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High resolution studies of multinucleon transfer reactions in the 206Pb+118Sn system from above to below the Coulomb barrier

S. Szilner1, L. Corradi2, T. Mijatović1, F. Galtarossa3, G. Pollarolo4, E. Fioretto2, A. Goasduff2, G. Montagnoli3, A. M. Stefanini2, G. Colucci5, J. Diklić1, A. Gottardo2, J. Grebosz6, A. Illana7, G. Jaworski5, T. Marchi2, D. Mengoni3, M. Milin8, D. Nurkić8, M. Siciliano9, N. Soić1, J. J. Valiente-Dobón2, N. Vukman1
1Ruđer Bošković Institute, Croatia
2Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Legnaro, Legnaro (PD), Italy
3Dipartimento di Fisica, Universitá di Padova, Italy
4Dipartimento di Fisica, Universitá di Torino, Italy
5Heavy Ion Laboratory, University of Warsaw, Poland
6The Henryk Niewodniczański Institute of Nuclear Physics, Krakow, Poland
7Grupo de Física Nuclear and IPARCOS, Universidad Complutense de Madrid, Spain
8University of Zagreb, Croatia
9Argonne National Laboratory, USA

Multinucleon transfer reactions (MNT) are presently at the focus of intensive investigations in both reaction mechanism and gamma spectroscopy [1-4]. MNT are in fact recognized as a very promising tool for the production of neutron rich heavy nuclei, especially in the N=126 region, relevant for astrophysics. At the same time via MNT one can probe nucleon-nucleon correlations, which are predicted to strongly affect the properties of nuclei with extreme N/Z ratios. In this context we performed a very detailed study of MNT processes in the 206Pb+118Sn system by measuring differential and total cross sections, and Q-value distribution for a variety of neutron and proton pick-up and stripping channels from above [1] to below [2] the Coulomb barrier. The above barrier energy region is connected with the evolution from quasi-elastic to deep inelastic channels, while the lower energy region with the effects of correlations, pairing in particular [5-7]. Data have been obtained making use of the highest capability of the magnetic spectrometer PRISMA [4], whose efficiency and resolution allowed to distinguish mass and nuclear charge for a variety of transfer products, with extracted cross sections spanning a range of two orders of magnitudes. The comparison of data with calculations showed important effects of secondary processes [1,8] at high energy and of pair degrees of freedom at low energy.
A presentation of these experiments will address the most relevant results, also in connection with the new possibilites offered by the availabilty of exotic beams.

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Author: SZILNER, Suzana (Ruder Boskovic Institute, Zagreb, Croatia)

Presenter: SZILNER, Suzana (Ruder Boskovic Institute, Zagreb, Croatia)

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