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Penning trap mass measurements of nuclides along the astrophysical *rp*- and νp- process paths[1]

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X-ray bursters and supernovae are examples of explosive stellar phenomena in which nuclides are quickly produced in great quantities. Observed as x-ray bursts, thermonuclear runaways on the surface of neutron stars accreting material from its binary star companion create elements by a nucleosynthetic procoess which involves a series of rapid proton-capture reactions, termed the *rp* process. The timescale, nuclides produced, and energy released during the *rp* process are very sensitive to delays encountered at waiting-point nuclides, nuclides in which their slow β decay is more probable than net proton capture. A possible mechanism to bypass the waiting-point nuclides is through the νp process, in which (n,p) and (n,γ) reactions on the waiting-point nuclides, in addition to the proton-capture reactions, are possible. Supernovae are possible sites for the νp process as the proton-rich ejecta can absorb antineutrinos to produce the required free neutrons. It is this νp process which may resolve the long-standing discrepancy between the observed and predicted abundances of ^{92}Mo and ^{94}Mo. Proton-capture Q values of nuclides along the *rp*- and νp- process paths are required to accurately model the nucleosynthesis, especially at the waiting-point nuclides. In recent years, Penning traps have become the preferred tool to make precise mass measurements of stable and unstable nuclides. To make the best use of these devices in measuring the masses of radioactive nuclides, systems have been developed to quickly, cleanly, and efficiently transport the short-lived, weakly produced nuclides to the Penning traps. This talk will discuss the *rp* and νp nucleosynthetic processes and will highlight the precise Penning trap mass measurements of nuclides along these process paths.

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