

BeamLab

Development of Chemically Reactive Nuclear Beams

Contributors: CERN, GANIL, IFJ PAN, INFN, IPNO

To develop nuclear beams towards rare and exotic nuclear beams, five European laboratories related to ISOL facilities have drew up this workpackage. The objective is to address the required development works to produce nuclear beams which are challenging because of the chemical reactivity. To study the different physicochemical interactions which occur from the target container to the ion source itself, the proposal will be organized in four main tasks:

- * Task 1: Efficient ion sources for difficult ISOL beams.

Different ion sources will be characterized in physicochemical conditions favoring the production of the ion species of interest. Computer calculations are also planned to optimize key parameters.

- * Task 2: Material compatibility in reactive gas atmospheres.

Because of the importance of the physicochemical interactions at the material surface, such a study will supply invaluable data to optimize chemically selective devices and to improve beam purity.

- * Task 3: New molecular beams.

Based on the chemical properties of the nuclei to produce, suitable chemical products will be used to create volatile compounds containing the nucleus of interest.

- * Task 4: Specific targets designs for non-volatile elements.

Key target parameters will be investigated to best release the nuclei of interest produced: target configuration, thickness and target material.

These tasks will focus on nuclei of interest such as non-volatile transition metals or rare earth. Thus the results of this R&D program are expected to directly benefit existing ISOL facilities and produce experimental data which will directly serve for the forthcoming 2nd generation ISOL facilities.

Requested budget

To achieve the required tasks the partners will use the experimental setups and resources available at their facilities. The requested budget will provide the manpower and extra cost needed to carry out these developments.

	CERN	GANIL	IFJ PAN	INFN	IPNO
post-doc position	100 k€			50 k€	89 k€
Consumables	10 k€	35 k€	21 k€		
Travel costs	2 k€	10 k€			3 k€
Total per Lab	112 k€	45 k€	21 k€	50 k€	92 k€
TOTAL	320 k€				

Milestones and Deliverables

Each task will lead to a specific deliverable.

Deliverable of Task 1 (D1): Database on radioactive plasma ion sources (R), Month 48.

A report will be supplied at the end of the project, synthesizing the key features of the plasma ion sources run and developed at GANIL, INFN, CERN and IPNO with the following milestones:

Final report Month 48

Intermediate report Month 24

Deliverable of Task 2 (D2): Database on physicochemical interactions at surface (R), Month 48.

A report will sum up the data obtained on the physicochemical interactions at the surface of the material used at high temperature in the target-ion-source units.

Final report Month 48

Intermediate report Month 24

Deliverable of Task 3 (D3): Developments of new beams (DEM), Month 40.

All the experimental results on the development of new beam should be gathered by month 40. The analysis of the results and their presentation in the final report will be achieved in the remaining time.

Intermediate status of the developments (R) Months 16 and 32

Deliverable of Task 4 (D4): Developments on targets (DEM) Month 40.

The final experiment results obtained on target development should be gathered by month 40.

Intermediate status of these developments (R) Months 16 and 32

The intermediate status reports as milestones in tasks 3 and 4 will be released as meeting reports between the partners.