ß-decay studies of very neutron-rich Pd and Ag isotopes

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The rapid-neutron capture process (r-process) is attributed as the source of nearly half the elements heavier than iron. Its astrophysical site is still unknown, making the specific astrophysical conditions uncertain. The modelling of such a process requires not only the correct choice of astrophysical scenario, but also reliable nuclear physics data. For that reason an experiment was performed to measure properties of neutron-rich nuclei just below the N=82 shell closure believed to be responsible for production of the A=130 peak in the solar r-process abundance pattern. ß-decay half-lives and neutron branching ratios, Pn values, were measured for Pd and Ag isotopes at the GSI Fragment Separator (FRS). The FRS provided in-flight separation and identification of fission fragments produced by a 238U beam. Ions of interest were implanted in the Silicon Implantation detector and Beta Absorber (SIMBA) array.

The large pixelation of the array allowed for position-time correlation between implants and the corresponding ß-decays. Due to large ß-decay Q-values, the parent nucleus may decay to an excited state in the daughter nucleus above the neutron separation energy emitting a neutron. These emitted neutrons were moderated and detected in Beta deLayEd Neutron (BELEN) detector surrounding the SIMBA array. Resulting analysis of half-lives and neutron emission branching ratios including impact on the r-process will be presented.