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# EuCARD

European Coordination for Accelerator Research and Development

Seventh Framework Programme, Capacities Specific Programme, Research Infrastructures, Combination of Collaborative Project and Coordination and Support Action

# INTERIM ACTIVITY REPORT

# INTERIM REPORT FOR SEMESTER 1: WP4 ACCNET

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## Delivery Slip

| | Name | Partner | Date |
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## 1. EXECUTIVE SUMMARY

In the first semester, from April to September 2009, the EuCARD WP4 Accelerator Science Networks have begun their studies on upgrades of European research accelerator infrastructures, in particular pertaining to the high-luminosity upgrade of the LHC at CERN, the upgrade of the LHC injector complex, the FAIR project at GSI, the XFEL at DESY, and future linear colliders.

Several presentations with AccNet results were delivered at the 2009 Particle Accelerator Conference in Vancouver, the EPS HEP2009 Conference in Krakow, and the LLRF09 Conference in Tsukuba, including two invited talks on the LHC upgrade plans.

An AccNet topical workshop on LHC crab cavities, "LHC-CC09", jointly organized with US-LARP, KEK and CI/Daresbury laboratory in September 2009, has highlighted the importance of crab cavities for an LHC luminosity upgrade and has given rise to a number of actions. At the occasion of this workshop, an international advisory board has been formulated. A revision of the plans for the upgrades of the LHC complex and LHC interaction region has been set into motion. LHC-CC09 was supported by both the AccNet EuroLumi and RFTech Tasks.

Planning has progressed for a second AccNet-EuroLumi topical workshop on anti electron-cloud coatings which do not require activation, "AEC'09," held at CERN in the first week of October,. Preparation has also started for further AccNet mini-workshops, on crystal collimation, scheduled for December 2009, on proton-driven plasma accelerations including a possible demonstration experiment in December 2009 or spring 2010, and on contributions from the high-energy physics community to medical accelerator developments in February 2010. A discussion meeting on proton-driven plasma acceleration with interested parties was held at CERN on 15 September 2009.

An important deliverable in 2009 was the establishment of an AccNet web site at LAL. After some initial difficulties with computer security policies, the possibility of editorial access to most of the AccNet web site has been provided for all work package and task coordinators. AccNet mailing lists have also been set up, and contact persons from all participating institutes have been compiled for both EuroLumi (WP4.2) and RFTech (WP4.3).

Man power and budget plans for the full duration of the program have been drafted.

Concerning dissemination, AccNet WP4.1 has contributed to two articles in the second EuCARD newsletter, one summarizing the LHC-CC09 workshop and the AccNet activity as a whole, and the other reporting on the novel idea of proton plasma acceleration. Two seminar talks were given at DESY and at the University of Heidelberg.

One outstanding issue is the publication of EuCARD documents in a special series, which has not yet been formally established. Another outstanding question concerns the reimbursement procedures and rules, especially for external experts attending AccNet workshops.

## 2. TASK 1 - ACCNET COORDINATION AND COMMUNICATION

The activities of this task are to oversee and coordinate the EuroLumi and RFTech networks between them and with all other relevant Work Packages in EuCARD, to ensure the consistency of the WP work according to the project plan and allocate and control network budgets. The coordination duties also include the organization of AccNet internal steering

meetings, the reporting to the project management, the contribution to the Annual Meetings and the distribution of the information within AccNet as well as to the other work packages running in parallel. In addition the task covers the organization of, and/or support to, activity workshops or specialized working sessions, implying the attendance of invited participants from inside and outside the consortium.

## 2.1. WORK PROGRESS AND ACHIEVEMENTS DURING THE SEMESTER

AccNet Web site and mailing lists have been created. A group of contact persons at participating institutes has been compiled. Several topical mini-workshops have been organized.

A first RFTech videoconference steering meeting was held on 30 March, addressing organizational matters, with J.M. De Conto, F. Zimmermann, W. Weingarten, M. Grecki, and J.P. Koutchouk participating.

