

Difference and Peculiarity of multinucleon transfer in reactions induced by $^{40,48}\text{Ca}$ ions on Au and U targets

Multinucleon transfer (MNT) reactions induced by $^{40,48}\text{Ca}$ ions on Au target have been studied at 400 MeV bombarding energy. Projectile-like fragments have been identified in nuclear charge, angular and kinetic energy distributions and inclusive cross sections were measured. Two groups of products were identified in Fig.1: 1) deep-inelastic products, the maximum yield of these products was at forward direction and 2) quasi-elastic with the formation of projectile-like products, with the maximum yield of these products at the grazing angle.

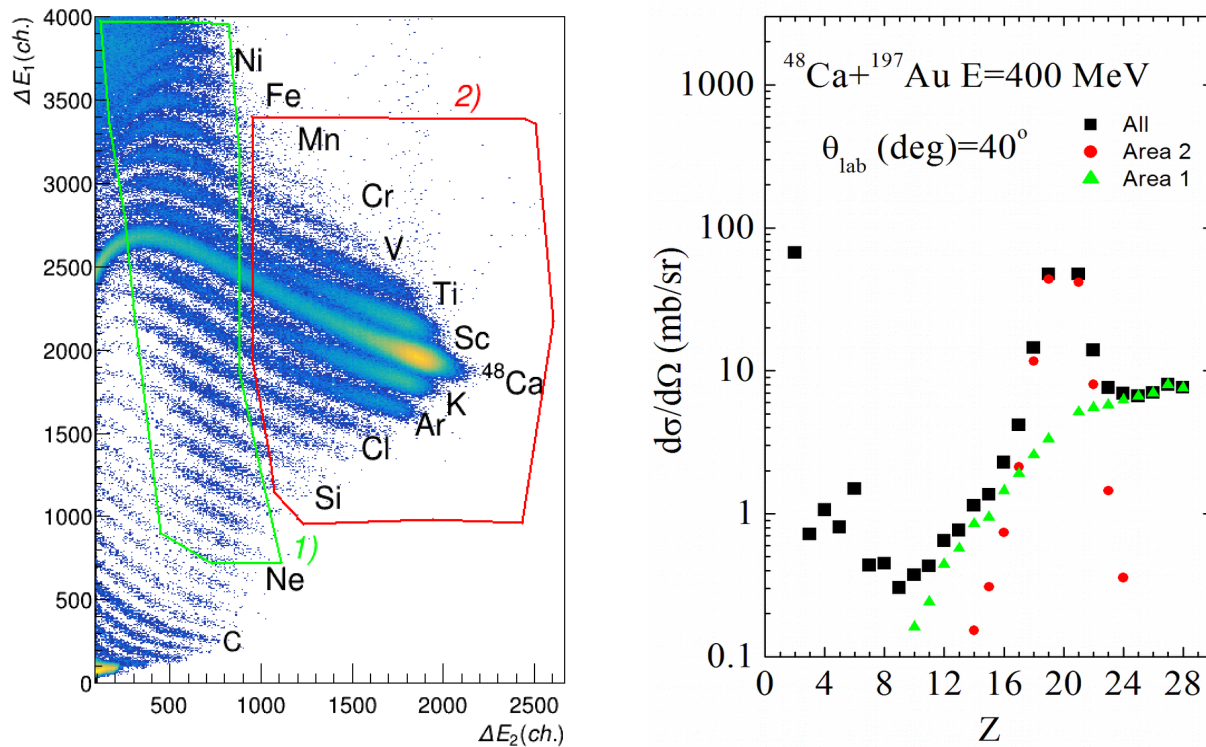


Fig.1 Examples of identification matrices obtained in the reaction $^{48}\text{Ca} + \text{Au}$ by a ΔE_1 - ΔE_2 telescope at 40° . **Fig.2** Production cross section versus Z of detected products at 40° .

In the reaction $^{48}\text{Ca} + \text{Au}$, for which quasi-elastic dominated, the angular distributions of the products of stripping and picking up protons (up to 8) were measured (Fig.2), and it was found that the cross sections of stripping protons were close to the corresponding values of picking up the same number of protons from the nucleus of the incident ion. Otherwise, in the reaction $^{40}\text{Ca} + \text{Au}$, only proton stripping channels were observed in the quasi-elastic channel and the process of picking up protons was not taken place. This behavior was interpreted by extra neutron excess in ^{48}Ca , allowing to pickup additional proton for N/Z balance in MNT process. Our finding might be important from the point of view of astrophysics and an optimization of primary reaction to produce secondary beams in the region $A \geq 48$.