

CATHI

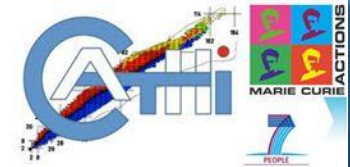
# Marie Curie Initial Training Network

Cryogenics, Accelerators and Targets at HIE-ISOLDE

**Yacine Kadi & Seamus Hegarty**  
**CATHI Project Co-ordinators**

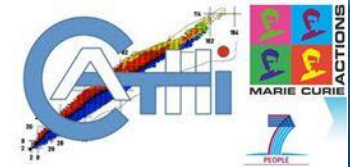
Final Review Meeting, 22-26 September 2014

\* Research project supported by a Marie Curie Early Initial Training Network of the European Community's Seventh Programme under contract number (PITN-GA-2010-264330-CATHI)



# Outline

- **CATHI and HIE-ISOLDE**
- Scientific Overview
- Networking
- Administrative & Management Issues
- Conclusions and Prospects

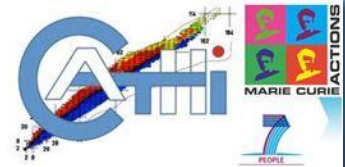


# CATHI and HIE-ISOLDE

## **CATHI – Cryogenics, Accelerators and Targets at HIE-ISOLDE:**

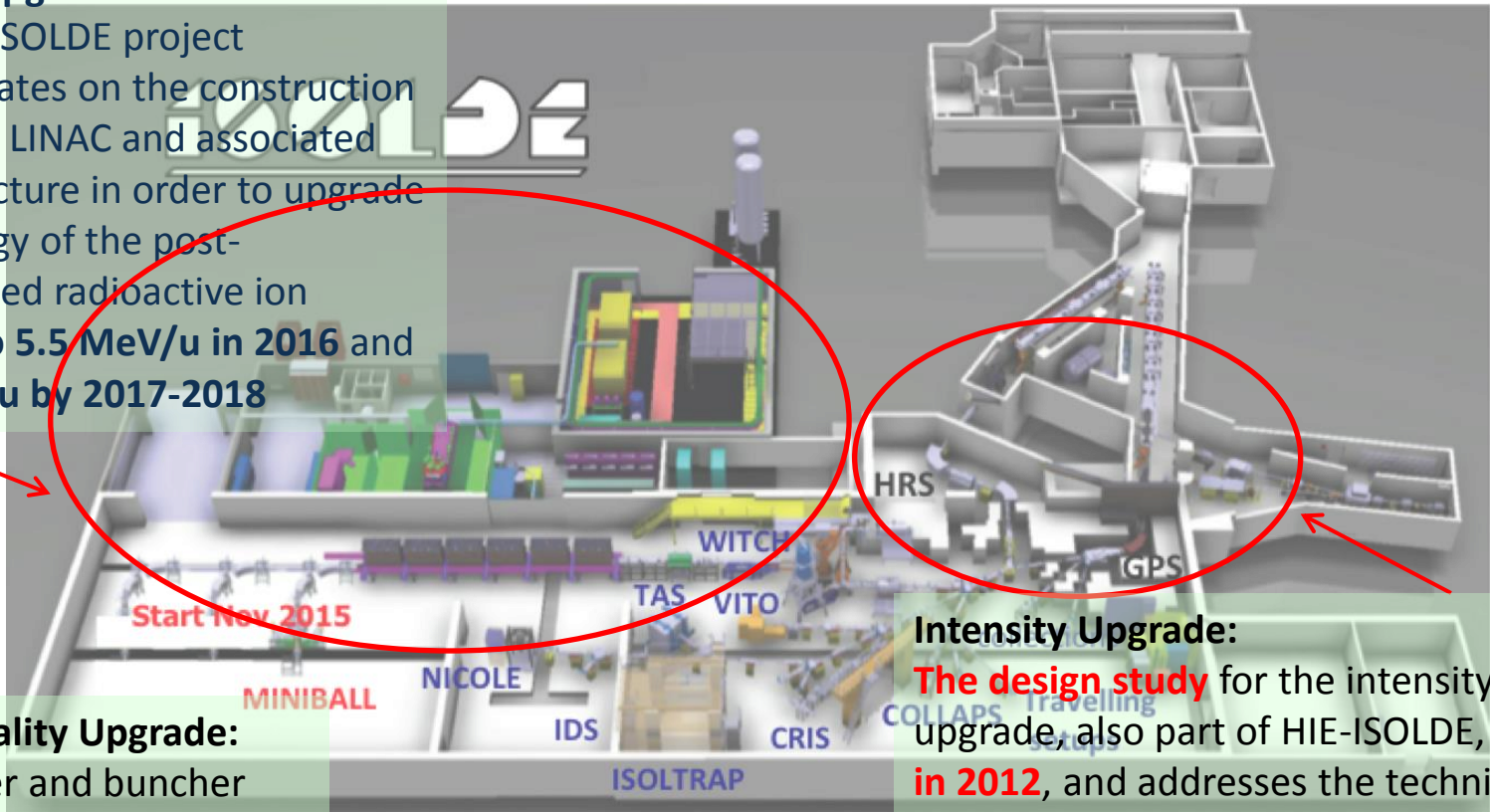
- ❖ The HIE-ISOLDE project at CERN represented an ideal R&D opportunity to train young engineers over a range of disciplines relevant to the accelerator and nuclear industry.
- ❖ CERN and the Associated Partners of CATHI offered excellent hands-on and academic training.
- ❖ ISOLDE provided a multi-disciplinary environment on a scale that encouraged collaboration and teamwork.