Coordinator A. Variola participated in the First EuCARD Steering Committee Meeting at CERN, 3 April 2009, and in the Second Steering Committee Meeting (Audio Conference) on 30 June 2009, where he presented the progress and plans of AccNet.

Two articles were contributed to the second EuCARD newsletter, summarizing the LHC-CC09 workshop and the AccNet activity as a whole, and describing the prospects of proton plasma acceleration, respectively.

Four outreach seminars or invited presentations, respectively, were delivered at two partner institutes and at two major conferences.

AccNet WP4.1 has also contributed to an Academic Training lecture series at CERN on scenarios for the LHC luminosity upgrade (http://indico.cern.ch/conferenceDisplay.py?confId=55043 ).

## 2.2. DELIVERABLES

D.4.1.1 - A continually updated AccNet web site was created ( http://accnet.lal.in2p3.fr/ ) and documented in a report (https://edms.cern.ch/file/1001866/4/EuCARD-Del-D4.1.1-D4.2.1-D4.3.1-1001866-v3.0.pdf ).

The completed deliverables are publicly available from the web link http://cern.ch/EuCARD/about/results/deliverables/ .

## 2.3. MILESTONES

M.4.1.1 – The first RFTech videoconference steering meeting on 30 March surveyed organizational matters. A general AccNet Steering meeting will be organized during the Second EuCARD Steering Committee meeting in November 2009 at Frascati.

## 2.4. PLANS FOR NEXT SEMESTER

An AccNet Steering meeting is planned to be held at Frascati in November 2009.

The AccNet web site will be continually updated.

Networking results will be disseminated.

## 2.5. SUMMARY OF HUMAN RESOURCES

Summary of the managerial man-power efforts of the participants involved in this Task.

Period: 1.04.2009 - 30.09.2009
Task 1 of WP 4

| | **man-power used** |
|---|---|
| **CERN** | 38% (of 0.63 person-months) |
| **CNRS** | 43% (of 0.56 person-months) |

### ANNEX: LIST OF WP4.1 PUBLICATIONS

A list of all publications that have resulting from work performed in this EuCARD Task during the reference period:

- F. Zimmermann, K. Kahle, CERN
  "Start by probing the crab cavities"
  - EuCARD Newsletter no. 2
  - Published
- A. Caldwell, G. Xia, MPI München; K. Lotov, BINP; A. Pukhov, Heinrich-Heine-Universität Düsseldorf; R. Aßmann, K. Kahle, F. Zimmermann, CERN
  "Breaking news for Proton "Surfatrons""
  - EuCARD Newsletter no. 2
  - published

## 3. TASK 2 - EUROLUMI

EuroLumi is the European forum for discussing performance limitations of high-intensity high-brightness accelerators, with emphasis on hadron facilities. It will help analyze and optimize the proposed upgrades of these facilities, and will also explore advanced future schemes such as proton driven plasma acceleration and medical applications of accelerators. In particular EuroLumi aims at realizing the full potential of the LHC, by means of LHC luminosity upgrades and new or enhanced LHC injectors. It also supports the SIS upgrade and the FAIR project at GSI.

### 3.1. WORK PROGRESS AND ACHIEVEMENTS DURING THE SEMESTER

EuroLumi Web site and mailing lists were created. Several topical mini-workshops were organized or are in preparation.

Presentations of EuroLumi results were given at the 2009 Particle Accelerator Conference and the 2009 EPS High Energy Physics Conference.

A topical AccNet workshop on crab cavities, "LHC-CC09," was jointly organized by EuroLumi and RFTech, together with US-LARP, KEK, & Daresbury Lab/Cockcroft Institute and CERN, from 16 to 18 September 2009. There were 50 registered participants, about half of whom from CERN, 3 from KEK, 4 from CI/DL, 3 from BNL, 1 from SLAC, 2 from FNAL, 1 from Cornell, 1 from JLAB, 1 from INFN, and 1 from DESY. The workshop was organized in 11+1 sessions, each with 30-60 min.

discussion. A session of the newly created LHC Crab-Cavity Advisory Board completed the event, and strongly endorsed crab cavity R&D for the LHC as well as an action plan for the near and medium-term future, providing an important guidance to the European and international collaborators.

