Gogny HFB prediction of nuclear structure properties

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The increasing need for nuclear data far from the valley of stability requires information on nuclei which cannot be accessed experimentally or for which almost no experimental data is known. In this case, the use of microscopic approaches to predict properties of such poorly known nuclei is necessary. Within this context, large scale mean field calculations from proton to neutron drip lines have been performed using the Hartree-Fock-Bogoliubov method based on the Gogny nucleon-nucleon effective interaction. This extensive study has shown the ability of the method to reproduce bulk nuclear structure data available experimentally. This includes nuclear masses, radii, matter densities, deformations, moment of inertia as well as collective mode (low energy and giant resonances). In particular, the first mass table based on a Gogny-Hartree-Fock-Bogolyubov calculation including an explicit and coherent account of all the quadrupole correlation energies is presented. The rms deviation with respect to essentially all the available mass data is 798 keV. Nearly 8000 nuclei have been studied under the axial symmetry hypothesis and going beyond the mean-field approach. The corresponding properties are made available to the nuclear scientific community on an internet web site for every individual nucleus. The content and original feature of this nuclear data library is also presented.