# HIE-ISOLDE aims at increasing the energy of the RIB up to 10AMeV and their intensity by a factor 10



## Energy Upgrade:

The HIE-ISOLDE project concentrates on the construction of the SC LINAC and associated infrastructure in order to upgrade the energy of the post-accelerated radioactive ion beams to **5.5 MeV/u in 2016** and **10 MeV/u by 2017-2018**



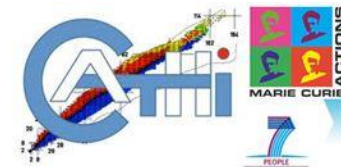
## Beam Quality Upgrade:

RFQ cooler and buncher  
Solid state lasers for RILIS  
Higher mass resolving power HRS

## Intensity Upgrade:

The design study for the intensity upgrade, also part of HIE-ISOLDE, **started in 2012**, and addresses the technical feasibility and cost estimate for operating the facility at **15 kW** once LINAC4 and Upgraded PS Booster are online.

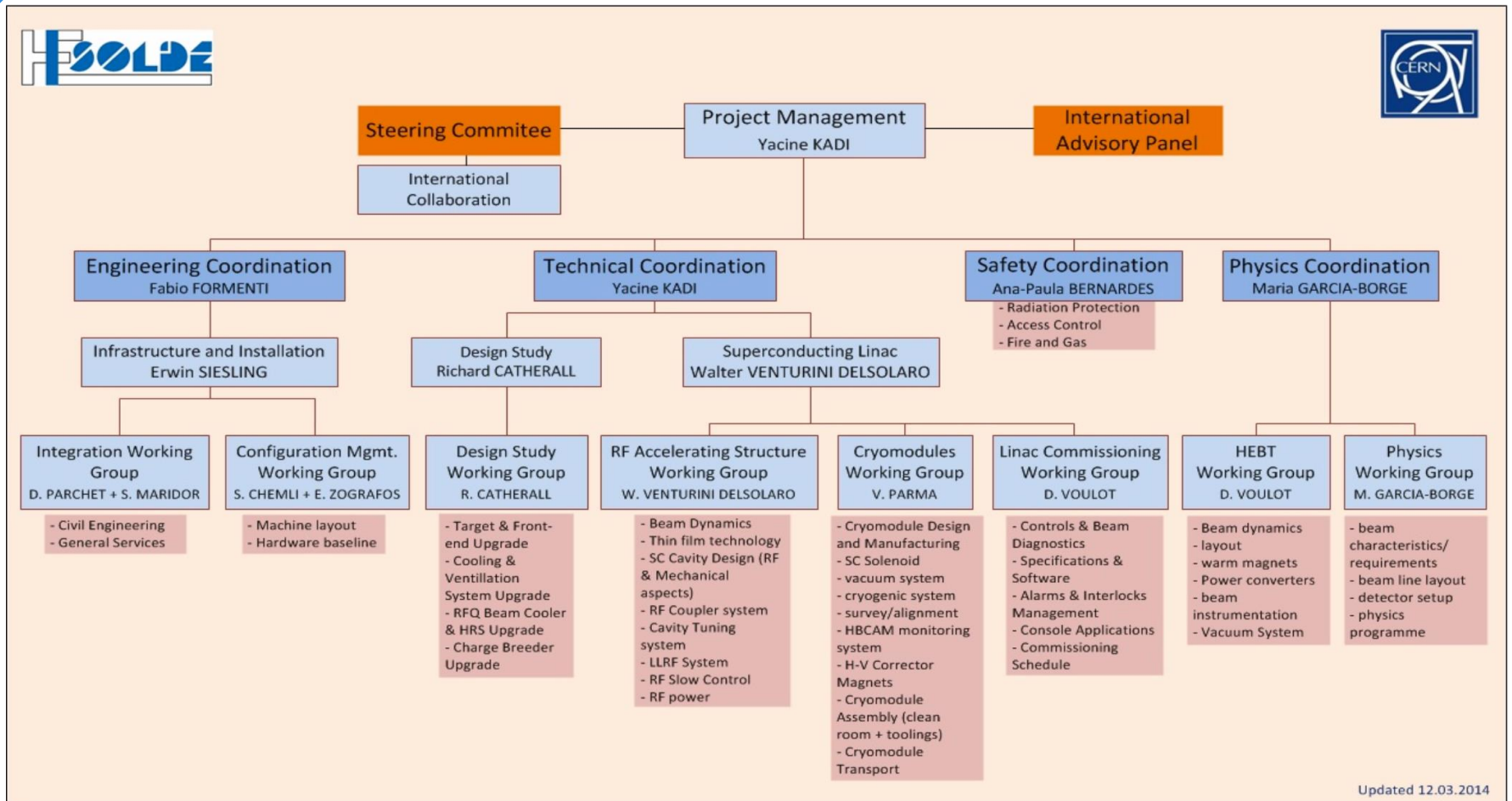
# Research Training Themes (21 Fellows over 4 years)



