**GATE- Gamma-ray Arrays Traveling for the European community**

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**1. Research objectives**

This proposal tackles the challenge of providing an expertise on an optimal utilisation of experimental setups for nuclear spectroscopy and nuclear reactions communities in order to address some of the scientific topics covered by the Accelerator Facilities for Hadron and Nuclear Physics (ALFA). Large research collaborations in these two fields are investing significant efforts and resources in developing new instrumentation (such as, e.g., AGATA) experimental methods and techniques for semiconductor and scintillator detectors, for front-line research on the fundamental properties, correlations and interactions of strongly-interacting matter. Several of these techniques are of common interest and the effective sharing of information through training and/or exchange of technical experts in addition to the pooling and maintaining of resources will be of great benefit to the whole research community working at all facilities. The coordinated effort of different collaborations centred around detectors and experimental resources that can travel and be shared among the infrastructures of various European laboratories for an optimal time period will largely enhance the quality and the scientific output of the experimental programs and globally improve our knowledge of nuclear structure in a coordinated way. Moreover, the optimal services for the travelling detectors, including a crucial training of new experts on the state-of-art detector technology, digital electronics, FPGA pre-processing, data analyses, as well as Machine Learning, will be provided.  This will guarantee a long-term availability of the existing resources and the future development of the field.

This work is split into 3 principal tasks to maximize is effectiveness at multiple levels**:**

**TASK 1:** Efficient use of the flagship European spectroscopy resources at the different infrastructures, focusing on maximizing their effectiveness, as well as coordination of the experimental campaigns at the various infrastructures providing and exchanging information on their potential opportunities.

For this task, we propose to organize remote annual meetings between the management of the nuclear spectroscopy collaborations and the directorate of the hosting infrastructures to ensure the best exploitation of the opportunities provided by the different infrastructures; to coordinate timelines and optimise the distribution of the resources for physics campaigns. We also offer our services for the organization of a workshop to discuss physics opportunities and perspectives for the future of the field.

**Budget:** 5 kEuros

**TASK 2:** Training in nuclear spectroscopy techniques

**Subtask 2.1:** Organization of training courses for new and more experienced users. The courses will cover the most important and useful subjects and techniques for nuclear spectroscopy, from hardware aspects to software tools, data access and management as well as data-analysis techniques of relevance to the investigation of the physics topics of interest.

**Budget:** 3 x 10 kEuros

**Deliverable:** Final report on training courses

**Subtask 2.2:** Organization of hands-on workshops for experienced scientific and technical staff. These workshops allow the experts in detector technologies to share their knowledge and expertise, reducing the risk of exposure by the retiring experts. Such a dissemination of information will benefit the physics campaigns of the community of ~500 spectroscopists.

**Budget:** 2x 10 kEuros

**Deliverable:** Final report on training courses

**TASK 3**: Sharing of technological expertise and transfer of knowledge through the exchange of technical experts between infrastructures and research institutions, with special emphasis on High Purity Ge detector maintenance and repair.

**Budget**: 5 kEuros

1. **Connection to Transnational Access infrastructures (TAs) and / or Virtual Access projects (VAs)**

Several research infrastructures with transnational access will benefit from the realization of the various tasks: CERN-ISOLDE and n-TOF, GSI/FAIR, GANIL/SPIRAL2, IN2P3 IJCLAB infrastructures, LNL-LNS, JYFL-ACCLAB, ELI-NP/IFIN-HH, NLC consortium (HIL Warsaw-IFJ/CCB Krakow).

**3. Estimated budget request**

A total budget of 60 kEuros (+overheads) is requested. To facilitate the realization of the various tasks, the funds will be distributed among 3 research infrastructures: GSI/FAIR, CNRS-IJCLab, INFN-LNL

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| --- | --- | --- | --- |
| Task | GSI/FAIR | CNRS-IJCLab | INFN-LNL |
| 1 | 5 | 0 | 0 |
| 2 | 20 | 15 | 15 |
| 3 | 5 | 0 | 0 |
| TOTAL | 30 | 15 | 15 |

**4. Participating and partner institutions**

List of partner Institutes: GANIL, GSI/FAIR, IFIC Valencia, IJCLab, INFN LNL, University of Liverpool

List of participating institutes: INFN (LNL, LNS, Padova, Milano, Firenze, Napoli, Catania, Perugia), IN2P3, CNRS, ICEA, GANIL, IRFU, IJCLab-Orsay, IP2I-Lyon, IPHC-Strasbourg, JLU, FAIR/GSI, U-Köln, TU-Darmstadt, STFC Daresbury, U-Liverpool, U-Manchester, U-Birmingham, U-Surrey, U-York, U-West Scotland, U-Lund, KTH Stockholm, U-Uppsala, JYFL, HIL-Warsaw, U-Warsaw, IFJ-PAN Krakow, NIPNE Bucharest, ININ-HH/ELI-NP, Demokritos-Athens, IFIC-Valencia, U-Huelva, UAM-Madrid, U-Huelva, U-S. de Compostela, GFN-U-Complutense-Madrid, U-Salamanca, IEM-CSIC, ATOMKI- Debrecen, ELI-NP, HIM, KU Leuven, UMAN, INRNE-BAS, UCO, LMU