EUROPEAN COMMISSION
Research Executive Agency
Marie Curie Actions – Networks for Initial Training

Project No: 264330

Project Acronym: CATHI

Project Full Name: Cryogenics, Accelerators and Targets at HIE-ISOLDE

Marie Curie Actions

Periodic Report

Period covered: from 01/11/2010 **to** 31/10/2012

Period number: 1st

Project coordinator name:
Dr. Yacine Kadi

Version: 1

Date of preparation: 11/03/2013

Date of submission (SESAM): 10/04/2013

Project coordinator organisation name:
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Periodic Report

PROJECT PERIODIC REPORT

Grant Agreement number:	264330
Project acronym:	CATHI
Project title:	Cryogenics, Accelerators and Targets at HIE-ISOLDE
Funding Scheme:	FP7-MC-ITN
Periodic report:	1
Period covered - start date:	01/11/2010
Period covered - end date:	31/10/2012

Project co-ordinator:

Organisation PIC:	999988133
Organisation legal name:	EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Person in charge of scientific aspects:

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DECLARATION BY THE PROJECT COORDINATOR

I, Dr. Yacine Kadi, as co-ordinator of the project (264330, CATHI), hereby confirm that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;

- The project has achieved most of its objectives and technical goals for the period with relatively minor deviations;

- The project Website is up to date.

- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project and if applicable with the certificate on financial statement.

- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

PUBLISHABLE SUMMARY

Comments:

https://espace.cern.ch/Marie-Curie-CATHI/default.aspx

The publishable summary contains photos that cannot be pasted directly into the report. Please see attachment "ITN 264330 CATHI publishable-summary.pdf"

Expected impact:

Role of CATHI fellows in strengthening ties with industry, partner research institutions and major experimental facilities worldwide exemplified by the number of additional institutions and industry who asked to become associated partners 13 to more than 20 !

SRF development => interest from industry with direct impact on future accelerator projects LRF-Huelva for instance and CATE consortium for ESS

Beam diagnostic => heavy involvement of industrial partner AVS => patents => cross fertilisation with other Marie-Curie project (DITANET, LA3NET)

SC solenoid magnet => there is interest from industry (DANFYSIK, DK) to development a novel type of superconducting solenoid magnet with integrated steerers

Strengthening of the collaboration between the major radioactive ion beam facilities; operational experience (INFN-Legnaro, TRIUMF, SPIRAL2, ALTO)

Developments in target technology and beam preparation (WP6, 7 and 8) of direct relevance for new facilities like SPIRAL2 but also those under construction like FRIB, ESS and EURISOL => common approach to nuclear ventilation in collaboration with ESS (ESR Andrea Polato) and, in the case of charge breeding, setting-up of an international working group thanks to the initiative of ER Andrey Shornikov.

Expected results:

Detailed Design Report and Commissioning report of the facility to be disseminated worldwide with the following prototypes:

- Validation of high-gradient low-energy accelerating structure => big impact for accelerator technology (alternative to bulk niobium => sustainable and cheaper) and major prospect for technology transfer to industry (ESRs Noemi Jecklin, Irene Mondino and ER Pei Zhang).

- Novel beam diagnostic instrument for very low intensity radioactive beams => challenging and industrially qualified process (ESR Alejandro Garcia Sosa and ER Esteban Cantero).

- Novel magnet technology for SC solenoid => new product for DANFYSIK (ESR Panagiotis Farantatos).

- New alignment method validated (ESR Guillaume Kautzmann).

- New offline testing facility for target development and beam preparation => off-line and accessible to other scientist for testing the production of exotic beams but also for training future users in beam production.

- Validation of particle simulation tools for light nuclei transport => important for the design and operation of future facilities (ER Sandra Giron).

