Magnetic moment measurement in ^{99,101}Mo isomeric states
Probing the N=59 deformation change region

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Nuclear moments give precise information on the structure of exotic nuclei. The magnetic moment is sensitive to the occupation of valence nucleons in a given orbital (single-particle states), whereas the quadrupole moment is an excellent tool to investigate the deformation and collective behaviour of nuclei. Thus, the measurement of electromagnetic moments plays a central role in the evaluation of nuclear structure models and allows us to study the evolution of shell closures near and far from β stability.

We performed an experiment to measure the magnetic moment of an isomeric state in ^{101}Mo ($T_{1/2}$ = 95±15 ns) and ^{99}Mo. The aim of these experiments is to better understand the nuclear structure in the N=59 region corresponding to a large deformation change as shown in figure 1. This two neutron-rich nuclei will be produced by a (d,p) transfer reaction (on a ^{98,100}Mo target for ^{99,101}Mo respectively) an in order to extract g-factors, the TDPAD method (Time Dependant Perturbed Angular Distribution) is used [1]. The reaction chamber is surrounded by $LaBr_3$ scintillators and HPGe detectors to detect γ-rays. The $LaBr_3$ scintillators are well suited for this type of experiment as they have an excellent time response (<1ns), mandatory for short lifetime isomer measurement, whereas the energy resolution remains correct (2.8% at 662 keV). The data analysis is ongoing and first results will be presented. In order to interpret the data, microscopic HFB calculations are made in Bruyères-le-Chatel in collaboration with the theoretical physics group using the Gogny D1S effective force.

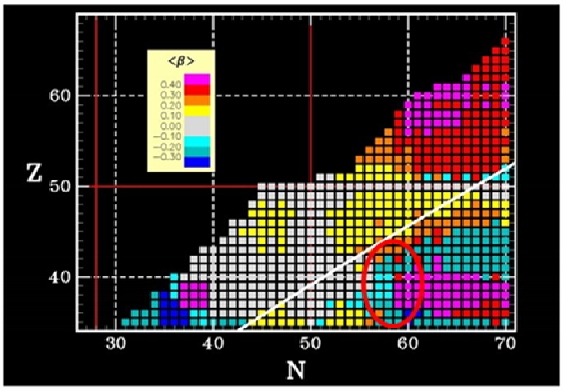

Figure 1: Prediction of quadrupole deformations using the Gogny D1S effective force [2]. The N=59 region of interest is pointed out by a red ellipse.

[1] G. Georgiev *et al.*, Eur. Phys. J **A30**, 351 (2006)

[2] S. Hilaire and M. Girod, http://www-phynu.cea.fr