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Many highlights in the DITANET Project's Final Phase

After four exciting years the DITANET project came to an end on 31.5.2012. The last few months were extremely eventful with many events happening across the network: An advanced researcher skills school was organized to help our fellows in the transition to their next career challenges; an international symposium on beam instrumentation and researcher training was held at the Cockcroft Institute, UK and highlighted the research results across the network; a conference stand at the world's largest accelerator conference, IPAC in New Orleans, USA, presented by the project T.E.A.M., summarized all projects achievements, allowed for partners and those interested in our activities to meet up and was directly supported by the EC/REA.

These are some more highlights of a truly unique initiative: DITANET was the first ITN that started within the European Union's seventh framework program and the largest training

network ever funded in the field of beam instrumentation. The ambitious goal of our consortium was to provide the highest possible level of researcher training to more than 20 early stage and experienced researchers. To achieve this, all network partners worked closely together to train our fellows locally, and in organizing a large number of international training events, such as schools and workshops. In addition a conference on beam instrumentation and diagnostics was held for trainees and the wider, international, beam diagnostics community.

DITANET's projects have produced remarkable research results and many of them have already led to journal publications and/or invited talks at international conferences and workshop. The first PhD degrees have been completed and many more will follow this summer. The comprehensive training afforded by DITANET is already showing benefits for trainees as many are now moving forward with their careers and taking up positions outside the

network.

We have received overwhelmingly positive feedback from the community for the training and networking ideas initiated. As a result the Steering Committee has decided to continue organizing events for our community. These will be announced in the future via our partner networks [oPAC](#) and [LA³NET](#).

None of this would have been possible without the continuous support from all network partners, the scientists in charge and supervisors and, most importantly, the great work of our fellows.

I would like to thank all them for making this project possible and look forward to future research collaborations!



Carsten P. Welsch, Coordinator



Recent Events

DITANET Showcase at IPAC12

New Orleans, USA - 21th to 25th May 2012



Local conference staff member, Liz, drew the competition winners and awarded an iPod to Mostafa Elaasar.



Helen Williams from the EU T.E.A.M. awards Donato Passarelli with his iPod prize

DITANET hosted an exhibition stand at the International Particle Accelerator Conference IPAC12 held in New Orleans last month. The stand was managed by members of the EU Project T.E.A.M. based at the Cockcroft Institute who are responsible for the day-to-day running of the ITN networks coordinated by the University of Liverpool.

The effort successfully disseminated DITANET on the international stage for particle accelerators raising awareness of the network's role and research results, in addition to highlighting Marie Curie ITNs as a whole, including [oPAC](#) and [LA³NET](#), two recently funded Marie Curie networks coordinated by

the University of Liverpool out of the Cockcroft Institute, UK.

DITANET brochures outlining the projects, trainees and partners were handed out to interested parties in addition to several marketing items. Flash drives were loaded with links to all DITANET events and selected published papers from trainees. In order to encourage engagement, and attract people to the stand, competitions were held. Four small prizes were offered to those lucky enough to find a prize link on their flash drives and two iPods were given as prizes in a business card draw and New Orleans quiz draw. The winners of the iPods were Mostafa Elaasar from Southern University

in New Orleans and Donato Passarelli from our Adjunct Partners Fermilab.

Many new contacts were made in addition to providing an excellent opportunity for the DITANET management to catch up with existing partners attending the event.

In addition to the exhibition stand, Carsten Welsch presented a series of posters on the scientific results from the network and DITANET fellow Adam Jeff displayed an electronic poster on the LHC longitudinal density monitor which gained significant interest.

Overall the event was considered highly successful, meeting its aim to disseminate DITANET.



Recent Events (Continued...)

DITANET Symposium: Quantum Systems and Research(ers) at Accelerators

The Cockcroft Institute, UK - 16th May 2012

More than 70 students, researchers and policy makers from universities, research centres and industry from all across Europe took part in a Symposium to celebrate the achievements of DITANET.

Delegates were given an insight into present and future challenges in antimatter research, beam diagnostics R&D, as well as researcher training - areas on which the projects had focused during the past four years - through a number of keynote talks and poster presentations.

