

FUSION, FISSION, AND OTHER COLLECTIVE MOTION FROM A MEAN FIELD APPROACH

Paul D Stevenson¹

¹University of Surrey, Guildford, GU2 7XH, United Kingdom

The use of effective interactions, such as those of the Skyrme type, within mean-field theories, has allowed a thorough exploration of many nuclear properties and processes. The effective interactions contain unconstrained parameters which are fitted to properties of nuclear matter and ground states of finite nuclei, and sometimes also to other observables, though typically not large-amplitude dynamic processes like heavy-ion collisions, which are computationally too costly to be included in fitting procedures. Through selection of different observables, many different effective interactions have been developed. We present results exploring the variation in outcome of heavy-ion collision reactions as different effective interactions are used, all of which give largely identical ground state data. We show that e.g. sizeable variations in fusion thresholds can be found, that heavy-ion reactions at low energies (around Coulomb barrier) show systematic dependence upon nuclear matter properties, that fission decay products can be described and that a consistent picture of giant resonances is produced.