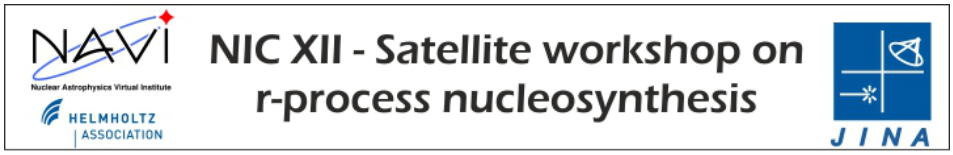

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First measurment for Half-lives of Zn and Ga r-process isotopes

Sunday, 5 August 2012 10:30 (30 minutes)

The β-decays of r-process neutron rich nuclei near the doubly magic ^{78}Ni were studied at the Holifield Radioactive Ion Beam Facility (HRIBF) using an electromagnetic isobar separator. The half-lives of ^{82}Zn (228$\pm$10 ms), ^{83}Zn (117$\pm$20 ms) and ^{85}Ga (93$\pm$7 ms) were determined for the first time. These half-lives were found to be dramatically different than the predictions of established global model used in astrophysical calculations, but close to the values obtained from our new microscopic calculation. The analysis of rapid neutron capture process using our new set of calculated half-lives shows a significant redistribution of isobaric abundances particularly strong near A $>$ 140 nuclei.
The beta-delayed neutron emission of 30 r-process relevant nuclei in the Cu,Zn,Ga,Ge,Rb,Hg,Sn and Sb isotopic chains were measured for the first time using the newly developed neutron detector VANDLE. The neutron energy spectra were measured using the time-of-flight technique, achieving world leading efficiency at low energies thanks to the novel implementation of digital electronics. The spectroscopic information showed that in many cases the Gamow Teller decay occurs to neutron unbound states in the long hypothesized in this region Pygmy giant resonance. As the beta-decay will occur mainly through this resonances, the systematics across isotopic chains will provide fundamental information to refine theoretical predictions of beta decay half-lives of r-process nuclei beyond the reach of current facilities.

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