HIE-ISOLDE Subsystem	Work Package (Research Training Theme)	No. ESR	No. ER
I. Energy upgrade: SC Linac & HEBT	1. Super-Conducting Cavity Development and Tests	2	1
	2. Beam Instrumentation Development	1	1
	3. New Magnets	1	-
	4. Linac Integration and Innovative Alignment Method	2	-
	5. Linac Commissioning	1	-
II. Design Study for intensity upgrade	6. New Target and Front-End Design	5	-
	7. ISOLDE target area and Class-A Laboratory Upgrade	2	-
	8. Beam Quality Improvements	2	1
III. Safety	9. General Safety and Radiation Protection Implications Studies	1	1
	TOTAL	17	4

# HIE-ISOLDE

## Working Group Structure



# CATHI: a rare mono-site ITN

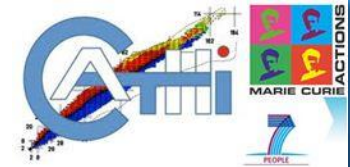
- ✓ 1 of 3 mono-site ITNs funded in FP7
  - One of the others was at CERN (ACEOLE)
- ✓ 4.8 M€ = BIG money from Brussels
  - 425 k€ for Fellow training
  - 355 k€ for Networking
  - 480 k€ for Fellow R&D and Prototyping
  - 145 k€ for Management Costs
- ✓ 3 = number of Project Officers (more than usual...)
  - Very helpful
  - Firm about contractual reporting issue
- ✓ 2 = Commissioner visits CATHI took part in
- ✓ 1 = monthly frequency & duration in hours of Carla's CATHI meetings (not a minute more!)
- ✓ >1000 = number of EDH documents signed !



# CATHI: The Fellows

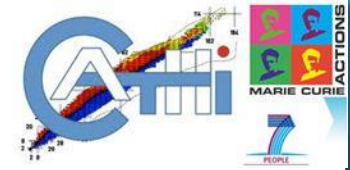
- ✓ 16 + 1 Early-Stage Researchers
- ✓ 4 Experienced Researchers
- ✓ 28.6% females (EC target 40%)
- ✓ Recruitment:
  - 150 Applications
  - Interviews at CERN and by video
  - Recruitment done in time
  - Good geographical spread
- ✓ Contribution to schools ([ASP14](#)), Conferences (EMIS12, SRF13, THEC13) & workshops (ISOLDE)





# CATHI: The Training

- Hands-on research training complemented by formal training:
  - CERN Training Programmes
    - Academic Training
    - CERN Seminars
    - CERN Accelerator School
    - Technical Training
  - International Conferences
    - LINAC, IPAC, SRF, ICIS, EMIS, RNB, IEEE Real-Time.....
  - Training during secondment
    - Up to 30% of contract duration
  - Complementary Training
    - CERN Management and Communication courses
    - Other external training courses

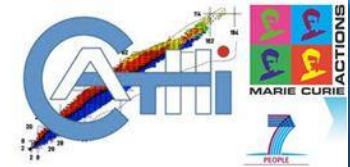


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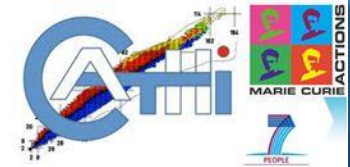
# Scientific Highlights (1/9)

<b>Work package number</b>	1	<b>Start date or starting event:</b>	Month 7
<b>Work package title</b>	Superconducting Cavity Development and Tests		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	96 (ESR1: N. M. Jecklin, 36 months; ESR2: I. Mondino, 36 months and ER1: Pei Zhang, 22 months)		
<b>Associated Partners</b>	IPN-Orsay, INFN-LNL, TRIUMF*		
<b>Objectives</b>	Develop techniques to realize and test a Superconducting resonant cavity of the quarter-wave type (QWR) using the technology of niobium film sputtering over a copper substrate at HIE-ISOLDE.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. <b>ESR2</b>: Specification and conceptual study of the SC cavity and subsequent realization of the prototype high-beta cavity.</li> <li>2. <b>ESR2</b>: Setup of the cryomodule test stand and cold tests of the SC cavity (investigation of Q-drop effect).</li> <li>3. <b>ER1</b>: Development of QWR frequency tuning strategy, QWR multipacting study and design study of the low-beta cavity.</li> <li>4. <b>ESR1</b>: Development and qualification of Niobium thin film sputtering techniques on the prototype and series high-beta copper cavities.</li> </ol>		
<b>Deliverables</b>	D06. Report on the SC cavity baseline mounting and sputtering ( <b>ESR1</b> ) D07. Report on the SC cavity performance measurements ( <b>ESR2</b> ) D08. Report/publication on the QWR frequency tuning strategy ( <b>ER1</b> ) D09. Report on the multipacting study of the high-beta cavity ( <b>ER1</b> ) D10. Final report and/or journal publications on the QWR Cavity Dev. and Tests ( <b>ESR2</b> )		



