Nuclear Dynamics with the Sky3d Code

P. D. Stevenson

Department of Physics, University of Surrey, Guildford, Surrey, GU2 7XH, United Kingdom

A new computer code which implements the time-dependent Hartree-Fock method for nuclear systems has recently been published [1]. Using it, one can explore a diverse range of collective nuclear motion whose sole physics input is a choice of Skyrme force parameterisation.

Initial conditions consist of one or more nuclei, typically generated as the result of static Hartree-Fock calculations, positioned at will in a coordinate space box, with rather arbitrary velocity initialisations which can either boost multiple nuclei relative to each other, and/or instigate an excitation of one or more nuclei. The code has been used for the calculation of fusion, deep-inelastic collisions, transfer reactions, fission, collective resonance states, neutron star matter, and to explore the properties of the effective interaction.

We present a sumamry of the code along with results obtained from it, along with a practical guide to its use, along with a guide to the kind of extensions one might consider applying to it.

References

[1] J. A. Maruhn, P.-G. Reinhard, P. D. Stevenson and A. S. Umar, Computer Physics Communications (2014),
`http://dx.doi.org/10.1016/j.cpc.2014.04.008`