Production of residual nuclides in the reactions ^{112,124}Sn+^{112,124}Sn at 1 A GeV

V. Föhr[1], A. Bacquias[1], E. Casarejos[2], T. Enqvist[3], A. Junghans[5], A. Kelic[1], T. Kurtukian[2], S. Lukic[1], D. Pérez[2], R. Pleskac[1], M. V. Ricciardi[1], K-H. Schmidt[1], J. Taíeb[4]

[1]GSI, Darmstadt, Germany, [2]Universidad de Santiago de Compostela, Spain, [3]CUPP Project, Pyhäsalmi, Finland, [4]CEA/DAM Bruyéres-le-Châtel, France, [5]FZD Dresden, Germany

It is currently a great interest of the scientific community to enlarge the experimental investigations towards rarely produced isotopes with extreme *N/Z* in order to investigate their structure-properties or to study the dependence of the nuclear equation of state on the isotopic composition of the system. In the meantime, the effects of the different isospin could be studied using stable nuclei with as much as possible different neutron-to-proton ratio.

In this report, we present two experiments performed at the Fragment Separator at GSI, where the isotopically resolved residues over the broad range of the nuclear charge were measured in the fragmentation of two symmetric systems: ^{112,124}Sn+^{112,124}Sn at 1 *A* GeV.

The experiments were performed in inverse kinematics, shooting the ^{112}Sn and ^{124}Sn beams into ^{112}Sn and ^{124}Sn targets, respectively. The fully stripped reaction products were identified at the FRS by detecting their nuclear charge, *Z*, with an ionization chamber and their mass, *A*, from the *A/Z* ratio deduced from the magnetic rigidity and from the time-of-flight between the mid plane and the exit of the spectrometer. Once the nuclides were identified, so *A* and *Z* were integer numbers, their velocity was precisely evaluated by the magnetic rigidity. The ratio of transmitted reaction residues can be calculated. By the known beam intensities, target properties and transmission ratios the production cross sections were calculated on the basis of the measured yields. The velocity spectra could be measured with a great precision, based on the magnetic rigidity. This knowledge gives a better insight into the reaction mechanism in which the residues were formed. More details on the analysis technique can be found in previous publications for experiments performed with the same experimental set-up [1, 2, 3, 4, 5, 6, 7, 8, 9,10, 11, 12, 13, 14, 15, 16, 17].

In Fig. 1 and in Fig. 2 we present the experimental production cross-sections on the chart of the nuclides for the reaction ^{112}Sn+^{112}Sn and ^{124}Sn+^{124}Sn, respectively. Due to technical problems encountered during the experiment, the production cross-section for some specific nuclides could not be measured. Nonetheless, the figures seem to indicate a "memory effect" that leads to the production of fragments which are on average more neutron rich for the ^{124}Sn+^{124}Sn system. This effect was also found in the projectile fragmentation of other systems, like ^{129}Xe+Al [18], ^{238}U+Ti [19], ^{124}Xe+Pb [16] and +^{136}Xe+Pb [16].

A more detailed analysis and the subsequent physic conclusion concerning the reactions ^{112}Sn+^{112}Sn at 1 *A* GeV and ^{124}Sn+^{124}Sn at 1 *A* GeV will follow in the future.

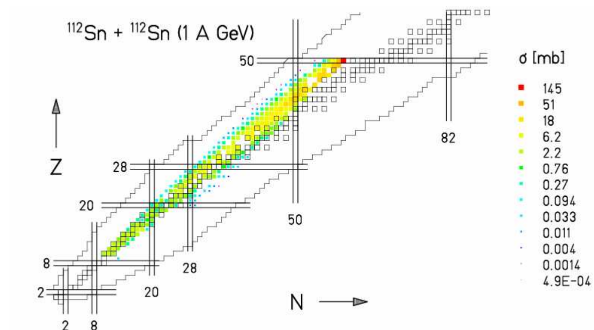

Figure 1: Experimental cross sections for ^{112}Sn+^{112}Sn at 1 *A* GeV

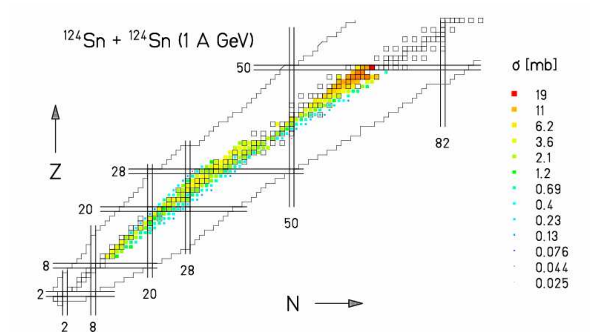

Figure 2: Experimental cross sections for ^{124}Sn+^{124}Sn at 1 *A* GeV

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