# Scientific Highlights (2/9)

<b>Work package number</b>	<b>2</b>	<b>Start date or starting event:</b>	Month 13
<b>Work package title</b>	Beam Instrumentation Development		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>60 (ER2: E. Daniel Cantero, 24 months and ESR3: A. Garcia Sosa 36 months)</b>		
<b>Associated Partners</b>	LPC-Caen, GANIL, INFN-LNL, CI, TRIUMF* and AVS*		
<b>Objectives</b>	Develop radiation-hard beam instrumentation for the 10 A*MeV Superconducting LINAC and a particle detector suitable for measuring very faint radioactive beams.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. <b>ER2, ESR3:</b> Design, fabricate and lab test prototype of position, profile and intensity monitors</li> <li>2. <b>ER2, ESR3:</b> Design, fabricate and lab test prototype of phase and energy monitors.</li> <li>3. <b>ER2, ESR3:</b> Design, fabricate and lab test prototype of emittance meter</li> <li>4. <b>ER2, ESR3:</b> Carry out irradiation tests.</li> <li>5. <b>ER2:</b> Carry out system-level integration tests and supervision work.</li> </ol>		
<b>Deliverables</b>	<p>D11. Conceptual design and sign-off specifications of beam instr. for SC Linac (<b>ER2</b>)</p> <p>D12. Define procedures for assembly, installation and commissioning (<b>ER2</b>)</p> <p>D13. Conceptual design and specifications of solid state beam instrumentation (<b>ESR3</b>)</p> <p>D14. Complete testing/irradiation and system-level integration test. Final conference report and/or journal publication (<b>ESR3</b>)</p>		



# Scientific Highlights (3/9)

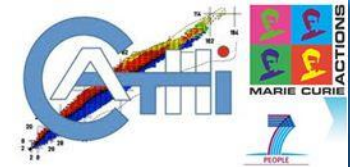
<b>Work package number</b>	<b>3</b>	<b>Start date or starting event:</b>	Month 12
<b>Work package title</b>	High-Energy Beam Transfer Lines Magnet Design		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>36 (ESR4: Panagiotis Farantatos)</b>		
<b>Associated Partners</b>	DTU*		
<b>Objectives</b>	Design, manufacture and commission compact warm magnets for the 10 A*MeV Superconducting LINAC and new beam transfer line.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. Specification of the magnet parameters.</li> <li>2. Design and implementation of the whole magnet system.</li> <li>3. Sign-off call for tender for the magnets procurement in industry.</li> <li>4. Participate in preliminary system tests using the 5.5 A*MeV Superconducting LINAC.</li> </ol>		
<b>Deliverables</b>	D15. Conceptual design of beam line magnets and distribution D16. Technical specifications of beam line magnets and distribution. Final conference report and/or journal publication		

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# Scientific Highlights (4/9)

<b>Work package number</b>	4	<b>Start date or starting event:</b>	Month 3
<b>Work package title</b>	Linac Integration and Innovative Alignment Method		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>2x36 (ESR5: Eleftherios Zografos and ESR6: Guillaume Kautzmann)</b>		
<b>Associated Partners</b>	Uni. BRANDEIS, Toptec and Uni. of Liberec		
<b>Objectives</b>	Carry out full integration studies for the different accelerator and experimental beam lines of HIE-ISOLDE and subsequent alignment of all the SC accelerating cavities, the beam monitors and the magnets.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. <b>ESR5:</b> Carry out design and space arrangement of the HIE-ISOLDE area.</li> <li>2. <b>ESR6:</b> Implement permanent internal monitoring lines to follow the relative movements of the cryo-cavities and solenoid inside each vacuum vessel.</li> <li>3. <b>ESR6:</b> Design of specific electro-optics cameras and control applications.</li> <li>4. <b>ESR6:</b> Electro-optical &amp; environmental characterization of optical packages.</li> </ol>		
<b>Deliverables</b>	D17. Final report on integration studies ( <b>ESR5</b> ) D18. Report on implementation and commissioning (including procedures) of the complete alignment system ( <b>ESR6</b> )		

