

**Special Interest
Articles:**

- **Announcement
DITANET
Symposium
May 2012**
- **First DITANET
PhD Thesis
completed**

**Individual
Highlights:**

Forthcoming Events	2
News from DITANET Partners	5
New to the Network	7
Vacancies	8

One Step Further: Linking Beam Diagnostics R&D with Beam Dynamics Studies and Numerical Simulation Codes

The optimization of the performance of any particle accelerator critically depends on an in-depth understanding of the beam dynamics in the machine and the availability of simulation tools to study and continuously improve all accelerator components. It also requires a complete set of beam diagnostics methods to monitor all important machine and beam parameters with high precision and a powerful control and data acquisition system.

Within the recently approved oPAC project, all these aspects will be closely linked with the aim

to optimize the performance of present and future accelerators that lie at the heart of many research infrastructures. Thereby, oPAC takes the DITANET ideas one step further. With a maximum project budget of 6 M€, 22 early stage researchers will be trained during the four year project duration, and a broad training program will be offered to the whole accelerator community. I strongly encourage every researcher interested in this initiative to get involved early on.

DITANET itself saw again many highlights: The consortium organized its 8th Topical Workshop at CERN with a record number of participants. The network also saw the first PhD thesis of its trainees completed and many other projects nearing completion. Finally, DITANET will organize a scientific symposium to celebrate the different successes realized during the past four years (see below) and I would like to use this opportunity to cordially invite you to this event!



Carsten P. Welsch, Coordinator

Particle Accelerators - Vital for Science

Liverpool, UK - 16th May 2012

The DITANET Consortium in collaboration with the QUASAR Group at the Cockcroft Institute will organize a Symposium on Antimatter Research, Beam Instrumentation and Researcher Training on the afternoon of Wednesday 16th May. The programme will

include talks from research leaders, industry experts and policy makers on the future challenges in beam diagnostics, the importance of technology transfer for science and the challenges associated to antimatter research. Researcher training will be focused upon during the

second half of the symposium, covering current training and trends. A poster session will give all participants the opportunity to present their research activities. **Registration will open shortly; in the meantime please add this event to your diaries!**

FORTHCOMING EVENTS



DITANET Trainees – Advanced Skills Training

Liverpool, UK – 14th and 15th May 2012

In response to requests from DITANET Trainees to hold a skills school, which will benefit them as they end their contracts and begin to look for employment, an Advanced Skills School will be held in Liverpool.

This will take place in the days immediately before the Symposium on Antimatter Research, Beam Instrumentation and Researcher Training. Topics covered will include CV writing, composing competitive

grant applications and an introduction to interview techniques. Full details will be issued to those concerned by mid March. This event will be open to all DITANET Trainees and provide an opportunity for them to network.



DITANET Conference Stand at IPAC

New Orleans, USA – 21st to 23rd May 2012

During IPAC 2012 DITANET will host a conference stand and we cordially invite those of you attending to come and visit us there. The stand will be open from the afternoon of Monday 21st until the afternoon Wednesday 23rd May. DITANET will present the

outcomes of all research projects undertaken and its broad international training program. Additionally, the work of two new Marie Curie Initial Training Networks, LA³NET and oPAC, will be introduced. This will provide an opportunity to see firsthand the projects

that run throughout these networks, the training events offered, the partners involved and to meet the management teams behind them.

We look forward to welcoming you!



DITANET Marie Curie Finance Workshop

Liverpool, UK - 19th March 2012

DITANET was one of the very first Marie Curie Initial Training networks funded by the EC. Many new online tools for the setup of the project, finance and research reporting, etc. have been introduced over the past four years. Furthermore, the Marie Curie rules and regulations have been continuously developed

and further improved. In order to impart the experience gained DITANET will host a dedicated Marie Curie finance administration training in Liverpool on March 19th.

This workshop will last from 10:00 - 16:30 and will cover all important aspects concerning finance administration and

reporting in Marie Curie Initial Training Networks, as well as an introduction to Marie Curie Actions. As usual, all training material will be made available via the DITANET homepage and VOCAL area.

Further details can also be obtained from our EU Finance Administrator:

Sue.Davies@liv.ac.uk

Recent Events

7th DITANET Topical Workshop on Beam Loss Monitoring

DESY, Germany
5th to 7th December 2011

The 7th DITANET Topical Workshop took place at DESY, Hamburg (Germany) on 5–7th December 2011. The Workshop was devoted to the important beam diagnostics field of beam loss monitoring that is used for people and machine protection. The main scope of the event was to review novel detector developments in the applications of Beam Loss Monitoring. Aspects of detector simulation and calibration as well as practical operation were covered.