PROJECT OBJECTIVES FOR THE PERIOD

Comments:

Project coordination objectives:
As stipulated by the ITN requirements, the main objective of the project management is to monitor and follow-up the research training programme. The focus for this period is the following:
- Setup of the project organizational structure (Supervisory Board, Management Committee and Selection Committee)
- Setup of the project website/sharepoint
- Kick-off meeting of the joint Supervisory Board and Management Committee

Recruitment objectives:
- Complete selection and appointment of the Researchers by month 12

Training objectives:
- As stipulated by the ITN requirements, define clearly the training objectives of each Researcher in his/her Career Development Plan.
- Organize regular meetings and an annual plenary meeting of Researchers and Supervisors.
- Organize at CERN specialized training courses and tutorials by CERN experts and visiting scientists from the associated partners every 6 months.

Secondment objectives:
- Organize internships in industry and secondment at Associated Partners within the first year of recruitment.

S&T objectives:
- The scientific and technological objectives of the project have been achieved through nine parallel work packages listed below. Each of these work packages involves a collaboration between CERN and one or more of the associated partners:
- WP1: SC Cavity Development and Tests (ER1, ESR1, ESR2) - focusing initially on the development of Nb sputtered High-Beta Quarter Wave Resonators (optimization of the coating process and cold RF testing of prototype cavities at CERN).
- WP2: Beam Instrumentation Development (ER2, ESR3) - Design, construct and test of a prototype diagnostic box suitable for measuring very faint radioactive beams.
- WP3: Magnet Development (ESR4) - focusing initially on the design and procurement of compact warm magnets for the 10 A*MeV SuperConducting Linac and the high-energy beam transfer lines.
- WP4: Linac Integration and Innovative Alignment Method (ESR5, ESR6) - focusing initially on the full integration of the new SuperConducting Linac and high-energy experimental beam lines; and development of a novel alignment system based on BCAMs.
- WP5: Linac Commissioning (ESR7) - focused initially on the development of machine tune-up procedures that will later be implemented in the control software for the linac operation.
- WP6: Studies for ISOL Target & Front-End upgrades (ESR8, ESR9, ESR10, ESR11, ESR12) - focused on R&D work on ion sources, target material and beam purification.
- WP7: ISOLDE target area and Class-A Laboratory Upgrade (ESR13, ESR14) - focused on R&D work on HVAC, Cooling and Vacuum systems of the future HIE-ISOLDE facility.
- WP8: Radioactive Ion Beams Quality Improvements (ER3, ESR15, ESR16) - focusing initially on the design and fabrication of (i) an off-line separator test stand, (ii) a new Radio Frequency Quadrupole Cooler and Buncher (RFQCB), (iii) a pre-mass separator and (iv) a high-current electron beam gun.
- WP9: General Safety and Radiation Protection Implications Studies (ER4) - focusing initially on the estimation of the radiation levels from x-ray emission of RF cavities and the design of the shielding of the future post-accelerator.

WORK PROGRESS AND ACHIEVEMENTS DURING THE PERIOD

Comments:

Work of recruited researchers in attached file "ITN 264330 CATHI researcher summary.PDF".

Work progress and achievements are listed in detail in attached file "ITN 264330 CATHI progress and achievements.pdf".