51



# Scientific Highlights (5/9)

<b>Work package number</b>	<b>5</b>	<b>Start date or starting event:</b>	Month 13
<b>Work package title</b>	Superconducting Linac Commissioning		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>36 (ESR7: Davide Lanaia)</b>		
<b>Associated Partners</b>	GANIL, INFN-LNL, TRIUMF		
<b>Objectives</b>	The ESR training will be focused on the development of machine tune-up procedures that will later be implemented in the control software for the linac operation and active participation in the startup of the machine.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. Draft the specification of the controls and of the beam monitoring tools specific to the HIE-REX Linac</li> <li>2. Definition of tuning procedures and management of machine protection and alarm system</li> <li>3. Draft console applications to be used by the operators for the Linac tuning and monitoring</li> <li>4. Follow progress of the different aspects of the Linac design, construction and installation</li> <li>5. Assist in the commissioning of the new machine</li> </ol>		
<b>Deliverables</b>	D19. Report on specifications for controls and beam diagnostics D20. Commissioning Plan.		



# Scientific Highlights (6/9)

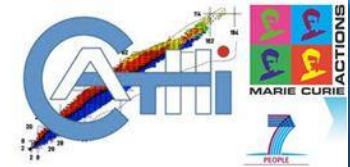
<b>Work package number</b>	<b>6</b>	<b>Start date or starting event:</b>	Month 3
<b>Work package title</b>	Studies for ISOL Target and Front-End Upgrades		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>180 (ESR8; ESR9; ESR10, ESR11 and ESR12: 36 months each)</b>		
<b>Associated Partners</b>	GANIL, INFN-LNL, IPN-Orsay, JYFI, SIDeA, TRIUMF, St-Gobain		
<b>Objectives</b>	The ESR training will be focused on R&D work on ion sources, target material and beam purification. Key issues include the study of target materials and maintaining the production rates of radioisotopes, thermal and shock studies, radiation protection and beam optics.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. <b>ESR8:</b> Carry out simulations of proton beam interactions with existing and potential target materials using FEM structural codes</li> <li>2. <b>ESR8:</b> Establish experimental programme to validate the simulations and verify the production rates and diffusion constants for different material prototypes</li> <li>3. <b>ESR9:</b> Thermal studies on target unit: off line tests, electro-thermal simulation via ANSYS code and prototyping of new concepts aiming at better thermal control uniformity.</li> <li>4. <b>ESR9:</b> Alternative cooling solution study: simulations and off line tests on heat pipes, cooling wings and redesign.</li> <li>5. <b>ESR10:</b> Optimization of the target(s) design for the study and optimization of different layout scenarii in terms of radiation protection issues, including benchmarking of code</li> <li>6. <b>ESR11:</b> Carry out beam optics simulations as a function of target and ion source parameters and beam profile requirements for mass separation</li> <li>7. <b>ESR11:</b> Draft functional and conceptual design of a new Front End including its integration into the existing facility</li> <li>8. <b>ESR12:</b> Perform design study for the low-level control of the new front end and the High Resolution Separator (HSR) magnet</li> <li>9. <b>ESR12:</b> Carry out dedicated study on state-of-the-art high accuracy positioning and sensor systems for the extraction electrodes as well as the control of devices for the safe manipulation of the target</li> </ol>		
<b>Deliverables</b>	<p>D21. Publication of test results and post analysis for the ISOL target material studies (<b>ESR8</b>)</p> <p>D22. Report on alternative cooling solution for the standard target unit (<b>ESR9</b>)</p> <p>D23. Final Report on the conceptual design of the ISOL target (<b>ESR9</b>)</p> <p>D24. Publication of the Safety File and risk analysis of the ISOL target (<b>ESR10</b>)</p> <p>D25. Final conference report and/or journal publication for the target layout optimization (<b>ESR10</b>)</p> <p>D26. Functional specifications of the extraction optics and front-end (<b>ESR11</b>)</p> <p>D27. Conceptual design, risk analysis and Safety File for the extraction optics and new front-end (<b>ESR11</b>)</p> <p>D28. Report on the front-end and HSR magnet control (<b>ESR12</b>)</p> <p>D29. Prototype of front-end control system including actuators and sensors (<b>ESR12</b>)</p> <p>D30. Simulator of the HSR dipole integrated magnetic field (<b>ESR12</b>)</p> <p>D31. Prototype of the HSR magnet control system (<b>ESR12</b>)</p>		

