Energy Density Functional Gradient Optimisation for the Description of Ground States in Deformed Nuclei

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A Gogny interaction was used for the description of few nuclei arround A $\approx$ 100 within a deformed Hartree-Fock framework [1]. In my work I discuss a method for an explicit multivariate gradient descent minimisation of the energy density functional for the description of the ground state in atomic nuclei. I present a way ensuring fast convergence of the minimization procedure [2], with a strict criterium for a local minimum of the energy density functional. The solution depends explicitly on the axial deformation of the nuclei, thus the binding energy is mapped as a function of the deformation parameters, exploring the whole phase space - fixing the deformation of the nucleus, and the global minima of the binding energy. Within this framework one could look for metastable states for different deformations of the nucleus.

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References

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[2] R. McWeeny, *Proc. R. Soc. A* **235** (1956) 496-509.