The event started with a poster reception before Prof. Carsten P. Welsch gave an overview of the main project outcomes. His talk was followed by Prof. Swapan Chattopadhyay, Director of the Cockcroft Institute, who presented accelerators as a key driver for cutting edge research in his presentation 'Particle Accelerators - Beaming into Matter and Life'

The development of beyond state-of-the-art beam instrumentation was one of the main aims of DITANET and Dr. Rhodri Jones, leader of the beam instrumentation group at CERN, gave an outlook on the needs of future

accelerator projects. The importance of technology transfer was then addressed by Rok Ursic, founder and CEO of Instrumentation Technology, Slovenia.

Prof. Walter Öfert from FZ Jülich is one of the key scientists in low energy antimatter research. Amongst others, he was in charge of the PS210 experiment that produced 11 antihydrogen atoms back in 1996. It was this experiment that led to the foundation of a whole research area. In his talk, he gave an overview of almost 20 years of fascinating research at CERN and also an outlook on what exciting opportunities will come up with the new ELENA storage ring. Another future experiment at CERN was then presented by PD Dr. Alban Kellerbauer from the MPI for Nuclear Physics, Heidelberg. The ERC grantee explained the aims of the AEGIS project and the challenges in determining the effects of gravity on matter and antimatter systems.

The last part of the symposium was dedicated to researcher training. Dr. Janet De Wilde, head of STEM at the Higher Education Academy, gave an overview of postgraduate training in

the UK and Europe, before Victoria Lobet from KoWi, Germany talked about present EU funding opportunities for researchers at all career stages. These presentations triggered many interesting discussions amongst the participants about researcher careers.

The event closed with an outlook on two new initiatives that will directly build up on the DITANET research and training plans: [LA³NET](#) and [oPAC](#). Both will be coordinated by the University of Liverpool and will involve many, if not all, DITANET project partners.

Further information

indico.cern.ch
confID: [181600](#)





Recent Events (continued...)

Final Meeting of the DITANET Steering Committee

The Cockcroft Institute, UK - 16th May 2012

The DITANET Steering Committee held its final meeting at the Cockcroft Institute, UK on May 16th. It reviewed all recent events organised by the network, for example the international workshop on beam loss monitoring at DESY, Germany and beam position monitoring at CERN, Switzerland. On this occasion, all project outcomes across the consortium were discussed together with the progress that the

trainees have made. The training program provided to the DITANET fellows was found to be extremely broad, with a strong inter sectoral character, and is expected to be an excellent base for their future careers.

The future of the DITANET project beyond its initial four year time frame was also discussed. Many of the new initiatives that DITANET started have been extremely

beneficial for the fellows and the wider community, such as the network's Topical Workshops series.

The Steering Committee will continue to initiate ideas for beam diagnostics and instrumentation events and encourage the community to work closely together.



4th DITANET School – Advanced Career Skills

Liverpool, UK – 14th and 15th May 2012

The development of complementary skills is regarded as a mandatory component of the training of postgraduate research students. Key requirements include the development of communication, networking and research management skills.

An advanced researcher skills school was held in Liverpool on 14th and 15th May 2012. The two day course started with training in CV writing and interview techniques. It placed emphasis also on the use of social networks and the importance of international networking and communica-

tion, building on the first course, with the aim to further improve the fellows' employability and career skills.

Project management in an international environment was the second focus of the course and gave the participants an insight into budget planning and management, definition of milestones and deliverables and assessing project progress. An overview into the challenges and changes in the international job market, as well as present grant writing opportunities completed the school program.

Within DITANET, more than 20 fellows have been trained in beam diagnostic techniques for particle accelerators since the project began in 2008. Their training included, amongst others, a one week complementary skills school that was held in Liverpool in March 2010. This training event turned out to be very successful and was used as the basis for similar post graduate research student courses in the school of physical sciences at the University of Liverpool.

Further information

[indico.cern.ch](http://indico.cern.ch/confID:180379)
confID: [180379](http://indico.cern.ch/confID:180379)



Recent Events (Continued...)

DITANET Marie Curie Finance Workshop

Liverpool, UK - 19th March 2012

DITANET was the first ITN project funded within FP7 and has build up excellent expertise in the management and administration of Marie Curie projects. The project has recently shared good practice and its project management knowledge with a number of European institutions.

