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Structure of exotic nuclei through nuclear moment and transition probability studies.

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The studies of exotic nuclei have revealed some new phenomena including modifications of the shell structure or appearance of regions of rapid onset of deformation. The nuclear moments and transition probabilities are among the observables that could shed light both on the single-particle and collective nuclear properties. Therefore they could prove of key importance in regions where interplay between spherical and deformed features is considered.
The neutron-rich A~100 region has attracted important experimental and theoretical interest for several decades. One of the most sudden onset of deformation throughout the nuclear chart is observed at N=60 for a number of isotopic chains lighter than Molybdenum. The south border of this region has been roughly established few decades ago but more detailed studies for the microscopic origin of the deformation have become possible only recently with the advances of radioactive ion beams techniques. Coulomb excitation studies of the odd-mass Rubidium isotopes, 93-99Rb, have been performed at REX-ISOLDE using the Miniball setup. The low-energy structure in those isotopes, and their transition probabilities obtained, show distinctively different feature for the quasi spherical nuclei (93,95Rb) below and the well-deformed ones (97,99Rb) above N=60. These results establish 97Rb as the corner stone of the region of deformation allowing for a clear identification of the orbitals on which it is built.
Obtaining high precision g-factor information on short-lived picosecond states is a non-trivial task. The experimental techniques usually applied, as e.g. TF or RIV, require calibration measurements on known states. This can be overcome performing time-dependent studies using charge states for which the hyperfine field can be calculated from first principles. The g(2+) of 24Mg has been measured at ALTO, Orsay using the Orsay Universal Plunger System (OUPS) in combination with the ORGAM array. Time Dependent Recoil In Vacuum technique on H-like charge states has been applied for the first time in “radioactive beam geometry”. The preliminary results, showing the power of this method and demonstrating its applicability for precise moment studies of picosecond states, will be presented.

Primary author: Dr GEORGIEV, Georgi (CSNSM, Orsay)

Presenter: Dr GEORGIEV, Georgi (CSNSM, Orsay)

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