DELIVERABLES AND MILESTONES TABLE

RECRUITMENT

Fellow First Name	Fellow Surname	Recruiting participant	Seconded from participant	Seconded to participant	Type of Contract	Category	Location of origin	Gender	Family charges	Start date of secondment/ recruitment	Duration of secondment / recruitment	End date of secondment/ recruitment	Working time commitment	Full-time equivalent person-months covered during the reporting period	Declaration of Conformity submitted
Mario	Hermann	CERN			A	ESR	DE-Germany	Male	No	01/04/2011	36	31/03/2014	Full Time	19	Yes
Pei	Zhang	CERN			A	ER	DE-Germany	Male	Yes	01/01/2013	22	31/10/2014	Full Time	0	Yes
Mathieu	Augustin	CERN			A	ESR	FR-France	Male	No	01/10/2011	36	30/09/2014	Full Time	13	Yes
Carla	Babcock	CERN			A	ESR	CA-Canada	Female	No	01/11/2011	36	31/10/2014	Full Time	12	Yes
Serena	Cimmino	CERN			A	ESR	FR-France	Female	No	01/01/2012	34	31/10/2014	Full Time	10	Yes
Panagioti s	Farantato s	CERN			A	ESR	EL-Greece	Male	No	01/10/2011	36	30/09/2014	Full Time	13	Yes
Alejandro	Garcia So sa	CERN			A	ESR	ES-Spain	Male	Yes	01/11/2011	36	31/10/2014	Full Time	12	Yes
Noemie	Jecklin	CERN			A	ESR	CH-Switzerland	Female	No	01/10/2011	36	30/09/2014	Full Time	13	Yes
Guillaume	Kautzmann	CERN			A	ESR	FR-France	Male	No	01/10/2011	36	30/09/2014	Full Time	13	Yes
Davide	Lanaia	CERN			A	ESR	IT-Italy	Male	No	01/11/2011	36	31/10/2014	Full Time	12	Yes
Jacobo	Montano	CERN			A	ESR	IT-Italy	Male	No	01/11/2011	36	31/10/2014	Full Time	12	Yes
Andrea	Polato	CERN			A	ESR	JP-Japan	Male	No	01/10/2011	36	30/09/2014	Full Time	13	Yes
Eleftheri os	Zografos	CERN			A	ESR	DE-Germany	Male	No	01/08/2011	36	31/07/2014	Full Time	15	Yes
Martino	Colciago	CERN			A	ESR	FR-France	Male	Yes	01/08/2011	36	31/07/2014	Full Time	15	Yes
Michal	Czapski	CERN			A	ESR	PL-Poland	Male	No	01/08/2011	36	31/07/2014	Full Time	15	Yes
Leonel	Morejon H ernandez	CERN			A	ESR	CU-Cuba	Male	No	01/02/2012	33	31/10/2014	Full Time	9	Yes
Sandra	Giron	CERN			A	ER	FR-France	Female	No	01/03/2012	24	28/02/2014	Full Time	8	Yes
Esteban	Cantero	CERN			A	ER	AR-Argentina	Male	Yes	01/06/2012	24	31/05/2014	Full Time	5	Yes
Andrey	Shornikov	CERN			A	ER	DE-Germany	Male	No	01/07/2012	24	30/06/2014	Full Time	4	Yes

Irene	Mondino	CERN			A	ESR	IT-Italy	Female	No	01/05/2011	36	30/04/2014	Full Time	18	Yes

No. of full-time equivalent months covered during this reporting period: 231

M - Months

RESR - Researcher

FAC B - Fixed amount contract B (%)

RECRUITMENT																																		
Participants	**R.1**	**R.2**	**R.3**	**R.4**	**R.5**	**R.6**	**R.7**	**R.8**	**R.9**	**R.10**	**R.11**	**R.12**	**R.13**	**R.14**	**R.15**	**R.16**	**R.17**	**R.18**	**R.19**	**R.20**	**R.21**	**R.22**	**R.23**	**R.24**	**R.25**	**R.26**	**R.27**	**R.28**	**R.29**	**R.30**	**R.31**	**R.32**	**R.33**	**R.34**	**R.35**	**R.36**
CERN	576	16		214	16		362	0		96	4		17	3		79	1			0			0			0			0			0			0	
Total	576	16		214	16		362	0		96	4		17	3		79	1			0			0			0			0			0			0	