On 19th March the project hosted a workshop for financial administrators of

Marie Curie projects. Through the experience of managing DITANET for the last four years, the project was able to provide this training workshop covering all aspects of the financial project management, reporting requirements and EC reporting tools.

The workshop started with an overview of present Marie Curie calls followed by a detailed presentation

of the financial rules and responsibilities and reporting processes for partners receiving funding.

The event was attended by thirty participants, representing fourteen European member states and was well received by all who attended.



News from DITANET Partners

DESY, Germany (L. Sukhikh and G. Kube) Coherent Resonant Diffraction Radiation from Inclined Grating as a Tool for Bunch Length Diagnostics

Longitudinal diagnostics of short electron bunches is a key task for modern accelerators including 4th generation light sources and future linear colliders.

One of the reliable techniques is based on coherent radiation diagnostics of the electron bunch. Coherent radiation results in a square dependence of radiated power on bunch population in the case when the bunch length is shorter than the radiation wavelength. The project is devoted to bunch length measurements using coherent resonant diffraction radiation (CRDR) which is emitted if an electron bunch travels

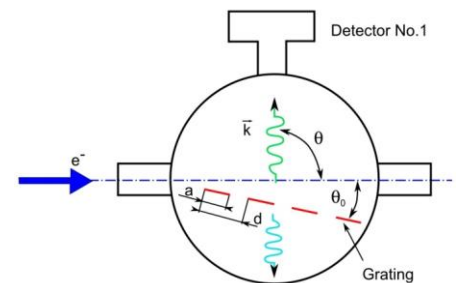
close to a grating surface. The advantage is that the emitted radiation spectrum strongly depends on the angle of observation, i.e. the spectral analysis of the emitted radiation which is required for bunch length determination is simply converted into a measurement of the angular distribution. In contrast to bunch length diagnostics based on Smith-Purcell radiation the main idea of this project is to rotate the grating surface with respect to the beam axis which results in a change of the wavelength together with the radiation intensity due to coherent emission.

According to simulations,

such a grating scan should allow the bunch length to be estimated with very good precision.

The project is developed by DESY and the Paul Scherrer Institute (Villigen, Switzerland) at the SwissFEL injector test facility which is a linear accelerator with maximum electron energy of 230 MeV. At this test accelerator, bunch lengths can be changed in a range of 50 fs – 1 ps using a bunch compressor scheme. The CRDR monitor test setup is optimized for bunch length measurements in the order of about 300 fs.

Continued...





News from DITANET Partners (Continued...)

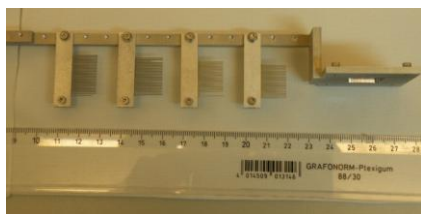
DESY, Germany (*L. Sukhikh and G. Kube*)

Coherent Resonant Diffraction Radiation from Inclined Grating as a Tool for Bunch Length Diagnostics

For the first test experiment a set of four gratings with a period equal to 700 microns was manufactured at DESY. The gratings were cut out of 100 micron thick silicon wafers. Two of the gratings were covered by 500 nm thick molybdenum from both sides in order to increase the permittivity. One grating was covered by molybdenum only from one side, and the last one consists of pure silicon. The gratings were

mounted at a special grating holder designed and manufactured by DESY inside a vacuum chamber. The grating holder can be moved up and down in order to interchange different gratings, and it can be rotated by 360 degrees with 0.09 degree per motor step. THz radiation emitted from a grating will be focused by a parabolic mirror and will be collected by a DTGS detector that is

installed outside of the vacuum chamber. The detector was tested at the infra-red beam line of the Swiss Light Source. The experimental setup was mounted and commissioned in the laboratory, and beginning of May it will be installed in the accelerator. The experiments will start as soon as possible after the next commission phase of the accelerator is completed.



