

Special Interest Articles:

- **DITANET
Training
Events**
- **2011 DITANET
Prize**

Individual Highlights:

News from DITANET Partners	2
Events	3
New to the Network	7
Position Vacancies	8/9

Second half of 2011 with many highlights

The past months have been truly eventful for the DITANET network and this cover page hardly provides enough space to provide even a short overview:

The DITANET initiative to organize a series of **Topical Workshops** for the wider beam diagnostics community has been a striking success so far:

With between 30-40 participants at each of these events, a good balance between internal and external researchers, as well as between experienced and early stage researchers and strong participation of the network's trainees, these workshops not only summarize the present state-of-the-art in a specialized field, they also give ample opportunities for knowledge exchange and to discuss future collaborative projects.

In 2011, DITANET organizes no less than five of these workshops:

This covered ultra-bright electron beams at the Cockcroft Institute (July), high intensity proton beam diagnostics in Paris (September), Technology

Transfer in Solkan (September), particle detectors in Seville (November) and beam loss monitoring in Hamburg (December). As usual, all contributions can be found at the individual indico pages - for details see this newsletter or our web page.

Another highlight was the network's **international conference** on beam diagnostics, held at CNA in Seville in November.

This event brought all trainees, their supervisors and the wider community together and provided an excellent overview of most recent research results. It was truly exciting to see the many excellent research results that have now been produced across the consortium and to see how well our fellows have developed their researcher profiles since their start within the project.

The conference was also the first time that the network's official **brochure** was distributed. It provides an overview of all research projects within DITANET and also presents our trainees and their backgrounds.

The DITANET prize 2011 was awarded during the conference and it is not without pride that I can announce that it was awarded to one of our DITANET fellows this time; please see further details in this newsletter.

The network keeps growing at an impressive speed: RIKEN (Japan), Bergoz Instrumentation (France) and CIEMAT (Spain) have now joined the network as **adjunct partners** and I am delighted to welcome them in our consortium.

Finally, a **new Marie Curie Initial Training Network** on laser applications ('LA³NET') has started on 1.10.2011. It combines research into laser particle sources, laser acceleration and laser-based beam diagnostics. Similar in size to DITANET it will surely enable many interesting research projects and exciting training events. I am sure that this will provide excellent opportunities also for our consortium.

I hope you enjoy reading this newsletter

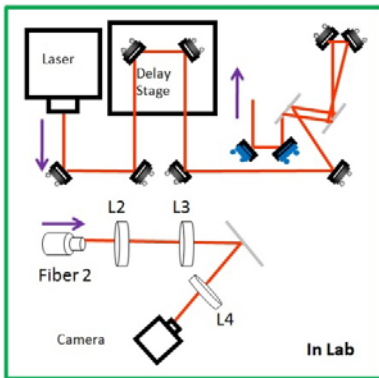


Carsten P. Welsch, Coordinator

News from DITANET partners

CERN (R. Pan)

Design of an Electro-Optic Bunch Length Monitor for the CERN-CTF3 probe beam



The overall Electro-optic bunch length monitor system is now designed for the *Califes* accelerator at CERN. *Califes* is the name of the probe beam within the Two Beam Test Stand (TBTS) of the CLIC Test Facility 3 (CTF3).

The bunches in *Califes* have a charge of 0.6 nC, 200 MeV beam energy, and a length of 1.4 ps.

Laser and camera will be placed in a dedicated laser lab, whilst the two crossed-polarizer set up will be setup in the machine.

Our erbium fibre laser has 3.2 nJ output pulse energy at 780 nm and a 120 fs pulse duration.

The laser goes through a delay stage and a stretcher, before going down one floor into the accelerator.

In CLEX, the laser is steered into chamber number 1 and goes through the cavity.

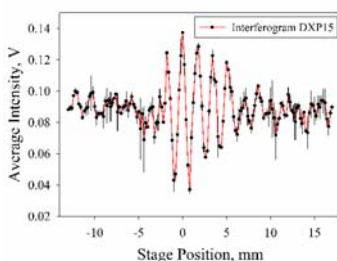
The electron bunch profile information is encoded into the laser pulse by a crystal there. After the polarizer and the wave plates, the laser will be transported back to the laser lab by a fibre. This transport line is around 20 meters long. Based on simulation studies, the anticipated resolution of the EO monitor is in the sub-picosecond regime.

So far, the main components of the system have been ordered and an extension of the laser lab was approved at CERN.

Preliminary work on beam profile measurements has already been completed.

The installation of the monitor will start early next year and preliminary tests will be performed by the end of next summer.