R.1 : Foreseen months (ESR)
R.2 : Foreseen researchers (ESR)
R.3 : Foreseen Fixed amount contract B (%) (ESR)
R.4 : Implemented months (ESR)
R.5 : Implemented researchers (ESR)
R.6 : Implemented Fixed amount contract B (%) (ESR)
R.7 : Difference months (ESR)
R.8 : Difference researchers (ESR)
R.9 : Difference Fixed amount contract B (%) (ESR)
R.10 : Foreseen months (ER)
R.11 : Foreseen researchers (ER)
R.12 : Foreseen Fixed amount contract B (%) (ER)
R.13 : Implemented months (ER)
R.14 : Implemented researchers (ER)
R.15 : Implemented Fixed amount contract B (%) (ER)
R.16 : Difference months (ER)
R.17 : Difference researchers (ER)
R.18 : Difference Fixed amount contract B (%) (ER)
R.19 : Foreseen months (VS <10)
R.20 : Foreseen researchers (VS <10)
R.21 : Foreseen Fixed amount contract B (%) (VS <10)
R.22 : Implemented months (VS <10)
R.23 : Implemented researchers (VS <10)
R.24 : Implemented Fixed amount contract B (%) (VS <10)
R.25 : Difference months (VS <10)
R.26 : Difference researchers (VS <10)
R.27 : Difference Fixed amount contract B (%) (VS <10)
R.28 : Foreseen months (VS >10)
R.29 : Foreseen researchers (VS >10)
R.30 : Foreseen Fixed amount contract B (% (VS >10)
R.31 : Implemented months (VS >10)
R.32 : Implemented researchers (VS >10)
R.33 : Implemented Fixed amount contract B (%) (VS >10)
R.34 : Difference months (VS >10)
R.35 : Difference researchers (VS >10)
R.36 : Difference Fixed amount contract B (%) (VS >10)

Comments:

There was a very slow start to the recruitment with difficulties in finding ESR candidates of the appropriate quality and level - an issue that is being observed by other ITNs at CERN. In addition to contacts through the recruiting groups at CERN, there was extensive use of advertising via social media by CERN's HR department (LinkedIn, Facebook, Twitter, Institute of Physics, Institute of Engineering and Technology). CATHI was also promoted in presentations by the scientists and engineers in talks they gave, and the HR deparment included Marie Curie Actions in their recruitment presentations around Europe and beyond.

Via the CERN e-recruitment website, we received about 150 applications for the ESR positions and selected 10 in the first year of ITN; we also used applications to the regular CERN Fellowship programme as a source of candidates as there was a feeling that we should have had more applications in response to the specific CATHI call for applicants; there was also a felling among the recruiting supervisors that there was a certain lack of quality in the level of MSc applicants. There has been a significant push to complete the recruitment of the ESRs and four more will start on 1 November 2011 (thereby benefiting from the full 36 months) and the final two ESRs at the start of 2012. One of the ESRs from Cuba encountered delays due to visa obtention.

The focus will now switch to the recruitment of the ERs.

We are paying particular attention to gender and will report on the results in the MTR and Periodic Reports. In so far as possible, candidates were invited to CERN for interview so that they could meet potential colleagues and see the facilities (the furthest a candidate travelled was from Cairo to Geneva); otherwise, interviews were held by Skype / video conference.

Total loss in recruitment months: 5 ESR + 2 ER.

INTERNATIONAL CONFERENCES / EVENTS OPEN TO EXTERNAL RESEARCHERS

Event Number	Participant hosting the event	Type of Event	Month when the event took place	Start date of the event	End date of the event	Total number of researchers outside the network attending the event	Total number of researcher days for researchers from outside the network attending the event	Website of the event
1	CERN	W12 (in Annex 1) - International Workshop on the upgrade of the HIE-EBIS	24	16/10/2012	17/10/2012	33	66	
2	CERN	W1 (in Annex 1) - invited speaker Jurgen Halbritter (Cornell), Thin film technology and SRFtheory (related to WP1)	19	10/05/2012	10/05/2012	25	12	

Total number of researchers outside the network attending the event	Total number of researcher days for researchers from outside the network attending the event
58	78

Planned number of researcher days for researchers from outside the network attending the event: 0

Remaining number of researcher days for researchers from outside the network attending the event: -78

I declare that the events in category F for which a contribution is claimed did not give rise to a profit: Yes

Comments:

There were no specific CATHI events organized as priority was given to recruitment in year 1. For those ESRs who started their employment contracts in year 1, they attended several training events and seminars to help them become familiarized with the field of CATHI's muti-disciplinary aspects. Workshops and seminars are being planned for year 2 and were addressed in the MTR and in this Periodic Report. Spending in Column D is going well and is under control; following discussion with the PO at the MTR in September 2012, we will pay special attention to spend Column E in the second period.

