

## Proposal for the SNRI16 laboratory stage

Title: Study of the efficiency of the GALILEO gamma-ray spectrometer.

The GALILEO gamma-ray array has been installed at the Legnaro National Laboratory of INFN with the aim of studying the nuclear structure of exotic nuclei by using in-beam gamma-ray spectroscopy. Such studies will take advantage of reactions induced by the stable beams delivered by the Tandem-ALPI-PIAVE accelerator complex and by the radioactive beams which will be provided by the SPES facility in the near future. The GALILEO in its final configuration will consist of a  $4\pi$  high-resolution gamma-ray array that will use the GASP [1] HPGe tapered detectors and the capsules of the EUROBALL [2] Cluster detectors, re-assembled in a triple configuration. The geometry of the array has been designed to maximize the photo-peak efficiency under typical in-beam medium-to-high gamma-ray multiplicity conditions, achieving a value of about 10%. The HPGe detectors will be surrounded by antiCompton shields in order to reach, for the whole array, a peak-to-total ratio of about 60%. In the present configuration, 25 single GASP HPGe tapered detectors, together with their anti-Compton shields, are combined with the EUCLIDES [3] charged particle array and the Neutron Wall array [4], mainly, for the study of neutron-deficient nuclei. To reconstruct the level scheme of such exotic nuclei, detection efficiencies are a fundamental information as well as the correlation among the emitted gamma rays. To this end, we propose to estimate the gamma-ray efficiency of the GALILEO array and to measure the angular correlation and DCO ratio (Directional Correlations de-exciting Oriented states), by using a calibration source.

- [1] D. Bazzacco, Proc. Workshop on Large gamma-ray Detector Arrays (Chalk River Canada) AECL10613, 1992, p. 376.
- [2] B. Caio et al., Nucl. Instr. and Meth. A111 (2000) 222.
- [3] A. Gadea et al., INFN-LNL Annual Report 1996, 225 and INFN-LNL Annual Report 2000, 151.
- [4] O. Skeppstedt, et al., NIM A 421 (1999) 531.

We propose to measure:

- 1) the absolute and relative efficiency of the GALILEO array, by using different calibration sources
- 2) the angular distributions and DCO ratio

All the results will be compared with the output of a simulation program

The available material consists of:

- 1) Calibration sources
- 2) Simulation software