Royal Holloway University of London (K. Lekomtsev) CDR-based bunch length measurements



A Coherent Diffraction Radiation (CDR) experiment was built at CTF3 at CERN. Two silicon wafers are positioned to one side of the beam and a CDR radiation originated from them is translated towards a Michelson Interferometer. A theoretical model based on the Classical DR theory was developed to theoretically calculate the radiation spatial distributions. The experimental spatial distributions were measured at the CDR

setup and demonstrated a general agreement with this theory. Installation of the second target made it possible to effectively eliminate the backgrounds coming from upstream of the experimental setup.

The ultimate goal of the experiment is to reconstruct the longitudinal bunch parameters. The results showed that despite the presence of the coherent backgrounds the interferometric measurements can be performed with the new two-target configuration.

The plot to the left shows a sample measurement, which was taken using a Schottky Barrier Diode sensitive in the 50-75 GHz frequency region.

Bunch length and shape instabilities and their influence on the measurements were investigated. A clear understanding of the problematic issues and the hardware constraints was achieved.

Recent Events

Topical Workshop on High Intensity Proton Beam Diagnostics *Massy, France*

A 2-day workshop on "High intensity Proton Beam Diagnostics" took place September, 26th and 27th 2011 in Massy, France and was hosted by DITANET Partner CEA Saclay.

35 participants from ten countries, including delegates from the USA and China, joined us during this event.

On the first day the latest diagnostics measurements in SNS (the only high intensity proton beam facility in operation) were presented, followed by presentations on the current status of the Linac-4, FAIR, ESS, SPIRAL 2,

LIPAc, and the MYRRHA project.

The four participating DITANET ESRs presented their work in the frame of high intensity proton beam diagnostics on the second day. These included presentations about reconstruction of the two-dimensional beam distribution based on tomography techniques, challenges that have to be faced during the development of an IPM for high intensity proton accelerators such as the LIPAc, the possible application of a gas curtain as a non-interceptive diagnostics device and thermal studies of slits for

emittance measurements at Linac4. This session was followed by a tutorial and general discussions.

Throughout the workshop it was repeatedly stressed that there still is a lot of work to be done in the field of beam diagnostics to cope with the increased demands of high intensity machines. The ESS, for instance, intends to roughly quadruple their current beam diagnostics staff within the next year and counts on DITANET students to fill these positions.

Further information:

indico.cern.ch
confID: 145066



Group photo of the 4th DITANET workshop on High Intensity Proton Beam Diagnostics, Massy

Recent Events (continued)

Topical Workshop on Technology Transfer *Solkan, Slovenia*



The fifth DITANET Topical Workshop on 'Technology Transfer' was held on 29th and 30th September 2011.

It was hosted by Information Technologies in Solkan, Slovenia and co-organised with Instrumentation Technologies' annual Libera Workshop which discusses beam stability issues from the injection point to the end station.

The workshop attracted 29 participants from 22 different accelerators across 14 countries: Australia, Brazil, China, Denmark, France, Germany, Italy, Jordan, Russia, Spain, Sweden, Switzerland, UK, and US. The workshop addressed new starters as well as experts working on electron and hadron

synchrotrons, FELs and ERLs. Speakers were selected from the international Libera user community and in-house experts.

During the two days, single pass BPMs in both linacs and transfer lines, eBPMs in storage rings and photon BPMs found e.g. in beam lines were be discussed with a focus on fast global orbit feedback, beam loss monitoring, as well as challenges linked to timing and synchronization.

In addition new technologies, such as white rabbit, open hardware, software architectures and uTCA, were covered with regard to their implementation into accelerator

instrumentation.

These sessions were complemented by discussions on ways to transfer technology from the academic to the industry sector and the important legal aspects that arise in this frame. Representatives from industry, academia and DITANET trainees discussed the benefits or inter-sector collaboration.

Further information:

indico.cern.ch
ConfID:145070



Recent Events (continued)

Topical Workshop on Beam and Reaction Detection Developments and Applications

Seville, Spain - 7./8. November 2011

A DITANET Topical Workshop on 'Beam and Reaction Detection Developments and Applications', hosted by the University of Seville was held at the National Accelerator Centre (CNA) in Seville, Spain on 7th and 8th November 2011.

This workshop provided the opportunity for exchange new ideas and to project the nuclear detection field into the next generation, in particular in view of the future particle accelerators under development. The main topics were beam

tracking detectors, novel detector arrays and detector applications.

Further Information:

indico.cern.ch
confID: 135829



International Conference on Beam Instrumentation

Seville, Spain - 9./11. November 2011

The DITANET Consortium held a three day international conference on diagnostic techniques for particle accelerators and beam instrumentation in Seville, Spain.

The conference was hosted by CNA and brought together all beneficiary, associated and adjunct partners from the consortium. It was also open to participants

from the world-wide diagnostics community, in particular to researchers in their early career stage.

The scientific program of this conference reflected the extremely broad research program that is being carried out by the DITANET partners and covered all essential aspects of state-of-the-art beam diagnostics R&D. All DITANET fellows were

given the opportunity to present their research results in oral presentation.