MILESTONES

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved	Actual / Forecast achievement date
01	Kick-off of Management Committee	30/11/2010	Yes	23/05/2011
02	First ESR appointment	01/02/2011	Yes	01/04/2011
03	Complete selection and recruitment of all ESRs and ERs	01/11/2011	Yes	01/01/2013
04	Cavity development conceptual design and specifications	01/10/2012	Yes	01/10/2012
05	LLRF system conceptual design and specifications	01/01/2014	No	
06	Conceptual design and specifications for QWRs	01/10/2011	Yes	01/10/2011
07	Cold test of QWR cavity prototype	01/05/2012	No	
08	Cavity and cryomodule tests - procedures and recording of test results	01/05/2014	No	
09	Solid state detectors: production and commissioning of prototype	01/05/2014	No	
10	Identification of requirements	01/01/2012	Yes	01/04/2012
11	Commissioning of magnets	01/10/2014	No	
12	Identification of equipment and infrastructure	01/08/2012	Yes	01/08/2012
13	CAD of integration studies	01/02/2014	No	
14	Identification of requirements for BCAM test	01/01/2012	Yes	01/04/2012
15	Modification of mechanical elements and data acquisition	01/10/2012	Yes	31/10/2012

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved	Actual / Forecast achievement date
16	Alignment of SC linac	01/10/2014	No	
17	First tests with beam	01/11/2013	No	
18	Full scale test, characterize beam quality and linac performance	01/11/2014	No	
19	Identification of target materials and future proposals	01/01/2012	Yes	01/01/2012
20	Off-line studies of potential target materials	01/02/2013	Yes	01/08/2012
21	On-line studies of potential target materials	01/08/2013	No	
22	Post irradiation analysis	01/01/2013	No	
23	Off-liine studies	01/01/2014	No	
24	On-line studies with laser vibrometer	01/07/2014	No	
25	Simulation of present layout	01/08/2012	Yes	31/10/2012
26	Design of new target	01/02/2013	No	
27	Design of shielding scenarii	01/08/2013	No	
28	Validation through measurements	01/02/2014	Yes	01/05/2012
29	Identification of requirements for project	01/02/2012	Yes	01/02/2012
30	Control system functional specifications	01/05/2012	Yes	01/05/2012
31	Front-end control system design study	01/05/2013	No	
32	HSR magnet control system design study	01/05/2014	No	
33	International market survey, call for tender documents	01/10/2014	No	
34	Identification of vacuum	01/10/2011	Yes	01/04/2012

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved	Actual / Forecast achievement date
	requirements			
35	Prototype testing	01/04/2013	No	
36	Assembly and commissioning of off-line separator	01/10/2014	No	
37	Set up pre-mass separator test stand	01/11/2013	No	
38	Prototype testing	01/05/2014	No	
39	Evaluation of requirements	01/01/2013	No	
40	Report on magnet configuration and Electron Beam design	01/05/2013	No	
41	Setup of cathode test bench	01/02/2014	Yes	31/10/2012
42	Comparison of different radiation transport codes	01/06/2012	No	
43	Estimation of beam loss of heavy ions	01/10/2012	No	
44	Estimation of radiation levels from x-ray emission of RF cavities and comparison with measurements	01/02/2013	No	
45	Incurred radiation levels during maintenance	01/11/2013	No	

Comments:

At the time of submitting the report (April 2013), 25/45 milestones achieved and 13/46 deliverables in the period. The table above only shows those which were completed in the reporting period. However, a full update of the status is contained in the attached file "ITN 264330 CATHI progress and achievements.pdf". All the achieved milestones and deliverables have been produced and uploaded to the website.