The Workshop brought together 22 participants including both world recognized experts and young scientists and students who take their

first steps in the field. Most of the participants were from Europe (CERN, DESY, Sinchrotrone Trieste, ESRF, Stockholm University, Fraunhofer Institute and Technical University Darmstadt and University of Liverpool) but there were also participants from the United States of America (SLAC National Accelerator Laboratory and Brookhaven National Lab) and from Russia (MEPHi).

This two and a half day Workshop included invited and contributed talks with extended discussions (17 talks), a round table discussion devoted to the interesting topics that were not covered during the previous talks and a visit

to DESY Free-Electron Laser FLASH. One of the most popular themes for discussion during the Workshop concerned Cherenkov fiber detectors that become more and more popular these days. Three talks were devoted to this topic covering simulations, practical aspects of operation and obtained experience.

Further Information:

indico.cern.ch
confID: [154172](#)



"You do not need a BLM-System as long as you have a perfect machine without any problems. However, you probably do not have such a nice machine; therefore you better install one..."
(K. Wittenburg)



Recent Events

8th DITANET Topical Workshop on Beam Position Monitors

CERN, Switzerland
16th to 18th January 2012

January 16-18th saw CERN hosting the 8th DITANET Topical Workshop on Beam Position Monitors (BPM). The event took place over two and a half days and included 28 talks. It covered all aspects of Beam Position Monitoring systems: new trends in pick-up design, review of radio-frequency simulation tools, update on high resolution BPM technology and an

exhaustive review of acquisition electronics for both linear and circular accelerators. In all 53 experts in BPM technology came from all over the world to present their work and their most recent achievements. With the presence of researchers from experimental, theoretical and simulations fields, the workshop provided an opportunity to discuss common issues and an

excellent training for three of the DITANET trainees who took part.

Further Information:

indico.cern.ch
confID: [164082](#)



News from DITANET Partners

University of Liverpool, UK (*T. Cybulski, C.P. Welsch*)
Beam current monitor at the Clatterbridge Centre for Oncology



A prototype of a non-interceptive real-time beam current monitor has been under development at the Cockcroft Institute. Proton kinetic energy transfer to a medium shows its maximum at the end of the impinging proton path length and is historically called the Bragg peak. This property has been exploited at the Clatterbridge Centre for Oncology (CCO), Wirral, UK for over two decades in proton therapy of eye tumours. There and at other places around the world, proton therapy has become a very powerful and precise treatment tool, demanding reliable and accurate beam parameters for monitoring and quality assurance.

An isochronous Scanditronix MC-60 PF cyclotron delivers a 60 MeV proton beam (in the isocentre) at the accelerating RF field frequency of 25.7 MHz. It is a first harmonic machine that produces approx. 1.37 ns long bunches every 72 ns. The total beam current is around 5 nA.

A non-invasive beam current monitor is presently in the phase of final preparations for experiments with beam. It will exploit the proton beam halo to provide information on the

absolute beam current. The set up consists of two independent detectors, the first, the LHCb VELO detector, measuring the beam 'halo' of the beam traversing 1.5 m distance in air before it reaches the isocentre and the latter, a Faraday Cup, which design has been optimised for the beam parameters at CCO by use of the FLUKA code.

The LHCb VELO readings will provide information on the beam current. This reading will be periodically related to the absolute Faraday Cup beam current measurements.

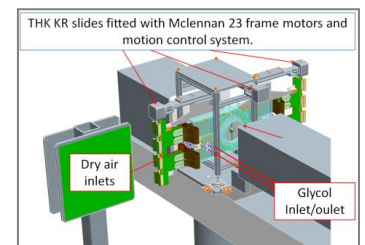
The LHCb VELO detector is a multi-strip silicon detector primarily dedicated to reconstruct tracks of vertices at the LHCb experiment at CERN. It is a position sensitive device based on two semi-circular p^+ -on-n Silicon multi-strip sensors arranged in $r\phi$ geometry for simplified track calculations. The detector read-out electronics have been matched with the LHC bunch crossing frequency at 40 MHz.

The Clatterbridge experiment is very demanding in terms of the detector operation. It is no longer operated in vacuum, which forced major adjustments of the detector support in terms of mechanical design and

thermal considerations, including cooling. The detector's central 'Beetle' chip releases a heat load of ~27.5 W, which may lead to detector overheating and even breakdown. Therefore, a dedicated glycol cooling system has been designed to dissipate this thermal energy. This unit is attached to the detector's thermal pyrolytic graphite (TPG) base, close to where the power and signalling connectors are located. Therefore an additional dry nitrogen shroud is going to be applied to prevent condensation and ice build-up on both cooling and electronic elements. The direct reason for the condensation is the detector operation at temperatures below the dew point, which is likely when extensive radiation damage to the detector occurs.