A prize for the best poster was awarded to C. Schömers (HIT, Germany) and for the best talk to J. Egberts (CEA, France).

Further information

indico.cern.ch
confID: 135831



FP7 Project News

University of Liverpool (*C.P. Welsch*)



The advancement of science and engineering in the past decades is inherently linked to the development of lasers. Ever higher laser beam powers, brightness and shorter pulse lengths have helped establish them as an invaluable tool for both a wide range of industry and medical applications, such as for example material treatment, precision measurements, laser cutting, display technologies, and laser surgery, and for fundamental research, where many of the most advanced experiments in astrophysics, atomic, molecular and optical physics would be impossible without the latest laser technology.

Moreover, lasers have become increasingly important for the successful operation and continuous optimization of particle accelerators: Laser-based particle sources are well suited for delivering the highest quality ion and electron beams, laser acceleration has demonstrated unprecedented gradients and might be an alternative for conventional particle accelerators in the future, and without laser-based beam diagnostics it would not be possible to unravel the characteristics of many complex particle beams.

LA³NET will bring together research centres, universities, and industry partners to jointly train 17 early stage researchers. With a project budget of 4.6 M€, it is a very large Initial Training Network, funded by the European Union within the 7th Framework Programme. Following the DITANET example, the consortium will also organize a number of international training events, such as schools, topical workshops and conferences.

Further information:

www.liv.ac.uk/la3net

DITANET PRIZE 2011

The winner of the annual DITANET prize was announced during the network's final conference in Seville, Spain.



This prize is awarded on an annual basis to a researcher within the first four years of their professional careers. Applications can be handed in by scientists from within and outside of the DITANET network.

Following close competition the Steering Committee awarded this year's 1,000 € cash prize to Mr. Massimiliano Putignano.

Massimiliano is a DITANET Researcher at the University of Liverpool in the QUASAR Group and based at the Cockcroft Institute (CI), UK.

In his research project, he investigates into the possible use of a curtain gas jet for beam profile monitoring applications with a focus on the ultra-low energy storage ring project (USR) at FLAIR.

To date, he has carried out extensive simulation studies into the generation and shaping of the gas jet itself and has designed and built up a prototype setup at the CI.

In first measurements, he has studied the use of this monitor in 'IPM mode', i.e. at higher residual gas pressures. This allowed him to commission the ion extraction field and benchmark the results from his numerical studies.

In the final part of this project, he is aiming to demonstrate the successful generation of a very cold, curtain-shaped gas jet.

Congratulations !!

New to the Network

RIKEN, Japan

The RI-beam factory (RIBF) at RIKEN's Wako campus features, amongst others, the world's first superconducting ring cyclotron and the superconducting RI-beam separator, BigRIPS. With the completion of RIBF a new era in the field of nuclear physics was started: By producing a large number of unstable nuclei, studying their

properties and finding the ultimate picture of the nuclei, new experiments to uncover the process by which the heavy elements were formed in the universe became possible.

The facility's powerful heavy ions beams will not 'only' be used for nuclear physics research but also for a number of other studies, including industry

applications.

The RIKEN accelerator's were mostly designed in-house and the accelerator team has extensive experience in developing and operating a very wide range of beam instrumentation.

Further information:

<http://www.riken.go.jp/>



Bergoz Instrumentation, France

Bergoz Instrumentation was founded 30 years ago with the purpose of developing analog electronics. It rapidly became specialized in instrumentation to measure accelerated particle beams parameters, initially thanks to technology transfer agreement K017 between CERN and Julien Bergoz, as the company was known until its

incorporation in 1998.

Other beam instruments followed; most were designed in collaboration with accelerator-based research institutes.

Today, most particle accelerators use the company's DC current transformers to measure close orbit beam current or CW current. Bunches and macropulses in transfer lines, linacs, injection and extraction

have their charge measured by Bergoz' beam charge monitors coupled to integrating current transformers. Even the femto-second bunches of novel laser-plasma wakefield accelerators use a variation of these instruments.

Further information:

www.bergoz.com



CIEMAT, Spain

Although the interest of beam diagnostics for accelerators is quite recent in our center, CIEMAT, through its Fusion National Laboratory, has a long standing experience in training graduate students in plasma diagnostics techniques at the TJ-II stellarator.

R&D activities include the development of diagnostics for hadron accelerators at IFMIF/EVEDA LIPAC using FPMs, BPMs, emittance measurements based on quadrupole scans and slits, energy spread measurements and micro fission chambers. The beam instrumentation group has

particular interest in developing non-interceptive transverse profilers, radiation-hard diagnostics for target monitoring, beam position monitors and interceptive devices with challenging thermo mechanical loads.