# Scientific Highlights (7/9)

<b>Work package number</b>	7	<b>Start date or starting event:</b>	Month 6
<b>Work package title</b>	ISOLDE Target Area and Class-A Laboratory Upgrade		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>2x36 (ESR13: Andrea Polato and ESR14: Mario Armin Hermann)</b>		
<b>Associated Partners</b>	GANIL, INFN-LNL, CEA-Saclay, ESS, TRIUMF		
<b>Objectives</b>	The ESRs will acquire the necessary knowledge and collaborate to the different phases of the design of HVAC and cooling systems for the future HIE-ISOLDE facility and participate actively in the startup of the machine.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. <b>ESR13:</b> Dimension the components of the Cooling and Ventilation installations</li> <li>2. <b>ESR13:</b> Define and integrate the Cooling and Ventilation plant in the general layout of the building</li> <li>3. <b>ESR13:</b> Elaborate the technical specifications and participate in the call for tender for the procurement in industry</li> <li>4. <b>ESR14:</b> Present a planning, perform the engineering study, organize tests and carry out the preliminary design and integration of the new vacuum system</li> <li>5. <b>ESR14:</b> Optimize the choice of control and diagnostic equipment</li> <li>6. <b>ESR14:</b> Design a new gas recuperation system taking into account radiation safety and contamination hazards</li> </ol>		
<b>Deliverables</b>	<p>D32. Report on existing facilities (<b>ESR13</b>)</p> <p>D33. Design report on the Cooling and Ventilation upgrade for HIE-ISOLDE (<b>ESR13</b>)</p> <p>D34. Vacuum engineering for the ultrahigh vacuum of the SC linac (<b>ESR14</b>)</p> <p>D35. Vacuum studies for the radio frequency quadrupole cooler and buncher RFQCB (<b>ESR14</b>)</p>		

# Scientific Highlights (8/9)

<b>Work package number</b>	<b>8</b>	<b>Start date or starting event:</b>	Month 12
<b>Work package title</b>	Radioactive Ion Beams Quality Improvements		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	<b>96 (ESR15: Mathieu Augustin 36 months; ESR16: Carla Babcock 36 months and ER3: Andrey Shornikov 24 months)</b>		
<b>Associated Partners</b>	JYFL, MPIK, NSCL-MSU, BNL, TRIUMF		
<b>Objectives</b>	The ESRs will acquire the necessary knowledge and collaborate to the different studies for the improvements of the radioactive ion beam quality in both resolution and purity.		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. <b>ESR15:</b> Define the functional and technical specifications for the production of an off-line separator</li> <li>2. <b>ESR15:</b> Assembly and commissioning of the off-line separator</li> <li>3. <b>ESR15:</b> Carry out design study of a high resolution magnet including the integration of multi-pole corrections</li> <li>4. <b>ESR15:</b> Elaborate the technical specifications and participate in the call for tender for the procurement in industry</li> <li>5. <b>ESR16:</b> Elaborate a functional and conceptual design of a Radio Frequency Quadrupole Cooler and Buncher (RFQCB)</li> <li>6. <b>ESR16:</b> Provide a design for a pre-mass separator and setup a test stand</li> <li>7. <b>ER3:</b> Carry out high-current electron beam simulations in order to establish a viable electron beam design</li> <li>8. <b>ER3:</b> Carry out beam-optics simulation of the A/q-separator connecting the EBIS breeder to the existing linac</li> </ol>		
<b>Deliverables</b>	<p>D36. Specifications for Off-line separator (<b>ESR15</b>)</p> <p>D37. Full design Report of high resolution magnet (<b>ESR15</b>)</p> <p>D38. Specifications for call for tender (<b>ESR15</b>)</p> <p>D39. Design report of a Radio Frequency Quadrupole Cooler and Buncher (<b>ESR16</b>)</p> <p>D40. Functional specifications and Conceptual Design Report of a Pre-mass separator (<b>ESR16</b>)</p> <p>D41. Final conference report and/or journal publication on test results (<b>ESR16</b>)</p> <p>D42. Preliminary report on magnetic field configuration and electron beam design (<b>ER3</b>)</p> <p>D43. First order mechanical design of electron gun, drift tube structures and collector (<b>ER3</b>)</p> <p>D44. Final report on magnetic field, electron beam and ion optics, electron collector design and charge breeding performance (<b>ER3</b>)</p>		

