NOTES ON FISSION DYNAMICS

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Abstract

The dynamics of the nuclear fission is a complex phenomenon, being not yet described adequately from the theoretical point of view. At present, they are not models giving a complete description of the richness of the features which characterizes this phenomenon. It is the mean reason for which I called this paper Notes on Fission Dynamics, being certain that I will not be able to make a global description, but only a picture underlining some particularities. So, this mini-overview should be considered only a part of the collection of articles treating the nuclear physics, published as a special number in the review of the Academy of Romanian Scientists, without an exhaustive character. A theory treating the nuclear fission is by excellence based on quantum mechanics. That is, a theory concerning the interactions between the smallest pieces that constitute a many-body nucleus. But, at present it is not possible to perform ab-initio calculations to describe the many-body structure of heavy nuclei which undergo fission by starting from fundamental interactions. To make the problem tractable, the nucleus as a whole are constrained by some collective parameters, associated to some collective degree of freedom. The collective variables are forced to vary, leading to a scission of the nuclear system. The response of the nuclear system to the external forces is given by the nuclear inertia. The mean field potential between the nucleons is obtained after a proper average, and then used to solve the Schrodinger equation. The treatments presented in this article are based on these simplifying concepts. I will give some examples of calculations that include the dissipation and the configuration mixing due to radial and angular couplings. The importance of the subject is also briefly reviewed.

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