A multi-axes positioning system has also been designed and is based on slides driven by high precision stepper motors from Mclennan, featuring a range of 200 mm parallel to the beam axis, and 90 mm perpendicular to it, both with 20 μ m repeatability.

All components have been ordered and will be commissioned, along with the detector, in the coming weeks.





News from DITANET Partners (Continued)

CERN, Switzerland (*B. Cheymol, F. Roncarolo*)

First DITANET PhD Success

'Development of beam transverse profile and emittance monitors for the CERN LINAC4'

Benjamin's work represents a very valuable contribution to the advance of the CERN Linac4 transverse profile and emittance monitors design and commissioning. Benjamin started by learning Monte Carlo simulation programs such as FLUKA, to create energy deposition models and produce results he compared with analytical predictions. Thanks to his contribution it was possible to design from scratch a new Slit-and-Grid system that is presently in fabrication and will be used next year at the Linac 4 test stand. Later, he completed a full set of analytical calculations and numerical simulations aiming at dimensioning all transverse profile monitors (Wire Scanners and Secondary Emission Grids) foreseen for Linac 4. This allowed defining fundamental parameters such as wire material and diameter.

During these studies, Benjamin quickly learned to use electro-magnetic field solvers like CST Microwave Studio and characterized the effect of electron stripping and secondary emission in the presence of external polarization fields. This

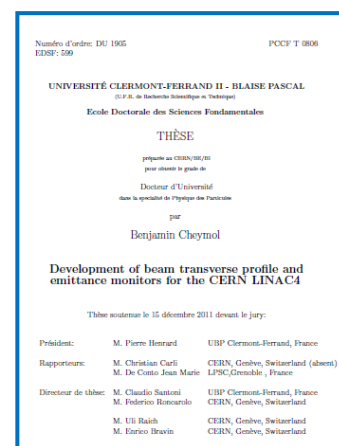
was particularly useful in the frame of laboratory tests at the Linac 4 source test stand to which Benjamin actively participated. He benchmarked his calculations by applying different polarizations at the emittance meter SEM grid monitors. Not only was he able to prove an excellent agreement between simulations and measurements, but also the appropriate bias voltages defined by him are now operationally used for minimizing the measurement uncertainties due to the electrons' escaping from the wires.

During the laboratory experiments, Benjamin had a very proactive attitude with respect to the overall systems optimization. This included the control and acquisition systems, for which he proved to perfectly understand the related electronics and even proposed some useful modifications. After defining the monitors' design, he was able to study the systems' resolution and accuracy by means of particle tracking studies starting from the expected Linac 4 beam properties. This included mastering the beam dynamics of low

energy particles, particularly affected by space charge effects.

In his last year within DITANET he completed a feasibility study of a laser stripping system for emittance measurements at the Linac 4 top energy (160 MeV). This work started with his visit to the Oakridge National Laboratory, where he had the opportunity to participate to beam based measurements with such a system, whose characteristics he now adapted for the Linac 4 case. Furthermore, Benjamin contributed to the design of other devices, such as the charge measurement of unstripped ions in the Linac 4 – PS Booster region.

Congratulations!!!



News from DITANET Partners (Continued)

New to the Network

Sue Davies, University of Liverpool

Sue Davies comes to DITANET with a background in working in European projects at the University of Liverpool, where she has been responsible for designing and implementing robust financial systems and processes.

Sue is now part of the European Projects team at the Cockcroft Institute and will be responsible for the financial administration and finance reporting of DITANET. Her role will be to answer any queries and to offer help and support with

regard to any financial aspects of this Marie Curie grant.

Contact:
sue.davies@liv.ac.uk
+44 1925 86 4046

Welcome!



THALES



Thales TH 1802
Multi-Beam klystron



Thales/RI-Research
Instruments XFEL
coupler

Product News

Thales Group (A. Beunas)

XFEL accelerator: Thales will supply a number of RF products

Thales has been involved in the XFEL accelerator project for over a decade. Thales has been selected to supply several types of RF products – klystrons, windows and couplers. These major contracts are the continuation of a long collaboration with DESY and other European labs. **Twenty-two units of our TH 1802 multi-beam klystron will be installed on the superconducting accelerator.** The horizontal TH 1802 reference is an evolution of the vertical TH 1801 model, which has already

been supplied to DESY and has been in operation for over 20,000 hours. Now operational for several months, the first TH 1802 tube has shown high reliability in operating conditions.

