



IDEAAL Work Package 4

Innovation and Industries





WP4 objectives

- The Innovation and Industries workpackage focuses on actions towards industrial users and for industrial valorisation and innovation
- It will provide
 - access dedicated for new applications to the existing GANIL accelerators and to the new SPIRAL2 facility
 - general support for industrial applications and technology transfer
 - increase of innovation potential for GANIL





WP4 Tasks and associated coordinators

- Task 1 : Access provision to research teams from industries and involvement of industrial users (GANIL MH Moscatello/X.Ledoux)
- Task 2 : Industrial Applications and Technology Transfer (NUCLEOPOLIS N.Renard) Sub-Task 2.1 – Provide industrial application tools to GANIL Sub-Task 2.2 – Operational implementation (*General Case*) Sub Task 2.3 – Operational implementation : Support for the technology transfer of the beam profile monitors Sub-Task 2.4 – Operational implementation: Innovative radioisotope production
- Task 3 : Increase of innovation potential (CEA/DRF A.Leservot)
- Workpackage leader: M-H. Moscatello GANIL
- Workpackage deputy leader: E. Duval NUCLEOPOLIS





Status of Task1

Access provision for research teams from industries and involvement of industrial users (GANIL)

- Financement of 240 hours of beam time (and travel expenses) for some new industrial experiments that would like to test the capabilities of the SPIRAL2 and GANIL facilities in order to confirm industrial's interest in the available beams
- Creation of an international selection panel to assess the proposed experiments
- Study with a selection of industrial users (among those using GANIL and SPIRAL2 facilities) on the possible involvement of these industries in the GANIL organisation
- \Rightarrow proposal of a business plan for the industrial application activity at GANIL
- \Rightarrow objective to increase the turnover of this activity at GANIL at the end of the IDEAAL project.

STATUS

- International panel created (CERN, CEA, CNRS) and validated by GANIL Director
- First call for proposals with GANIL beams Deadline for proposal: October 1st 2018
- Selection of experiments in November 2018, they will be scheduled in 2019





Status of Task 2

Applications and Technology Transfer (Nucleopolis)

Sub-Task 2.1 – Provide industrial application tools to GANIL

- Mapping of existing potential at GANIL (technologies know-how competences) and identify industrial candidates for technology transfer
- Identify new areas for industrial applications (market research) and potential customers for existing facilities GANIL and SPIRAL2
- Build the implementation arrangements for transfers (financial and legal aspects)
- Build tools to promote this activity in connection with the communication service

STATUS:

- Mapping of existing potential: meetings and interviews with most of the groups at GANIL (~ 40 meetings occured) Report finalised
- Presentation of a cartography (non-exhaustive) and selection of transferable or valorisable subjects to Ganil Direction in early September 2018
- Contract for market (« opportunity ») research launched
- Selection of valorisation subjects in progress, in order to prepare the communication tools





Task 2: Applications and technology transfer

Sample of some subjects identified for potential valorisation

Beam diagnostics

ECR ion sources

High power targets

Vacuum technologies

Complex welding techniques

Magnetic measurements

Spectrometry Gamma, Alpha

Radioprotection

R&D for medical radioisotopes





Sub-Task 2.2 – Operational implementation (General Case)

To allow the "matching" between industrial application opportunities and the companies

- B2B meetings
- GANIL conferences
- > Set up a virtual trading place on the website
- Participation in exhibitions

STATUS:

- Exchange of good practices with GSI laboratory: meeting in GSI on November 30th
 - Practices for technology transfer
 - Meetings with companies
- Participation in WNE 2018 with Nucleopolis (June 26th to 28th Paris Nord Villepinte) booth J141
- Participation to the ENSAR2/NUPIA Workshop on October 11 12th 2018





Sub Task 2.3 – Operational implementation: Support for the technology transfer of the beam profile monitors

Technology and pre-existing know-how transfer (legal, economical and marketing aspects) and research agreement – started in June 2016 because of urgent need

STATUS:

Milestone in June 2017: not completed

- Transfer contract signed in December 2017 and transfer to Pantechnik in progress
- Collaboration contract: depends on a national agreement between CEA and CNRS Actions from CNRS Normandie and from CNRS/IN2P3 in progress to get the signature



SPIRAL2



Sub-Task 2.4 – Operational implementation: Innovative radioisotope production

Innovative medical radioisotope production methods are a new research topic at GANIL

- Develop R&D programs for innovative radioisotope production
- Identify possibilities and methods of transfer •

Alpha-immunotherapy is a very innovative therapy for cancers -> Astatine 211 (7,2h) and Lead 212 (10,6h) are good candidate



Prospective phase : use of NFS converter



This R&D activity started at GANIL in 2014

Common project with **ARONNAX** et ILL in France





Sub-Task 2.4 – Operational implementation: Innovative radioisotope production

STATUS:

Study and proposals of possible methods for technology transfer of R&D on ²¹¹At and ²¹²Pb with M2 trainee - January to June 2017 (GANIL/Nucleopolis

->²¹¹At: ARRONAX collaboration: presently on stand-by, waiting for a decision of Ganil Direction for a strategy on this subject

-> ²¹²Pb: Some informal discussions with industrial companies occured a few months agos

-> ²¹²Pb: More official contact to be organised in the next weeks





Task 3: Increase of innovation potential (CEA/DRF)

Study the possibilities of increasing the innovation potential of the GANIL laboratory:

- Identify new applications to heavy and light ions beams, in order to replace the reactor technology with the accelerator technology, for as many applications as possible
- Identify new R&D subjects that might lead to innovative technologies and application
- Identify the necessary technical developments to adapt the facility to these future and new applications





Task 3: Increase of innovation potential

Potential Topics	Impact GANIL / SPIRAL	Connex impact	Comment
BNCT	SPIRAL2 adaptation	Development of neutron capture studies	Complementary to Archade
Neutrons for analysis and Neutron Activation Analysis	NFS : Structure neutronography, diffusion & hot cells	Visibility of neutron offer to be increased	Discuss with LLB
Production & separation of Radiolsotopes	Development of new production/separation methods (ISOLDE process) ? Use of the Beam Dump ?	Radiochemistry	Strong demand for health developments. S
Membranes & filtration	Adapt the GANIL facility (CIME) Develop instruments with CIRIL for these applications	Give more visibility to this activity	Ganil environment positive for these applications
Low Energy Focused Ion Beams	PELIICAEN Project (Maskless material modification at nanometer scale)	What about a low energy radioactive focused ion beam and its potential applications?	Micro-electronics, quantronics, spintronics, data storage, quantum cryptography, nano-sensors, high speed electronic components Energy: Studies for solar cells, LEDs, catalysis, piezo- electrics conversion

Extract of the table of subjects to be deepened





Task 3: Increase of innovation potential

Medical radioisotope tendancy



Cf. Task 2.4

Source: MEDraysintell (2015)





Status of Task 3

- Bibliography and brainstorming on potential applications (discussions with nuclear and interdisciplinary physicists see next slide)
- 2 subjects to be studied into details were selected during T1 2018
 - Production & separation of radioisotopes (non health) by ISOLDE process
 - Membranes & filtration (Nanometer tracks with high aspect ratio induced by ion irradiation: controlled size, shape and fluence, high area available (m² scale)





Innovation and Industries deliverables

Task1: Limited pilots of access provision to research teams from industries and involvement of industrial users

- D4.1 Business plan for the industrial application activities at GANIL (M36)
- Task 2: Industrial Applications and Technology Transfer
 - D4.2 Report on the technology transfers developed in the framework of the project (M36)

Task 3: Increase of Innovation Potential

- D4.3 Report on the increase of innovation potential study (M36)





Innovation and Industries milestones

Milestone number	Milestone name	Due date	Means of verification
MS9	Beam profile monitors: Licence contract and R&D collaboration contract with the company	Months 6 DELAYED	Report
MS10	Report on the methodology for the technology transfer for radioisotope production	Months 30	Report





Thank you for your attention