Further information:

www.ciemat.es



Forthcoming Events

Topical Workshop on Beam Position Monitoring *CERN, Switzerland - 16th - 18th January 2012*



The network will hold a two and a half day workshop at CERN, Switzerland.

This workshop will focus on the design and operation of beam position monitoring systems with five sessions covering pick-up design, simulation and acquisition electronics.

This workshop will bring together researchers from the experimental, theoretical and simulation fields and provides an opportunity to discuss common challenges.

A first agenda is available at the workshop web page and will be updated on a regular basis. Suggestions for additional talk are welcome.

Registration is now open and will close on December 17th.

Further information:

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

Position Vacancies

EU Project Manager *University of Liverpool, UK*



There is a position vacancy for an EU project manager at the Cockcroft Institute for Accelerator Science and Technology.

Candidates need to have a PhD in physics or engineering (or related area), experience with the management of FP7 projects, in particular Marie Curie projects, and good knowledge of national and international funding bodies.

The project manager has a central role within the consortium and is responsible for the communication between partners and trainees from universities, research centers and industry. S/he is also coordinating the project's manifold training activities, such as international schools, topical workshops or conferences.

A good command of English and experience in working in international contexts is desirable.

The post is available for 2 years initially and shall be filled as soon as possible.

Further Information:

liv.ac.uk

[Job reference: 576687](#)

Position Vacancies (continued)

Volkswagen Foundation Post-Doctoral Fellowships

The Volkswagen Foundation is offering three-year postdoctoral fellowships to support free-electron laser research projects at Stanford, undertaken in affiliation with a German institution. The deadline to apply for the Peter Paul-Ewald Fellowships is Jan. 25, 2012.

Hard X-ray free-electron lasers—such as SLAC's Linac Coherent Light Source, and DESY's European XFEL under construction in Hamburg, Germany—create new research opportunities for natural scientists. The ultra-short and intense X-ray pulses allow researchers to discover

the atomic structure of biomolecules, film chemical reactions, and study matter under extreme experimental conditions.

Further information:

volkswagenstiftung.de/ewald-fellowships



Instituto Nazionale di Fisica Nucleare, Italy

Post-Doctoral Fellowships for non-Italian Citizens in Experimental Physics

The INFN Fellowship Programme 2011/2012 offers 20 positions for non-Italian citizens for research activity in experimental physics.

Fellowships are intended for young post-graduates who are under 35 years of age at the time of the deadline, December 15th, 2011.

Each fellowship, is initially granted for one year, but may be extended for a second year. The annual gross salary is 28 k€.

Applications, in electronic form, must be sent to INFN no later than **December 15, 2011**.

To register, look at:

http://www.ac.infn.it/personale/exp_fellowships/

The application form requires:

- Statement of research interests;
- curriculum vitae;
- three names of references.

The Fellowships must start no later than June 2012.



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



Glenda Wall – Project Manager

Cockcroft Institute
4, Keckwick Lane
Warrington, WA4 4AD
United Kingdom

PHONE:
+44 (0) 1925 86 4346

FAX:
+44 (0) 1925 86 4037

E-MAIL:
g.p.wall@liv.ac.uk

Carsten P. Welsch – PI

Cockcroft Institute
4, Keckwick Lane
Warrington, WA4 4AD
United Kingdom

PHONE:
+44 (0) 1925 86 4352

FAX:
+44 (0) 1925 86 4037

E-MAIL:
c.p.welsch@liverpool.ac.uk

www.liv.ac.uk/ditanet

Examples of Recent Publications

Publications

- A. Jeff, et al., 'First Results of the LHC Longitudinal Density Monitor'. *Nucl. Instr. Meth. A* 659 (1) (2011)
- N. Joshi, et al., 'Position Determination of Closely Spaced Bunches Using Cavity BPMs', Proc. IPAC, San Sebastian, Spain (2011)
- J. Harasimowicz et al., ' Experimental Results from Test Measurements with the USR Beam Position Monitoring System, Proc. IPAC, San Sebastian, Spain (2011)
- M. Schwickert, F. Kurian, et al., 'Diagnostic Devices for Beam Intensity Measurement at FAIR', Proc. IPAC, San Sebastian, Spain (2011)

Upcoming DITANET Events

Dec 5 th -7 th , 2011	Topical Workshop on Beam Loss Monitoring, DESY, Germany
Jan 16 th -18 th 2012	Topical Workshop on Beam Position Monitoring, CERN, Switzerland

Other Interesting Events

April 15 th – 19 th 2012	Beam Instrumentation Workshop, Newport News, USA
May 20 th – 25 th 2012	IPAC, New Orleans, USA
Oct 1 st – 4 th 2012	IBIC, Tsukuba, Japan

NOTICE BOARD

DEADLINE FOR THE NEXT NEWSLETTER (February 2012)
25th January 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.