UPPSALA
UNIVERSITET

Uppsala University (*V. Ziemann*)

Accelerator Physics Activities at Uppsala University

The accelerator physics group at the department of physics and astronomy at Uppsala is active in the following international projects:

- CTF3 and CLIC at CERN in Geneva, Switzerland;
- XFEL and FLASH at DESY in Hamburg, Germany;
- European Spallation Source ESS in Lund, Sweden;

where the common theme is the interaction of charged particle beam with electro-magnetic fields, either by electrons emitting radiation, or by the fields that are used to accelerate the beams.

CLIC

Uppsala University takes part in the design effort for the Compact Linear

Collider (CLIC), a project aiming at the construction of a high-energy linear collider to follow the presently operating Large Hadron Collider at CERN. The CLIC activities reached a significant level in 2005 when the Swedish Research Council (VR) and the Wallenberg Foundation funded the construction of the two-beam test stand for the CLIC Test Facility CTF3, a central part where the novel acceleration scheme for CLIC is experimentally tested. Construction is finished and we currently receive an operation grant from VR to run the facility at CERN. Furthermore, the Wallenberg foundation supports us to build a novel diagnostic device -- the Flashbox-- for the

detection of signals emanating from the accelerating structure in case of a discharge. Beyond the installation at CERN we are engaged in the pan-Scandinavian collaboration NorduCLIC in which we test the accelerating structures for CLIC.

Moreover, we participate in the European Seventh Framework program EuCARD, where we investigate the mechanism of discharges on copper surfaces. This is a limiting factor for the achievable acceleration in CLIC. Jointly with the electron-microscopy group at Uppsala University the experiments are performed in-situ inside an electron microscope.

Continued....

News from DITANET Partners (Continued...)

Uppsala University (V. Ziemann) Accelerator Physics Activities at Uppsala University

XFEL and FLASH
Our activities in the Free-electron laser accelerators FLASH and XFEL are based on the manipulation of the electron beam with an external laser. Originally, since 2006, we are centrally involved with the design, construction and operation of the optical replica synthesizer (ORS) which is a diagnostic device to measure the length of ultra-short electron pulses. After a major reconstruction of the accelerator at DESY

we are currently re-commissioning the device and expand its capabilities to implement the so-called Echo-enabled harmonic generation scheme. The expertise gained with the ORS led to a successful application for funds to construct the laser heater as a Swedish in-kind contribution to the European XFEL which was granted in 2008 and is ongoing.

ESS
Uppsala University participates in the design of the radio-frequency (RF) distribution system of the ESS. In this context the FREIA project was launched, which will lead to the construction of a test stand for superconducting RF systems in Uppsala. We are presently working on the technical specifications of components that will enter into the technical design report of the ESS and will be incorporated into the FREIA test stand.



UPPSALA
UNIVERSITET

University of Seville/CNA Update from Seville

In the last issue of the journal 'Agenda de la Empresa' (April 2012, p. 72-73), which is aimed at Spanish companies, there is an article, entitled 'Redes Europeas de Formación, una oportunidad para la

colaboración entre investigadores y empresas'. There, the author, Prof. Joaquin Gómez Camacho, describes the experience at CNA of the European Training Networks, in particular DITANET. The

training-focused aspects of ITNs are outlined, and how this can benefit the transfer of knowledge from research to companies in Spain.

[Further Information](#)



Product News

Thales Group (A. Beunas) XFEL accelerator: Thales will supply a number of RF products

Thales has been selected by CERN to design and manufacture a 704 MHz 1.5 MW peak klystron for the new test stand to be built in the framework of the SPL project.

In addition, Thales has designed and is currently gearing up to produce the

new 2.8 MW pulsed klystron TH 179, suitable for all new proton accelerator projects in development worldwide.

CERN has chosen this klystron for the future linac4 injector on the Large Hadron Collider (LHC). This tube will

become the reference for new proton linear accelerators requiring high average power levels.

The Thales TH 2179 is the ideal candidate also for the European Spallation Source (ESS) in Sweden and the FAIR accelerator complex in Germany.

THALES



TH 2179 model enabling up to 2.8 MW peak 210 kW avg at 352/325 MHz

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Product News (Continued...)