ADDITIONAL INFORMATION

Fellows First name	Fellows Surname	Living allowance (€)	Mobility allowance (€)	Travel distance (km)	Travel allowance (€)	Career allowance (€)
Mario	Hermann	40406.70	550.50	300	250.00	2000.00
Pei	Zhang	62096.40	880.80	862	500.00	0.00
Mathieu	Augustin	40406.70	550.50	8970	2000.00	2000.00
Carla	Babcock	40406.70	550.50	2820	1500.00	2000.00
Serena	Cimmino	40406.70	550.50	10	250.00	2000.00
Panagiotis	Farantatos	40406.70	550.50	1710	500.00	2000.00
Alejandro	Garcia Sosa	40406.70	880.80	998	500.00	2000.00
Noemie	Jecklin	40406.70	550.50	10	250.00	2000.00
Guillaume	Kautzmann	40406.70	550.50	308	250.00	2000.00
Davide	Lanaia	40406.70	550.50	1208	750.00	2000.00
Jacobo	Montano	40406.70	550.50	450	250.00	2000.00
Andrea	Polato	40406.70	550.50	9350	2000.00	2000.00
Eleftherios	Zografos	40406.70	550.50	365	250.00	2000.00
Martino	Colciago	40406.70	880.80	10	250.00	2000.00
Michal	Czapski	40406.70	550.50	1147	750.00	2000.00
Leonel	Morejon Hernandez	40406.70	550.50	8078	2000.00	0.00
Sandra	Giron	62096.40	550.50	402	250.00	0.00
Esteban	Cantero	62096.40	880.80	12380	2500.00	0.00
Andrey	Shornikov	62096.40	550.50	400	250.00	0.00
Irene	Mondino	40406.70	550.50	175	250.00	2000.00

Indicate any additional information, which may be considered useful to assess the work done during the reporting period. The socio-economic aspect of the project may be addressed in this section. If applicable, propose corrective actions related to discrepancies between planned and executed deliverables and milestones.

Career Exploratory Allowance only for those who had been recruited for at least 12 months in the reporting period.

DISSEMINATION ACTIVITIES

Comments:

Outreach video: http://cds.cern.ch/record/1474613

CERN relay race 2012: CATHI fellows ran in the annual relay race around the CERN site wearing the CATHI t-shirt!

Planned: special poster for CATHI at the EMIS 2012 conference in Matsui, Japan in December 2012.

Planned: SRF 2013 - Paris, September 2013, there will be a special stand at the conference as well as sponsorship of young researchers from developing countries (organization ongoing).

PROJECT MANAGEMENT

Comments:

As indicated to the Project Officer at the MTR, we will add seven associated partners (making a total of 20) - paperwork to follow.

Regarding use of the Management Costs : these have been charged for administrative support to the scientist in charge and for the overall financial and administrative management of the project by the Resources Planning and Control Group and the HR Department on the basis of timesheets.

Slight deviation to ER1 due to late recruitment: research topic modified from low-level RF development to cryo-module prototype test (explained in the detailed report on work progress).
The revised schedule is in the attached file "ITN 264330 CATHI revised schedule.pdf".

FINANCIAL STATEMENTS – FORM C AND SUMMARY FINANCIAL REPORT

Comments:

CERTIFICATES

List of Certificates which are due for this period, in accordance with Article II.4.4 of the Grant Agreement.

Beneficiary	Organisation short name	Certificate on the financial statements provided?	Any useful comment, in particular if a certificate is not provided
1	CERN	Yes	

Attachments	ITN 264330 CATHI progress and achievements.pdf, ITN 264330 CATHI publishable-summary.pdf, ITN 264330 CATHI researcher summary.pdf, ITN 264330 CATHI revised schedule.pdf
Name	
Date	

This declaration was visaed electronically by Seamus HEGARTY (ECAS user name nhegarse) on 10/04/2013