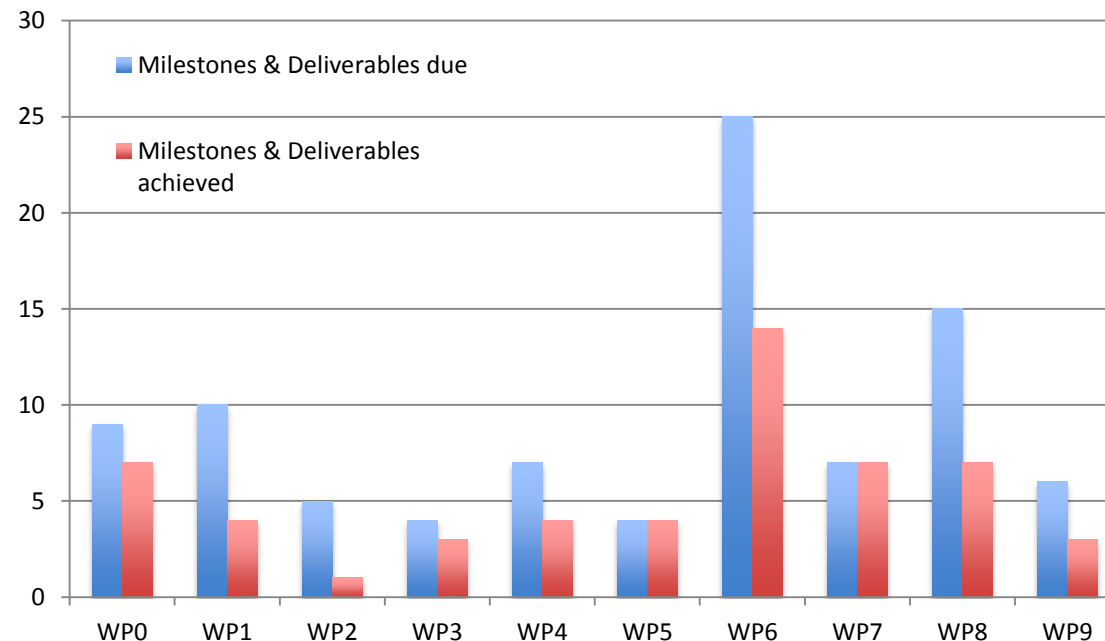


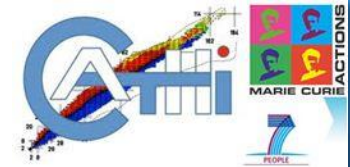
# Scientific Highlights (9/9)

<b>Work package number</b>	9	<b>Start date or starting event:</b>	Month 17
<b>Work package title</b>	General Safety and Radiation Protection Implication Studies		
<b>Activity Type</b>	RTD		
<b>Person-months</b>	24 (ER4: Sandra Giron)		
<b>Associated Partners</b>	GANIL, IPN-Orsay, CEA-Saclay, INFN-LNL, TRIUMF		
<b>Objectives</b>	<p>The ER will acquire the necessary knowledge in the radiation protection aspects of the extension of the REX post-accelerator for radioactive ions He will collaborate with the teams in charge of the rebuilding of the target area for allowing a primary beam power between 10 kW and 30 kW – a factor of 3 to 10 above the present beam power at ISOLDE. The ER will also participate actively in the startup of the machine.</p>		
<b>Description of work</b>	<ol style="list-style-type: none"> <li>1. Draft parts of the HIE-ISOLDE safety file dealing with radiation protection</li> <li>2. Provide professional assistance to solving questions of radiation safety</li> <li>3. Estimate the activation and radiation levels from beam loss of heavy ions</li> <li>4. Estimate the radiation levels from x-ray emission of RF cavities</li> <li>5. Apply and monitor the foreseen protection systems</li> <li>6. Assist in the commissioning of the new machine</li> </ol>		
<b>Deliverables</b>	<p>D45. Design report on the shielding of the future post-accelerator</p> <p>D46. Final report on the Estimation of the activation of the machine for the radioactive waste inventory</p>		

# Scientific Overview

- More details will follow in the individual presentations of the CATHI fellows
- **What's next:**
  - **Concentrate on final write up**

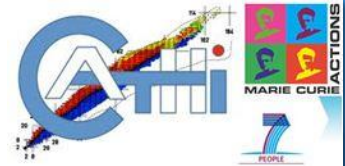




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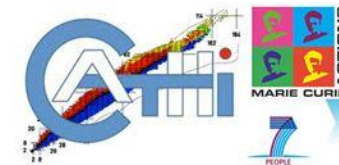
# WORKING TOGETHER



- CATHI partners
  - Pre-existing relationships and/or collaborations
  - CERN services tailored to support international collaborations
- EU funding covered People:
  - Researcher salaries + social conditions
  - Training & Mobility
  - ITN Management
  - Organization of workshops, conferences, schools, outreach
  - **Did cover a small fraction of the research project costs (prototype development)**

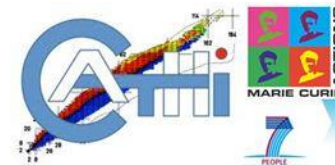


# List of Participants

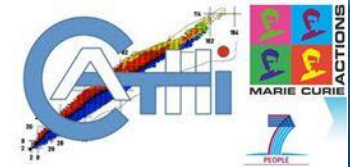


	Private Sector Participant	Country	Legal Entity Name	Department /Division/ Laboratory	Scientist-in-charge
<b>Full Network Partner</b>					
<b>1</b>		Switzerland	European Organization for Nuclear Research	Engineering Dept.	Yacine Kadi
<b>Associated Partners</b>					
<b>1</b>	√	Italy	CINEL		Sergio Bongiovanni
<b>2</b>		France	CNRS/IN2P3	IPN-Orsay	Sebastien Bousson
<b>3</b>		France	CNRS/IN2P3	LPC- Caen	Nigel Orr
<b>4</b>		UK	Cockroft Institute	Accelerator Science and Technology Center	Peter McIntosh
<b>5</b>		France	GANIL	Technique de la Physique	Pierre Delahaye
<b>6</b>		Italy	Istituto Nazionale di Fisica Nucleare	Laboratori Nazionali di Legnaro - LNL	Gianfranco Prete
<b>7</b>		Germany	Max Planck Institute	MPI- Heidelberg	Klaus Blaum
<b>8</b>		USA	Michigan State University	National Superconducting Cyclotron Laboratory	C. Konrad Gelbke
<b>9</b>	√	UK	Scientific Magnetics		Peter Penfold
<b>10</b>	√	France	SDMS		Pierre Maccioni
<b>11</b>	√	Italy	SIDEA		Marco Mauri
<b>12</b>		Finland	University of Jyväskylä	Physics Dept.	Ari Jokinen
<b>13</b>	√	Italy	ZANON		Ettore Zanon