A second topical workshop on anti electron-cloud coatings has been prepared for October 2009. Further three mini-workshops - on crystal collimation, plasma acceleration and medical applications - are foreseen in the period from December 2009 to February 2010. A possible demonstration experiment for proton-driven plasma acceleration was discussed in a special meeting at CERN, on 15 September 2009.

EuroLumi has supported a 2-month stay at CERN by Mexican summer student Humberto Maury Cuna of CINVESTAV, Mexico, who performed electron-cloud simulations for the nominal LHC and various LHC upgrade scenarios. It has also initiated a 6-weeks visit by Chandrashekara Bhat of FNAL (financed through US-LARP) for experimental and numerical studies of longitudinal bunch manipulations and beam stability for the "Large Piwinski Angle" scenario of the LHC upgrade.

EuroLumi has supported the incremental travel costs for one participant of LHC-CC09 and member of the crab cavity Advisory Board, and some of the (moderate) workshop charges.

### 3.2. DELIVERABLES

D.4.2.1 - A continually updated EuroLumi web site has been created (http://accnet.lal.in2p3.fr/Tasks/Eurolumi/ ) and documented in a report (https://edms.cern.ch/file/1001866/4/EuCARD-Del-D4.1.1-D4.2.1-D4.3.1-1001866-v3.0.pdf ).

The AccNet web site features the main objectives, the network structure, activity reports, link to the WP4 Collaboration Workspace, job opportunities, workshops, literature and presentations, and links, as well as access to the web sites of the two sub tasks EuroLumi and RFTech, and "Hot News" .

The completed deliverables are publicly available from the web link http://cern.ch/EuCARD/about/results/deliverables/ .

### 3.3. MILESTONES

M4.2.1: Instead of a general annual EuroLumi workshop, several topical mini-workshops are being organized and supported during this first year. One reason for the choice of a series of mini-workshops is the high efficiency of such topical workshops; another reason was the perceived need to minimize interference with LHC consolidation and re-commissioning. The first topical AccNet workshop, LHC-CC09, was held in September, the second AEC'09 in October. Additional EuroLumi mini-workshops will address crystal collimation (December 2009), medical applications (February 2010), and plasma acceleration (December 2009 or spring 2010). For spring or fall 2010 a first major EuroLumi workshop is planned.

### 3.4. PLANS FOR NEXT SEMESTER

In the second semester, AccNet will organize or co-support a number of additional topical mini-workshops, as have just been specified, namely on anti-electron-cloud coatings, "AEC'09," in October 2009, crystal collimation (December 2009), medical applications (February 2010), and proton plasma acceleration (December 2009 or spring 2010). AccNet will also contribute to the

CERN Chamonix'10 workshop, which will feature several sessions devoted to the LHC upgrade.

### 3.5. SUMMARY OF HUMAN RESOURCES

Summary of the man-power efforts of the participants involved in this Task.

Period: 1.04.2009 - 30.09.2009
Task 2 of WP 4

| | **man-power used (FTE)** |
|---|---|
| **CERN** | 38% (of 0.63 person-months) |

## ANNEX: LIST OF WP4.2 PUBLICATIONS

A list of all publications that have resulting from work performed in this EuCARD Task during the reference period:

- F. Zimmermann, CERN
  "CERN Upgrade Plans for the LHC and Its Injectors"
  - Proceedings EPS HEP2009 Krakow 17 July 2009
  - Accepted

- C. Bhat, FNAL; F. Caspers, H. Damerau, S. Hancock, E. Mahner, F. Zimmermann, CERN
  "Stabilizing Effect of a Double-Harmonic RF System in the CERN PS"
  - PAC'09 Vancouver
  - Published

