

Programme / Sub-programme / Module	5/5.1/ELI-RO
Project type	RDI
ELI-NP thematic	RA4/I Gamma-beam experiments at ELI-NP
Project title / Acronym	Technical developments in support of the GBS experiments/GBS-TD
Project duration	26.5 months

PROJECT SUMMARY

The ELI-NP project is already in its second phase of implementation and approaching fast the milestone of becoming fully operational in 2019. The work of acquiring detectors and electronics and build the experimental setups envisaged to take data at the GBS is already well underway. At this point, the challenge is to test and commission all the equipment and detectors and to develop the software tools to handle the data coming out. Within this project, we identified several directions, all related to the ELI-NP Working Group “Gamma Above Neutron Threshold” (ELIGANT) in which our group could have important contributions in the implementation phase. Our objectives are:

- Development of a software package to control and readout an analogue data acquisition system based on peak-sensing ADC modules and multi-hit TDC modules in the VME standard
- In-beam study of the TOF characteristics of the ELIGANT-GN NE213 liquid scintillators. The response of this detectors to neutrons emitted following a fusion-evaporation reaction will be studied at the 9 MV Tandem accelerator using the ROSPHERE spectrometer.
- Testing and calibration of the ELIGANT-TNF instrumentation. which will be used for generating a new Compilation of total and partial photoneutron cross sections. We propose to test the DAQ system for the first time by acquiring simultaneously the signals generated by the ^3He counters and the signals generated by the current integration system. We propose to calibrate in efficiency the neutron detection system by using monitor reactions and cross checking the results using the activation method.
- Development of an alternative read-out system for the ELIGANT-GN 3"x3" $\text{LaBr}_3(\text{Ce})$ (or CeBr_3) scintillators based on the new SiPM photosensors, A prototype detector will be build using a 3"x3" $\text{LaBr}_3(\text{Ce})$ crystal, a custom SiPM matrix and a FEE interface.

In order to achieve our goals, we rely on the local expertise acquired by the project's team by developing and running the ROSPHERE spectrometer, but also in the international collaborations (IDS@ISOLDE, HISPEC/DESPEC@FAIR) and on the extensive local infrastructure.

Our objectives are necessary steps towards the implementation of the ELI-GANT experimental setups, having a direct impact on this general objective of the ELI-RO programme. At the same time, our project will offer an opportunity for the Phd and master students working in ELI-NP to acquire specific experience of running experiments and setting up detectors, thus contributing to acquire the competences required to run GBS experiments.