# New Associated Partners



14	University of Liverpool	LIV	UK	Research and Scientific Training	Carsten P. Welsch c.p.welsch@liverpool.ac.uk
15	University of Manchester	MANU	UK	Research and Scientific Training	Roger M. Jones Roger.Jones@hep.manchester.ac.uk
16	CEA – IRFU	IRFU	FR	Research and Scientific Training	Valentin Blideanu valentin.blideanu@cea.fr
17	Brookhaven National Laboratory	BNL	USA	Research and secondment	Edward Beebe
18	Brandeis University	BRD	USA	Research and Scientific Training	Jim Bensinger bensinger@brandeis.edu
19	TRIUMF	TRIUMF	CA	Research and Secondment	Bob Laxdal lax@triumf.ca
20	University of Liberec	TUL	CZ	Research and Scientific Training	Miroslav Sulc
21	Regional Centre for Special Optics and Optoelectronic Systems	TOPTEC	CZ	Research and Scientific Training	Miroslav Sulc

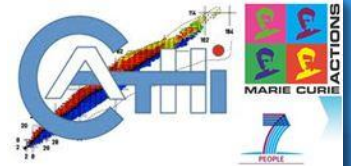


# Outline

- CATHI and HIE-ISOLDE
- Scientific Overview
- Networking
- **Administrative & Management Issues**
- Conclusions and Prospects



# Administrative & Management Issues

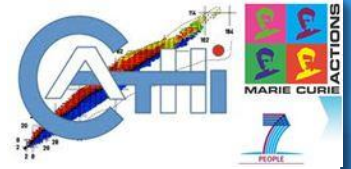


- ❖ There were no deviations from the original contract
- ❖ Slight re-adjustment of Deliverables and Milestones to account for the delay in the project
- ❖ Some secondment periods had to be re-scheduled (new partners, late recruitment, etc...)
- ❖ Given the difficulty in recruiting ER1, task was covered by CERN staff => ER1 re-oriented on cavity tuning strategy and cryomodule test
- ❖ 3 ESRs enrolled on a PhD programme.
- ❖ Additional recruitment of 1 ESR was made possible

# Periodic Reviews

- **Mid-Term Review:** *“I would like to congratulate to you, at the mid-term stage you have shown very good progress of your research and well running project network..... the project is excellent, fellows are happy in your network, they see it as a great opportunity for their research career”*
- **2<sup>nd</sup> Progress Report:** *“the CATHI Progress Report for Period 2 is accepted. The information provided in the report and attachment is clear and complete. It allows us to conclude that until now, the project seems to be running according to the plan”*

# Conclusions



- The presence of the CATHI fellows was paramount for the HIE-ISOLDE project:
  - Replace missing staff deployed on other high-priority projects (LS1, LHC Upgrade, L4, LIU, etc...)
  - Represent 1/3<sup>rd</sup> of the total manpower of the project and almost 2/3<sup>rd</sup> in the case of the Design Study !
  - Help establish or re-inforce existing collaborations
- Created a good spirit and teamwork within the project

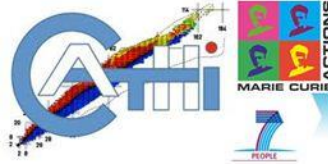


# From FP7 to Horizon 2020

- ❖ From Marie Curie Actions to Marie Skłodowska-Curie Actions
- ❖ No more mono-site ITNs ☹️
- ❖ From *Initial* to *Innovative* Training Networks
  - ✓ ESRs only
  - ✓ More industrial (non-academic) involvement
- ❖ The challenge to secure more funding for stimulating projects continues
- ❖ Next ITN application deadline: 13 Jan 2015!

# And finally...

- ❖ Over 4 years of FUN + interesting work 😊
- ❖ A great group of ESRs and ERs all at CERN
- ❖ A project that has never been forgotten by our first Project Officer Marcela Groholova
- ❖ Fellows finding jobs 😊
- ❖ Keep in touch!
- ❖ Have fun in Barcelona – Seamus « sorry I can't be there »



Thank you very much for your  
attention

HIE-ISOLDE web site -> <http://hie-isolde-test.web.cern.ch>

CATHI-ITN web site -> <https://espace.cern.ch/Marie-Curie-CATHI/default.aspx>