Thermo Fisher Scientific (T. Chapman)

New Line of High Performance Scientific Imaging Cameras with Unprecedented Linear Dynamic Range Exceeding 24 Bits

Thermo Fisher Scientific, a manufacturer of application-specific Charge Injection Device Technologies (CIDTEC) based imagers and cameras, introduces SpectraCAM™ – a new line of revolutionary high performance, cooled, randomly addressable, 16-bit digital scientific imaging systems designed for spectroscopy, and scientific markets. The SpectraCAM incorporates low noise CID sensor technology with non-destructive readout, random addressability, anti-blooming, and UV sensitivity to provide capabilities not available with CCD camera systems. The current SpectraCAM platform is available in 540(H) by 540(V) or 1024(H) by 1024(V) with 27 microns pixels, or the SpectraCAM XDR™ with 2048(H) x 2048(V) with 12 microns pixels.

When used in conjunction with RACID Exposure software, the SpectraCAM automatically varies the exposure time from pixel to pixel based upon the real time observation of signal intensity automatically optimizing the signal-to-noise ratio for each unique image feature. Intensely

illuminated pixels receive numerous short integration cycles while weakly illuminated pixels are allowed to integrate for longer periods. This proprietary technique called "Random Access Integration" and allows for unprecedented linear dynamic range exceeding 7 orders of magnitude or 24 bits using a single exposure period. The CID cameras superior anti-blooming performance ensures accurate image detail even under extreme lighting conditions.

The RACID imagers employed in the SpectraCAM systems are cooled with a three-stage thermo electric cooling system to reduce dark current, and are available in two configurations for imager containment: The Purged SpectraCAM is commonly used in applications where argon or nitrogen gas is readily available, while the Sealed SpectraCAM utilizes a hermetically sealed imager container designed to maintain high vacuum eliminating purge requirements.

The 16-bit gray level camera controller is based on PENTIUM™ architecture with Ethernet host-controller

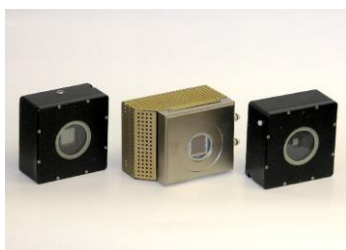
communications link.

The controller allows for data acquisition algorithms with dynamic exposure-time control of user-specified Regions of Interest (ROI) and real-time video processing of acquired data. The camera software also supports the export of data in various imaging and spreadsheet formats. In addition to programmable position and size, each ROI may be individually programmed for pixel collective read (or binning) and non-destructive reads per pixel.

Thermo Fisher Scientific is the world leader in serving science, enabling our customers to make the world healthier, cleaner and safer. With annual sales of more than \$9 billion, we employ 30,000 people and serve over 350,000 customers within pharmaceutical and biotech companies, hospitals and clinical diagnostic labs, universities, research institutions, government agencies as well as environmental and industrial process control settings.

For more information please visit:

www.thermofisher.com



CIDTEC Cameras

New to the Network

SLAC National Accelerator Laboratory

SLAC National Accelerator Laboratory is operated by Stanford University for the U.S. Department of Energy's Office of Science and has recently joined the DITANET consortium as adjunct partner. It has a multi-purpose mission requiring a wide range of electron- and photon-beam diagnostics. In the past, diagnostic R&D was concentrated on applications for high-intensity storage rings and the SLC. These systems included electron and positron beam position monitors, high-speed timing infrastructure,

positron production systems, fast and slow beam feedback, laser interferometers, polarized electron gun diagnostics and beam collision monitoring. R&D also included a host of software tools for applications ranging from beam loss monitors to measurement of beam emittance to accurate determination of sub-micron beam sizes. SVD-based software algorithms were introduced for both beam steering and lattice calibration applications at both SPEAR and the SLC. With the advent of PEP-II, increasingly sophisticated

diagnostics were developed for low-level RF control and bunch-by-bunch feedback in both the transverse and longitudinal directions. Storage ring SR monitoring was extended to include a streak camera, multiple fast gated cameras and Michelson's two-slit interferometer for transverse beam size characterization. More recently similar SR diagnostics have been incorporated into SPEAR3 with plans to install bunch-by-bunch feedback in the near future.

Welcome !!



Position Vacancies

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 send an [email](#).



Position Vacancies (Continued...)

