes nuclear masses, lifetimes, and reaction cross sections to determine reaction rates. For some unique cases, these reaction rates can be measured directly with the availability of intense radioactive ion beams from new and upgraded accelerator facilities. However, more often such beams are not available and the nuclear data required to calculate reaction rates of interest must be obtained via indirect techniques. A selection of recent results from both direct and indirect methods and the impact of such results will be discussed, along with an outlook on such studies for the near-term future.

Attendance Type

In-person

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