- R. Calaga, R. De-Maria, BNL; R. Assmann, J. Barranco, F. Caspers, E. Ciapala, T. Linnecar, E. Metral, Y. Sun, R. Tomas, J. Tuckmantel, T. Weiler, F. Zimmermann, CERN; N. Solyak, V. Yakovlev, FNAL; Y. Funakoshi, N. Kota, O. Yukioshi, A. Morita, Y. Morita, KEK; G. Burt, Lancaster U; J. Qiang, LBNL; P .A. McIntosh, DL/ASTeC); A. Seryi, Z. Li, L. Xiaa, SLAC
  "Status of LHC Crab Cavity Simulations and Beam Studies"
  - PAC'09 Vancouver
  - Published

- Y.-P. Sun, F. Zimmermann, R. Tomas,
  "Tune Shift Due to Crossing Collision and Crab Collision"
  - PAC'09 Vancouver
  - Published

- Y.-P. Sun, R. Assmann, J. Barranco, R. Tomas, T. Weiler, F. Zimmermann, CERN; R. Calaga, BNL; A. Morita, KEK
  "Study with One Local Crab Cavity at IR4 for LHC"
  - PAC'09 Vancouver
  - Published

- J.P. Koutchouk, F. Zimmermann,
  "LHC Upgrade Scenarios"
  - PAC'09 Vancouver
  - Published

## 4. TASK 3: RFTECH

The goals of RFTech are to provide a network for information exchange and close collaboration between the European, and worldwide, experts on accelerator RF systems. The scientific objectives are the improvements of RF cavity design, superconducting RF (equipment for R&D and test of cavities and cryomodules), low-level and high-power RF systems, and costing tools.

### 4.1. WORK PROGRESS AND ACHIEVEMENTS DURING THE SEMESTER

The ACCNET web site http://accnet.lal.in2p3.fr has been implemented (23/04/2009), including the RFTech web pages. A deliverable report has been published, describing the sites, their scope and their structure and is available at https://edms.cern.ch/file/1001866/4/EuCARD-Del-D4.1.1-D4.2.1-D4.3.1-1001866-v3.0.pdf.

The LHC Crab Cavity Workshop "LHC-C09" was held at CERN from 16 to 18 September 2009, jointly organized by AccNet, US-LARP, KEK, Cockcroft Institute/Daresbury Laboratory and CERN. The workshop program covered both EuroLumi and RFTech activities.

In the frame of the sLHC program, upgrade studies are underway for the Superconducting Proton Accelerator at CERN (SPL). Contacts to European and worldwide experts on superconducting RF have been established in order to create an international working group dedicated to cavities and accessories. Besides CERN experts, it comprises by now individuals from CNRS-IPN-Orsay, CEA-Saclay (France), BNL (USA), TRIUMF (Canada), and University of Rostock (Germany). This working group took part in two SPL collaboration meetings. A third meeting (http://indico.cern.ch/conferenceDisplay.py?confId=63935) is scheduled for November 2009.

### 4.2. DELIVERABLES

D.4.3.1 - A continually updated EuroLumi web site has been created (http://accnet.lal.in2p3.fr/Tasks/Rftech/ ) and documented in a report (https://edms.cern.ch/file/1001866/4/EuCARD-Del-D4.1.1-D4.2.1-D4.3.1-1001866-v3.0.pdf ).

The completed deliverables are publicly available from the web link http://cern.ch/EuCARD/about/results/deliverables/ .

### 4.3. MILESTONES

M4.3.1: Annual RFTECH workshop. Deadline is March 2010 (month 12).

### 4.4. PLANS FOR NEXT SEMESTER

The main objective will be the organization of the first RFTECH workshop.

Financial support will be provided to 4 persons, to attend the LLRF09 workshop (to be held in Japan at the end of October 2009). The total amount is estimated to be about 10 kE.

### 4.5. SUMMARY OF HUMAN RESOURCES

The global effective manpower (coordination at CERN, Hamburg and Grenoble) is about 60 person-hours (meetings, mainly).

Period: 1.04.2009 - 30.09.2009
Task 3 of WP 4

| | **man-power used** |
|---|---|
| **CERN** | 48% (of 0.25 person-months) |
| **DESY** | 45% (of 0.45 person-months) |
| **UJF** | 39% (of 0.70 person-months) |

### ANNEX: LIST OF WP4.3 PUBLICATIONS

There are no RFTech publications for this first semester.