University of Liverpool/Cockcroft Institute of Accelerator Science and Technology

Postdoctoral Research Associate

A Research Associate position vacancy is presently open at the University of Liverpool/Cockcroft Institute. This project will focus on the study of the beam dynamics in low-energy storage rings, medical accelerators with a focus on beam halo studies. It will involve

detailed simulations of charged particle beams, with a focus on the influence of space charge effects, beam extraction schemes and experiment optimisation.

Applicants should have excellent degree marks and a PhD in a relevant subject. The role will be a central link to experimental

groups at FAIR, CERN and CCO and allow to contribute to PhD student training. The post is available for 24 months with the possibility of renewal.

Closing date 6 July 2012

[Further information](#)



University of London, Department of Physics Joint Lectureship in Accelerator Physics

Royal Holloway, University of London (RHUL) and the UK Science and Technology Facilities Council (STFC) intend to make a joint Lecturer appointment in Accelerator Physics. RHUL is part of the John Adams Institute for Accelerator Science, a joint venture between Oxford University, RHUL, Imperial College London and STFC. The RHUL accelerator physics group is currently involved in projects at the ATF2 at KEK, CTF3 at CERN, PETRA3 at DESY, DIAMOND and the Front End Test Stand at STFC's Rutherford Appleton Laboratory (home of the proton-accelerator-based ISIS spallation neutron

source), the ESS at Lund, and the LHC at CERN. RHUL's projects are currently built around expertise in laser-based beam diagnostics, advanced RF systems and design, cavity BPMs, radiation physics, and advanced simulation. The successful candidate would not be restricted to work in these areas but would also be welcome to contribute to them.

We are looking to make a Lectureship appointment to establish a vibrant joint programme of accelerator physics at Royal Holloway and STFC; we particularly welcome applicants in the area of proton machines. You should have

considerable postdoctoral research experience and be developing an international reputation in the field. This is an excellent opportunity to be part of a growing joint programme and would suit someone who aspires to a leading role in a major national laboratory, while establishing a strong academic profile in one of the larger colleges of the University of London.

For an informal discussion about the post please contact Prof. Grahame Blair at

G.Blair@rhul.ac.uk

[Further information](#)



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

Prof. 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@liv.ac.uk

www.liv.ac.uk/ditanet

Examples of Recent Publications

Abou-Haidar, Z., Bocci, A., Alvarez, M. A. G., Espino, J. M., Gallardo, M. I., Coretes-Giraldo, M. A., Ovejero, M. C., Quesada, J. M., Arrans, R., Ruiz Prieto, M., Perez Vega-Leal, A. and Perez Nieto F. J. 'Output factor determination for dose measurements in axial and perpendicular planes using a silicon strip detector', Physical Review Special Topics – Accelerators and Beams, 15, 042802 (2012).

Jeff, A., Andersen, M., Boccardi, A., Bozyigit, S., Bravin, E., Lefevre, T., Rabiller, A., Roncarolo, F., Welsch, C. P. and Fisher, A. S. 'Longitudinal density monitor for the LHC' Physical Review Special Topics – Accelerators and Beams, 15, 032803 (2012).

Olvegaard, M., Adli, E., Braun, H. H., Bravin, E., Chritin, N., Corsini, R., Dabrowski, A. E., Dobert, S., Dutriat, C., Egger, D., Lefevre, T., Mete, O., Skowronski, P. K. And Tecker, F. 'High intensity profile monitor for time resolved spectrometry at the CLIC Test Facility D' Nuclear Instruments and Methods in Physics Research A – 683 (2012) 23-39.

Table with 2 columns: Date, Event Name. Rows include August 6th-10th (Workshop on Accelerator Operations, SLAC, USA), October 1st-4th (IBIC 2012, Tsukuba, Japan), October 15th-19th (1st LA3NET School on Laser Applications, Ganil, France), and October 28th - November 9th (CERN Accelerator School, Granada, Spain).



Find us on Facebook

FOLLOW LA3NET: The exploitation of LASers for Applications at Accelerator facilities for ion beam generation, acceleration and diagnostics is the goal of the new NETWORK (LA3NET) within the FP7 Marie Curie Initial Training Network (ITN) scheme.

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.

