

INVESTIGATION OF CONTINUOUS SPECTRA OF LIGHT CHARGED PARTICLES EMITTED IN PROTON INDUCED REACTION ON ^{103}Rh NUCLEUS AT 22 MeV ENERGY

Wednesday, 22 September 2021 18:05 (5 minutes)

The development of the new generation of nuclear energy systems with a high level of safety (Accelerator Driven System), consisting of a proton accelerator, the neutron production target and sub critical reactor are deployed in many countries. In creating such devices for correct modeling of the neutron flux the data on the spectral composition and angular distributions of secondary protons and light charged particles produced by primary proton beam are required.

Continuous energy spectra of protons, deuterons and alphas emitted from reactions initiated by proton of 22 MeV on rhodium nucleus were measured on isochronous cyclotron U-150M of Institute of Nuclear Physics (Kazakhstan). For registration two telescopes of detectors were used. One of them consisted of silicon detector of 100 micron thickness and CsI(Tl) detector of 2.5 cm thickness (for protons and deuterons), and another consisted of 50 micron and 2 mm silicon detectors (for alphas). The self-supporting foil of Rh with thickness of 3 mkm was used in these experiments.

The energy calibration of a spectrometer was carried out on kinematics of levels of residual nuclei in the reaction $^{12}\text{C}(p, xp)$ and protons of recoil. The whole systematic error was less than 10 % and the statistical uncertainty was less than 8 %.

The analysis of the experimental results has been conducted in the Griffin exciton model [1] of the preequilibrium decay of nuclei. The code Talys, which describes the emission of particles with mass numbers from 1 to 4, has been used in our theoretical calculations. A satisfying agreement between experimental and calculated values in the energy region corresponded to the pre-equilibrium mechanism has been achieved.

1. Griffin J. J. // Phys. Rev. Lett. 1966. №9. P.478.

Primary authors: ZHOLDYBAYEV, Timur (Institute of Nuclear Physics); MUKAN, zhuldyz (INP, Kazakhstan); Ms USSABAYEVA, Gulnaz (al Farabi Kazalh National University); Dr SADYKOV, Bakhtiyar (Institute of Nuclear Physics); Ms ALIEVA, Gulzhayna (Gumilev Eurasian National University,); Dr NASSURLLA, Maulen (Institute of Nuclear Physics); Dr KERIMKULOV, Zhambyl (Institute of Nuclear Physics)

Presenter: ZHOLDYBAYEV, Timur (Institute of Nuclear Physics)

Session Classification: Poster session (Experimental and theoretical studies of nuclear reactions)

Track Classification: Section 2. Experimental and theoretical studies of nuclear reactions.