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| Programme / Sub-programme / Module | 5/5.1/ELI-RO |
| Project type | RDI |
| ELI-NP thematic | RA4/I.1 Nuclear Resonance Fluorescence Experiments RA4/I.2 Gamma-ray studies above the neutron threshold RA4/I.5 Photofission studies RA4/I.7 Physics studies of exotic nuclei produced in photofission |
| Project title / Acronym | Versatile approach to integrated large data acquisition system for complex ELI-NP experiments/VDAQ-CEX |
| Project duration | 26.5 months |

PROJECT SUMMARY

The Technical Design Reports for the experiments that are being prepared at ELI-NP are describing in great detail the experimental setups that will be available in the first days of operation of the Gamma Beam Source. There is no mention about how these setups will evolve, and, most importantly, how the different detectors that are being purchased can be integrated for other complex measurements.

The project proposes the integration of the segmented clover detectors with at least two other types of detectors already available at ELI-NP: neutron detectors and charged particle detectors. The segmented clover detectors (part of the ELIADÉ array) are some of the most powerful and complex detectors that will be used at ELI-NP. The complexity of the detectors, their support infrastructure (High Voltage, Low Voltage, DAQ, data analysis, etc.) makes it very hard to imagine that they could be used in combination with other detectors without a serious preparation. The project aims at carrying out the most complicated parts of these studies. The goal of the project is to make the segmented clover detectors a tool available to all the projects that could benefit from their performance.

The work of the project will have two main components. On one hand we will study how the data acquisition system and data analysis of the ELIADÉ array can be extended to include the other types of detectors, either by integrating their data flow with that of the segmented clovers or by interfacing their respective data acquisition systems. The other important component of the project is to improve the data flow, the algorithms and the documentation of the data taking and data analysis procedures to make the combined experiments available to external users. The documentation and software being developed as part of this project will refer both to how the hardware and software analysis should be performed, but also will emphasise how new type of detectors could be integrated, allowing external users to design experiments that are using detectors and hardware not available at ELI-NP.

The project is being carried out by research groups with very different backgrounds: the group at IFIN-HH has a long-standing experience in designing detector arrays and outstanding experience in working with large detector arrays. The group at UPB is comprised of well established computer scientists with proven record in using the most recent and complex technologies in IT. The first part of the project aims at bringing together the two research groups by the common work of defining the problems to be solved starting from the data flow of the ELIADÉ array. The second year of the project will allow the two groups to fully leverage their expertise in their respective fields, by designing the test-bench for the complex detector set-up and by building and testing optimised computer codes. The last year of the project will have the two groups working together in implementing, testing and documenting the extended system comprised of at least three types of detectors: segmented clover detectors, particle detectors and neutron detectors.