

# Shapes and Dynamics from the Skyrme Time-dependent Density Functional Approach

**P. D. Stevenson**

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

## **Abstract**

The mean-field approach based on the Skyrme energy density functional (EDF) provides a basis for describing low energy nuclear phenomena [1]. The functional includes around ten parameters, fitted to experimental data, usually of ground state energies, radii, nuclear matter properties and spin-orbit splittings and sometimes some collective properties. From this, one attempts to use the functional for a broad range of phenomena, including excited state properties which e.g. activate time-odd densities and currents in the mean-field not well constrained by the fit to ground state properties. In particular, the time-dependent version of the EDF approach – used for calculating dynamical nuclear processes – necessarily involves such time-odd quantities. Using our recent time-dependent EDF code, Sky3d [2], we present some results concerning shapes of ground and isomeric states (using a blocking approach) and discuss role of the effective interaction in driving these results.

## **References**

- [1] M. Bender, P.-H. Heenen and P.-G. Reinard, *Reviews of Modern Physics* **75** (2003) 121-180.
- [2] J. A. Maruhn, P.-G. Reinard, P. D. Stevenson and A. S. Umar, *Computer Physics Communications* **185** (2014) 2195-2216.