# Production of very neutron-rich nuclei in nucleus-nucleus collisions around Fermi-energy

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Nucleus-nucleus collisions in the Fermi energy domain exhibit a large variety of contributing reaction mechanisms and reaction products ( see e.g. [1] ) and offer the principal possibility to produce mid-heavy to heavy neutron-rich nuclei in very peripheral collisions. In the reactions of massive heavy ions such as $^{86}$Kr+$^{124}$Sn [2] and $^{124}$Sn+$^{124}$Sn [3], an enhancement was observed over the yields expected in cold fragmentation which is at present the method of choice to produce neutron-rich nuclei. Further enhancement of yields of n-rich nuclei was observed in the reaction $^{86}$Kr+$^{64}$Ni [4] in the very peripheral collisions, thus pointing to the possible importance of neutron and proton density profiles at the projectile and target surfaces. In [5], the model of deep-inelastic transfer was supplemented with a phenomenological correction introducing the effect of shell structure on nuclear periphery. A consistent agreement with experimental data is achieved in the reactions of a 25 AMeV $^{86}$Kr beam with three different target nuclei, specifically allowing to describe the deviation of the nucleon exchange from the path toward isospin equilibration. The production cross sections of very neutron-rich nuclei in nucleus-nucleus collisions around Fermi-energy, calculated using the modified version [5] of the model of deep-inelastic transfer for peripheral collisions and incomplete fusion model [1] for lower impact parameters, are compared to estimated production cross sections of very neutron-rich nuclei in spallation reactions and in reactions of beam fragmentation. The achievable yields of very neutron-rich nuclei are estimated for typical target setups in reactions of both primary and secondary beams, specifically addressing the capabilities envisioned for the projected RNB facility Eurisol.

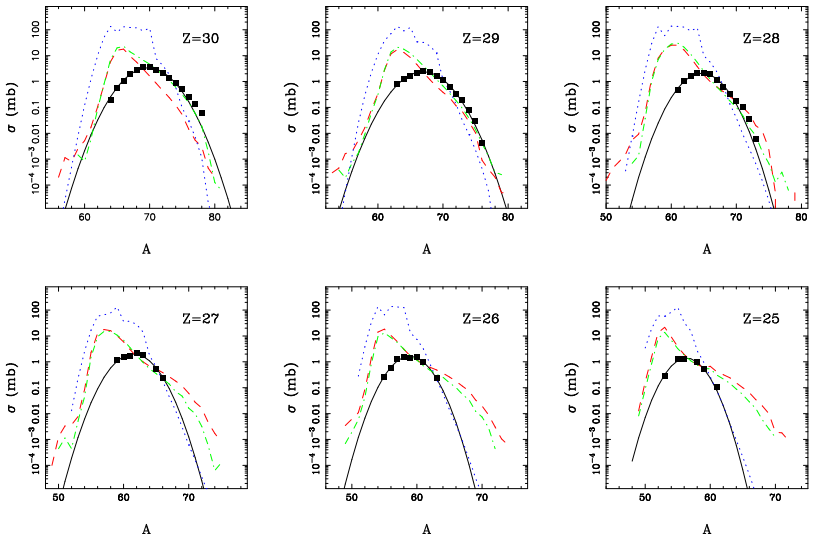


Figure 1: *Production cross sections calculated for reactions of $^{86}$Kr,$^{82}$Se+$^{64}$Ni at 25 A MeV ( dashed and dash-dotted line ), compared to estimates for reaction of 1 GeV proton beam with U target ( symbols and solid line ) and for fragmentation of stable nuclei ( dotted line ).*

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