

Experimental studies of closed shells influence on fusion-fission and quasifission competition in reactions with $^{40,48}\text{Ca}$

Fission of atomic nuclei studies is one of the main problems of the modern nuclear physics. Quasifission is considered to be one of the competing processes for fusion-fission of heavy and superheavy nuclei, preventing the formation of the complex compound nuclei. These two mechanisms are being governed by the shell effects [1-4].

The following work is dedicated to experimental studies of fusion-fission and quasifission mechanisms in $^{40,48}\text{Ca}+^{208}\text{Pb}$ at energies around the Coulomb barrier. Such choice of reactions is determined by the existence of $Z = 20$, $N = 20$, $N = 28$ closed shells in calcium isotopes. The experiment was carried out at the U-400 accelerator in FLNR JINR. Mass and total kinetic energy (MTKE) distributions were measured with the use of double-arm time-of-flight spectrometer CORSET.

In this work we presented MTKE distributions for fusion-fission and quasifission processes in reactions $^{40,48}\text{Ca}+^{208}\text{Pb}$ at incident energies 197.5-222 MeV for ^{40}Ca and 208-281 MeV for ^{48}Ca . It was also shown how the contribution of fusion-fission and quasifission processes change with the excitation energy.

1. U. Brosa et al. Phys. Rep. 197 (1990) 167-262.
2. H. Paşca et al. Nucl. Phys. A 977 (2018) 1-13.
3. E.M. Kozulin et al. J. Phys.: Conf. Ser. 282 (2011) 012008.
4. C. Simenel et al. Phys. Lett. B. 710 (2012) 607-611.

Section

Experimental and theoretical studies of nuclear reactions

Primary author: KULKOV, Kirill (FLNR JINR)

Co-authors: KOZULIN, Eduard (FLNR); Mrs KNYAZHEVA, Galina (FLNR); BOGACHEV, Alexey (JINR); NOVIKOV, Kirill (Joint Institute for Nuclear Research); Mr VOROBIEV, Igor (FLNR JINR); PCHELINTSEV, I. V. (Flerov Laboratory of Nuclear Reaction, Joint Institute for Nuclear Research); TIKHOMIROV, R. S. (Flerov Laboratory of Nuclear Reaction, Joint Institute for Nuclear Research); Dr DEY, ANIRUDDHA (Flerov Laboratory of Nuclear Reaction, Joint Institute for Nuclear Research); Dr SANILA, S. (FLNR JINR)

Presenter: KULKOV, Kirill (FLNR JINR)

Session Classification: Experimental and theoretical studies of nuclear reactions