NEUTRON-RICH NUCLEI POPULATED IN MULTINUCLEON TRANSFER REACTIONS: THE 197AU+130TE SYSTEM

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In recent studies multinucleon transfer processes in near-barrier collisions between heavy ions have been indicated as a suitable mechanism to produce and explore neutron-rich nuclei around the N=126 region of the nuclide chart [1]. This region can be hardly accessed by fragmentation or fission reactions and the population of such heavy nuclei is considerably affected by secondary processes, like particle evaporation and transfer-induced fission, which can shift the final yield to lower masses.
The availability of beams with A~200 at the Laboratori Nazionali of Legnaro made it possible to investigate these phenomena more in detail, making use of inverse kinematic to obtain the best possible ion identification. Following the experience gained in measurements at sub-barrier energy [2], in 2014 we performed an experiment to study the multi-neutron and multi-proton transfer channels in the reaction ^{197}Au+^{130}Te at E_{lab}=1070 MeV. Concerning the "light" reaction product, the main goal is to determine the A, Z and Q-value distributions and compare them with the predictions of theoretical models, like the GRAZING code [3], that have already proved to be successful with lower-mass systems. In particular ^{130}Te has just 2 protons more and 4 neutrons less than ^{132}Sn, which represents a benchmark neutron-rich nucleus for several physics cases, reported in the proposals of present and forthcoming radioactive beam facilities. As regards the "heavy" partner, the goal is to compare its yields with those of the light partner and get quantitative information on the secondary processes described above. For this reason a new detector, composed of a PPAC for time and position information followed by an axial ionization chamber, was coupled to the large acceptance magnetic spectrometer PRISMA for kinematic coincidence measurements. Mass identification of the light partner can be obtained through an event-by-event reconstruction of the ion trajectory in PRISMA, using position, timing and energy information given by the entrance Micro-Channel Plate detector and the focal plane detectors (a Multi-Wire Parallel Plate Avalanche Counter followed by an Ionization Chamber). Exploiting the kinematic coincidence, we can also determine the mass distribution of the heavy partner detected with the so-called "second arm" of PRISMA with a simple kinematic formula based on momentum conservation in the hypothesis of pure binary reaction. Deviations from this relation can be attributed to non-binary events, corresponding to secondary processes like particle evaporation or transfer-induced fission.
The results of the analysis, already at an advanced stage, will be presented.

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