Description of magnetic moments within Gogny HFB

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While the ground state configuration is classically determined by the variational principle minimizing the binding energy of the system, some deviation are obtained for spin and parity assignment between Hartree-Fock-Bogolyubov (HFB) ground states and experimental measurements. Such difference can be attributed to the shortcomings of the actual interaction as well as to those of the method. In this context, we propose a procedure to identify the configuration of the ground state in odd-A and odd-odd nuclei. This procedure is based on the HFB framework with a self-consistent blocking of the unpaired nucleon and identifies the ground state as the blocked quasi-particle configuration compatible with the observed spin and parity and, most importantly, the measured magnetic moment.

First, we present the protocol focusing on magnetic moments for all odd Hg isotopes for which experimental data is available. To validate the method, a systematic comparison between the predicted and measured electric quadrupole moments and isotopic shifts is performed [1]. Second this protocol is applied to all odd and odd-odd nuclei for which magnetic momenta are given in Stone table [2]. Once the best candidate to reproduce the data has been selected, effective factors for the orbital and spin parts of the magnetic operator are adjusted in order to increase the identification procedure in forthcoming measurements. The values of this effective coefficient and their impact will be discussed. Third, the impact of ground state selection through the magnetic moment constrain will be illustrated in the context of the isotopic shift analysis for the bismuth isotopic chain [3].

To finish, some perspectives will be given for beyond-mean-field approaches and new generation of effective interaction.

[1] S. Péru, S. Hilaire, S.Goriely and M. Martini, Phys.Rev. C 104, 024328 (2021)

[2] N.J. Stone, Atomic Data and Nuclear Data Tables 90,75-176 (2005)

[3] A. Barzakh *et al.*, Phys. Rev. Lett. 127, 192501 (2011)