Fragment-mass distributions in fission of heavy nuclei by intermediate and high-energy probes

Airton Deppman
IFUSP

E. Andrade-II
IFUSP

J. C. M. Menezes
UESC

S.B. Duarte
CBPF

F. Garcia
UESC

P. C. R. Rossi
IPEN

O.A.P. Tavares
CBPF

Recent experiments have shown that the multimode approach for describing the fission process leads to some compatibility with the observed results. A systematic analysis of the parameters obtained by fitting the fission-fragment mass distribution to the spontaneous and low-energy data has shown that the values for those parameters present a smooth dependence upon the nuclear mass number. In the present work it is shown that the same parameter-values obtained for low- energy fission can be used to describe high-energy fission results of fragment-mass dis- tributions if one takes into account the appropriate distribution of the fissioning system. To calculate the fission-fragment mass distributions, Monte Carlo simulations are used. This simulation considers a two-step reaction mechanism, namely, an intranuclear cas- cade providing the compound nucleus followed by a mechanism of competition between particle evaporation and fission. The fission-fragment masses are obtained according to the multimode approach following the Statistical Scission Model. Simulations for fission induced by 660 MeV protons on 241Am and 237Np, and for fission of 238U induced by photons from Bremsstrahlung with end-point energies of 50 MeV and 3500 MeV have been performed, and the results have been compared with recent experimental data.