UNIFIED APPROACH TO INTERFERENCE EFFECTS IN THE FISSION PROCESS

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Multilevel formula for the fission process based on R-matrix theory was first proposed by Reich and Moore. The number of fission channels was assumed to be small to explain the asymmetries in the energy dependence of fission cross sections by interference between the resonances. Earlier A.Bohr related fission channels with transition states of fissioning nucleus at the top of the barrier. Because they differ in projection K of spin J on a deformation axis, the way was given to describe the angular distribution of fission fragments. Our work deals with the problems, which arise, in combined use of both these approaches for description of angular correlation and P-odd and P-even interference effects in the neutron induced fission.

We apply the nuclear reaction theory to formal description of fission cross section, fragment angular anisotropy in fission of aligned nuclei, as well as P-odd and P-even angular correlation of fission axis with spin and momentum of incident neutrons. Using felicity representation for fission fragments we justify strictly the reduction of the huge number ~ 10^{10} of exclusive fission channels to the small number of the really accounted fission channels, related with A.Bohr transition states. Thus we obtain the unified multilevel approach to fission cross section as well as to angular correlation in the fission process. The latter's are influenced significantly or even completely determined by interference of the resonances not only with the same spin and parity but with the different ones also.

PRODUCTION OF THALLIUM-199 IN PROTON INDUCED REACTIONS ON ENRICHED MERCURY-200 TARGETS

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Between two tens of Thallium isotopes only Thallium-201 and Thallium-199 are used in medicine for the myocar-dial diagnostics. The Tl-199 radionuclide decaying into stable mercury causes the irradiation dose that is ten times lower in comparison to Tl-201. The excitation functions for Tl-199 production were not investigated experimentally yet. The method to produce the radioactive Tl-199 through the irradiation of gold targets with alpha particles provides low yield. The lack of a suitable to produce Tl-199 in large quantities prevents the wide use of this advantageous radionuclide. Method of thallium-199 production via the reaction $^{200}Hg(p,2n)^{199}Tl$ induced with protons in the energy range of 10-35 MeV is investigated. The excitation functions for the $^{200}Hg(p,2n)^{199}Tl$ reaction and accompanying $^{200}Hg(p,n)^{200}Tl$ and $^{200}Hg(p,3n)^{198}Tl$ reactions were performed with ALICE code. Thick target yields for thallium-199, thallium-200 and thallium-198 and radionuclidic purity thallium-199 were estimated using excitation functions obtained. The estimated yields of Tl produced in the reaction (p,2n) on Hg-200 for the proton energy of 30 MeV exceeds the known yield through the reaction on gold more than 100 times. The analysis performed showed that the minimum admixture of TI-200 for