

# Dipole Response of Exotic Nuclei and Neutron Skin – Possible Experiments for a next generation LaBr<sub>3</sub>(Ce) scintillator based setup at RIBF

*Saturday, 5 February 2011 15:35 (35 minutes)*

## Summary

In the last years the study of the giant resonance response, in particular the pygmy dipole state in neutron rich nuclei as produced in radioactive beams has provided the first interesting experimental results. Such experiments requires high efficiency and well designed arrays. Future experiments in this field will benefit from the availability of higher beam intensity and improved experimental set ups.

One of the techniques which can be used in these studies is the virtual photon scattering technique followed by gamma decay.

This technique was used to study the Pygmy Dipole Resonance (PDR) in <sup>68</sup>Ni with an experiment at GSI using the FRS and the RISING setup.

New experiments to investigate further the properties of the pygmy dipole resonance are expected to be made. The objective of future measurements is to use more exotic beams, get a more detailed information on the isovector nature and on the fine structure of the PDR (above and below the particle emission threshold). For this a new, high gamma-efficient and high resolution gamma ray detection array combined with beam tracking is essential.

For detection of high energy gamma-rays after virtual photon scattering at bombarding energies of around 250 MeV/nucleon the SHOGUN array combined with BigRIPS-ZDS for beam identification meets these requirements. It has to be noted that this approach is complementary to the neutron break up technique, which will be employed in the future SAMURAI setup at RIKEN.

We present plans for future gamma decay experiments of the PDR in radioactive neutron rich nuclei. The particular cases we are interested in concern the nuclei along the Ni and Zr -chain, which are expected to be good key cases to study the nature and properties of the dipole response in neutron rich nuclei. In fact, these studies are natural follow ups of the previous work for <sup>68</sup>Ni for which the comparison with theory deduces an estimate of the size of neutron skin.

**Primary author:** Dr WIELAND, Oliver (INFN sezione di Milano)

**Co-authors:** COLO, Gianluca (University of Milan and INFN sezione di Milano); LEONI, Silvia (University of Milan and INFN sezione di Milano)

**Presenter:** Dr WIELAND, Oliver (INFN sezione di Milano)

**Session Classification:** Physics Opportunities, New Ideas, Discussion