The French CNRS has also selected the consortium formed by Thales and RI-Research Instruments, to supply 670 high-power couplers for XFEL. The couplers inject the RF power generated by the klystrons into the accelerating cavities and are a critical part of the super-

conducting linear accelerator.

The flash transverse damping system at DESY will be equipped with 2 Thales TV2002 DOD klystrons – under the responsibility of INR – Institute for Nuclear Research of the Russian Academy of Science in Moscow.

Position Vacancies

Fermi National Accelerator Laboratory (Fermilab), USA - Visiting Scholars



The University Research Association's (URA) Visiting Scholars Programme at Fermilab announce an award opportunity for Spring 2012.

These awards are restricted to faculty and students of URA member universities.

The full text of the announcement can be found at:

www.fnal.gov/pub/forphysicists/fellowships/ura_visiting_scholars/index.html

RIKEN / University of Liverpool

PhD studentship in beam diagnostics for exotic ion beams

There is a position vacancy for a PhD candidate in the QUASAR Group. In partnership between RIKEN and the University of Liverpool, monitors for non/least destructive beam profile measurement shall be developed during the next four years. This project

foresees that half of the research is carried out in Japan and half in the UK. After an initial training period in beam diagnostics technique, the candidate will work on RIKEN's Wako campus, where one of the most world's advanced facilities for exotic ion beams is in

operation. There, the monitor design will be developed and prototypes will be built up and used for measurements. This project will be completed by a final year in the UK. For further information and application details, please email:

contact@quasar-group.org



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Examples of Recent Publications

Bocci, A., Cortes Giraldo, M. A., Gallardo, M. I., Espino, J. M., Arrans, R., Alvarez, M. A. G., Abou-Haidar, Z., Quesada, J. M., Perez Vega-Leal, A., Perez Nieto, F. J. 'Silicon strip detector for a novel 2D dosimetric method for radiotherapy treatment verification', NIM-A, Vo. 673, pages 98-106, January 2012.

Putignano, M. and Welsch, C. P. 'Numerical study on the generation of a planar supersonic gas-jet', Nuclear Instruments and Methods in Physics Research A 667 pp 44-52 (2012).

Cortés-Giraldo, M. A., Gallardo, Rafael Arráns, M. I., Quesada, J. M., Bocci, A, Espino, J. M. Abou-Haidar, Z. and Alvarez, M. A. G. 'Geant4 Simulation to Study the Sensitivity of a MICRON Silicon Strip Detector Irradiated by a SIEMENS PRIMUS Linac', Progress in NUCLEAR SCIENCE and TECHNOLOGY, Vol. 2, pp.191-196 (2011).

Thomas, R.D., Schmidt, H.T., Gurell, J., Haag, N., Holm, A.I.S. Johansson, H.A.B., Källersjö, Larsson, G.M., Mannervik, S., Misra, D., Orban, A., Reinhed, P., Rensfelt, K.-G., Rosén, S., Seitz, F., Weimer, J., Zettergren, H., Andler, G., Danared, H., Das, S., Liljebj, L., Björkhage, M., Blom, M., Brännholm, L., Hallden, P., Hellberg, F., Källberg, A., Leontein, S., Löfgren, P., Malm, B., Paál, A., Simonsson, A., and Cederquist, H. 'DESIREE: a unique cryogenic electrostatic storage ring for merged ion-beams studies' Journal of Physics: Conference Series 300, 012011 (2011).

DITANET Events 2012	
May 14 th -15 th	DITANET Skills Workshop
May 16 th	DITANET Symposium
May 16 th	DITANET Final Steering Committee Meeting
Other Interesting Events	
March 5 th -9 th	International ICFN Workshop on Future Light Sources, Newport, USA
April 15 th -19 th	BIW 2012, Newport, USA
May 20 th -25 th	IPAC 2012, New Orleans, USA
June 18 th -21 st	HIAT 2012, Chicago, USA
October 1 st -4 th	IBIC 2012, Tsukuba, Japan
October 15 th -19 th	1 st LA ³ NET School on Laser Applications, Ganil, France.

NOTICE BOARD

DEADLINE FOR THE NEXT NEWSLETTER
27th April 2012

About DITANET

The development of novel Diagnostic Techniques for future particle Accelerators is the goal of the European Network (DITANET) which is installed within the Marie Curie ITN scheme. Several major research centers, leading universities, and partners from industry are developing beyond-state-of-the-art diagnostic techniques for future accelerator facilities, whilst jointly training students and young researchers within this unique European structure.

This project is funded by the European Commission as part of the FP7 Marie Curie Actions under contract number PITN-GA-2008-215080.

