I. THE EXPERIMENT

A ^{206}Pb beam was accelerated at $E_{\rm lab}$=1200, 1090 and 1035 MeV with an average current of ∼2 pnA employing the PIAVE positive-ion injector followed by the ALPI post-accelerator of Legnaro National Laboratories. A 200 μg/cm^2 strip (2 mm) ^{118}Sn target, with an isotopic purity of 99.6%, sandwiched between 15 μg/cm^2 carbon layers, was used. We detected target-like fragments in the magnetic spectrometer PRISMA, which was placed at $\theta_{\rm lab}$=35° and 25°. The inverse kinematics was employed, with the kinetic energy of traget-like ions in the order of 6-8 MeV/A. Monitors of silicon surface barrier type were placed inside a sliding seal scattering chamber at $\theta_{\rm lab}$ = 50° - 65°. The monitors were used to detect Rutherford scattered Sn ions for relative normalization between different runs and to control the beam conditions during the measurements. The identification of target-like products in PRISMA has been done on an event-by-event basis through the reconstruction of the trajectories of the ions inside the magnetic elements. A start signal for time-of-flight measurements and two-dimensional position information are given by a position-sensitive micro-channel plate detector. After passing through a quadrupole and a dipole magnetic element, ions enter a focal plane made of a parallel-plate detector of multi-wire type, providing timing and position signals, followed by an array of transverse-field multi-parametric ionization chambers (IC), where the nuclear charge Z is identified via energy-loss (ΔE) and total-energy (E) measurements. The magnetic fields of the spectrometer were set to bring the target-like ions with maximum yield near the center of the focal-plane area. From the energy information of the IC we obtained the atomic charge-state (q) distribution, which, combined with the A/q spectra, leads to the final mass distributions. In the trajectory reconstruction, the very large longitudinal dimension of PRISMA with respect to the transversal one, as well as the large dimensions of the magnetic elements, ensure that the trajectories are planar after the quadrupole and that the effect of the fringing fields is rather small. Nevertheless, for very heavy ions, the mass resolution can be affected by the presence of optical aberrations due to higher-order magnetic fields which can deviate the ions trajectory from the planarity. Thus, an additional empirical correction has been applied, by polynomial linearization of the A/q bands as a function of the position at the entrance and focal-plane detectors.

II. DIFFERENTIAL AND TOTAL CROSS SECTIONS AT 1200 MEV

the data file: 206Pb+118Sn_angular_fig7_FINAL.txt

Differential cross sections have been extracted for the measurement performed with PRISMA at 1200 MeV and at $\theta_{\rm lab}$ = 35° (near the grazing angle). For the elastic+inelastic and pure neutron-transfer channels the cross sections could be extracted also with PRISMA at $\theta_{\rm lab}$ = 25°. At both angular settings the quasi-elastic part has been obtained by integrating only the part of the total kinetic energy loss distributions. For the channels involving protons, only an integration of the full total kinetic energy loss distributions with PRISMA at $\theta_{\rm lab}$ = 35° has been applied.

File: 206Pb+118Sn_angular_fig7_FINAL.txt lists the obtained angular distributions in a following way, selected by the atomic charge state (Z), and mass (A) in atomic mass units (the first and second column). The scattering angle in the center-of-mass frame (θ_{cm}) in degree, and the differential cross sections ($d\sigma/d\Omega$ in mb/sr) and their statistical errors are shown in the third, fourth and fifth column, respectively. Different integrations of the total kinetic energy loss distributions are listed. The elastic+inelastic channel (Z=50, A=118) is listed as a ratio over the Rutherford cross section.

the data file: 206Pb+118Sn_TCS_fig8_FINAL.txt

Experimental total angle and Q-value integrated cross sections for the various transfer channels populated in the ^{206}Pb+^{118}Sn reaction at $E_{\rm lab}$=1200 MeV are listed by the atomic charge state (Z), and mass (A) in atomic mass units (the first and second columns). The total cross sections (σ in mb) and their statistical errors are shown in the third, and fourth columns, respectively. Experimental errors are only statistical ones.

III. DIFFERENTIAL CROSS SECTIONS AT 1200, 1090 AND 1035 MEV

the data file: ELASTIC_OVER_RUTH_fig4.txt

Experimental elastic(+inelastic) (σ_{el}) over Rutherford (σ_{Ruth}) cross sections (the second column) is listed as a function of the distance of closet approach (D in fm) (the first column). The points have been obtained by binning, for each measured energy, the PRISMA angular acceptance in steps of $\Delta\theta \sim 1°$. The distance of closet approach has been calculated as:

$$D = \frac{Z_p Z_t e^2}{2E_{cm}}(1 + \frac{1}{sin(\theta_{cm}/2)}) \quad (1)$$

where Z_p and Z_t represent the atomic charge of the projectile and target, e stands for the fine structure constant, while E_{cm} and θ_{cm} represent the energy and scattering angle in the center of mass frame.

the data file: Ptr_D_fig3.txt

Experimental transfer probabilities (the fourth column) for the one- and two-neutron pick-up and stripping channels (identified by A) are listed as a function of the distance of closest approach D (the third column). Only statistical experimental errors are listed (the fifth column). The mass (A) listed in the third column corresponds to the one-neutron pick-up channel (A =119), two-neutron pick-up channel (A =120), one-neutron stripping channel (A =117), and two-neutron stripping channel (A =116), respectively. The beam energy in MeV is also listed (the first column). The probabilities have been obtained by dividing the transfer cross sections by the elastic(+inelastic) (entrance channel mass partition) cross sections. The points have been obtained by binning, for each measured energy, the PRISMA angular acceptance in steps of $\Delta\theta \sim 1^\circ$. At the smallest measured D, corresponding to the highest measured energy and angles forward than the grazing, we listed the value corresponding to the central angle only.