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Beta decay spectroscopy studies of novae and x-ray bursts

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Nucleosynthesis and energy generation in classical novae and type I x-ray bursts are driven by nuclear reactions. Many of the thermonuclear rates have substantial uncertainties that preclude accurate comparisons between astronomical observations and astrophysical models. A program of beta decay measurements utilizing intense sources of rare isotopes adjacent to the proton drip line has been established at the National Superconducting Cyclotron Laboratory. These measurements take advantage of high purity germanium arrays to detect beta delayed gamma rays that correspond to the exit channels of radiative capture reactions. Recently, a gas-filled detector of low-energy beta delayed charged particles has been constructed to measure the entrance channels. The information gained from these experiments can be used to determine the energies and strengths of resonances in several of the reactions that have the greatest influence on the modeling of astronomical observables.

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