Newsletter
April 2015
Issue 12

Let there be light !

2015 has been proclaimed by the UN General Assembly as the International Year of Light and Light-based Technology. It is a global initiative highlighting the importance of light and optical technologies to the citizens of the world in their lives, for their futures, and for the development of society. It is a unique opportunity to inspire, educate, and connect on a global scale. Light provided by lasers is central to the R&D program of LA³NET: Our Fellows use it for beam generation, acceleration of particles and detailed diagnostics of beams. They are also contributing to a global effort to promote improved public and political understanding of the central role of light in the modern world through public engagement. All Fellows have realized at least two visits to primary and secondary school, have produced a short video about their research (see this newsletter for some examples), and will present their research as part of a large Outreach Symposium that will take place in Liverpool on the 26th June 2015.

Research bearing fruit. Contributions to various workshops over the past two years and recently to our international Conference on Laser Applications at Accelerators have indicated that there are impressive R&D results across the network. This is now also reflected in high quality publications by Fellows across LA³NET: Andreas Döpp from CLPU and co-workers have just published a paper in *Nature Communications* on the demonstration of relativistic electron beam focusing by a laser-plasma lens and Alexandra Alexandrova from the Cockcroft Institute/University of Liverpool explains in *Optical Engineering* how laser self-mixing can be used for precise velocity measurements of solid and fluid targets.

All those of you who are in the first five years of their researcher careers (after their MSc) should remember that the deadline for applications for our annual LA³NET prize is approaching quickly. We are looking for the very best R&D result or innovative solution to a current research challenges from an early stage researcher in the world. I strongly encourage everyone who thinks they have achieved something "special" to apply – there might be 1,000 € waiting for you…

INTERNATIONAL YEAR OF LIGHT 2015

Prof. Carsten P. Welsch, Coordinator

Research News

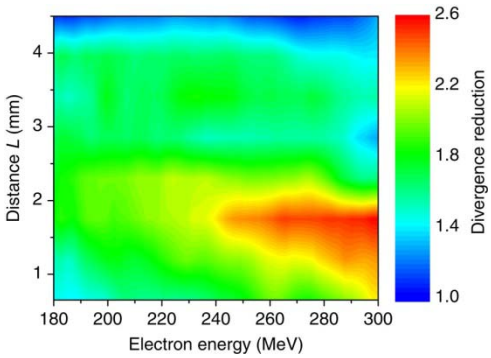
Andreas Döpp among the main authors of a paper published in Nature Communications

The work on 'Demonstration of relativistic electron beam focusing by a laser-plasma lens' by C. Thaury, E. Guillaume, A. Döpp, R. Lehe, A. Lifschitz, K. Ta Phuoc, J. Gautier, J-P Goddet, A. Tafzi, A. Flacco, F. Tissandier, S. Sebban, A. Rousse & V. Malka has been published in Nature Communications.

A research team from Laboratoire d'Optique Appliquée (LOA) demonstrates a new laser-plasma lens, providing focusing fields orders of magnitude higher than in conventional beam optics.

Laser-plasma accelerators have the potential to revolutionize accelerator technology as acceleration over just a few millimeters can provide GeV-level electron beams. An intrinsic advantage of this kind of accelerators is their micrometer source size and femtosecond duration, while currently missing the beam energy spread and divergence obtained with conventional accelerators. Due to the latter it is difficult to transport the beam in conventional beam optics without significant emittance growth.

Recently Cédric Thaury from LOA proposed to not only take advantage of the strong longitudinal wakefields, but also to use the transverse fields of the linear wakefield accelerator to reduce the electron beam divergence. Remi Lehe developed a theoretical framework for this kind of laser-plasma lens [1] and the team led by Professor Victor Malka succeeded shortly after to implement the technology in a proof-of-principle experiment at the Salle Jaune Laser system.



The colour map shows the factor of reduction of the divergence, as a function of the electron energy and of the distance *L* between the accelerator and the lens. The peak electron density in the focusing stage is ~3.9 × 10^{18} cm^{-3}.

For the study a dual gas jet target was set up. To enable the scanning of the positions between both jets, LA^{3}NET Fellow and one of the main authors of the publication, Andreas Döpp designed a new nozzle, which was then produced using 3D printing technology. Together with Emillien Guillaume they performed the experiment, with their supervisors Kim Ta Phuoc and Cédric Thaury.

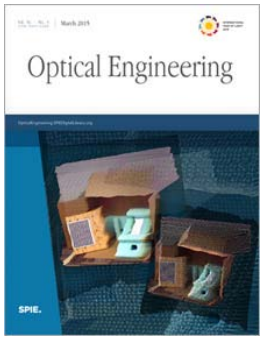
Depending on the position and density of the second jet they observed a divergence reduction of nearly a factor of three, enough to enable efficient coupling of the laser-accelerated beam to a conventional beam transport line.

Article:

'Demonstration of relativistic electron beam focusing by a laser-plasma lens', C. Thaury, E. Guillaume, A. Döpp, R. Lehe, A. Lifschitz, K. Ta Phuoc, J. Gautier, J-P Goddet, A. Tafzi, A. Flacco, F. Tissandier, S. Sebban, A. Rousse & V. Malka, Nature Communications 6, 6860 (2015).

[1] Lehe, R., et al. Laser-plasma lens for laser-wakefield accelerators. Phys. Rev. STAB **17**, 121301 (2014).

Alexandra Alexandrova's work on laser self-mixing published in Optical Engineering

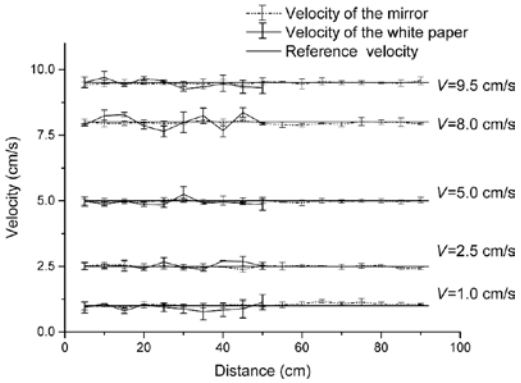


The manuscript 'Laser Diode Self-mixing Interferometry for Velocity Measurements' by A. Alexandrova, et al has just has been published in Optical Engineering.

Laser self-mixing is usually used for measurement of low velocities and vibrations but this paper explores the proposal to use the method for the measurement of velocity and density of gas jets based on self-contained optical feedback.

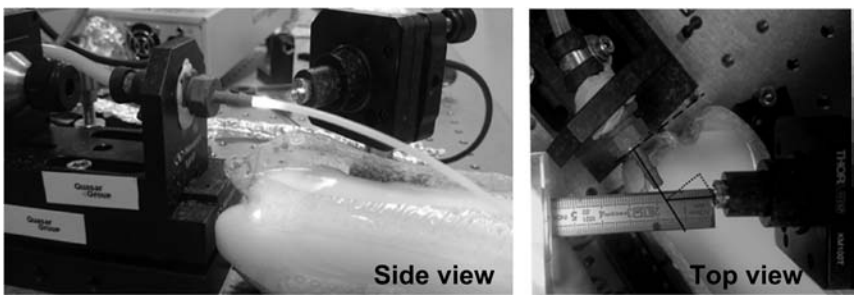
Self-mixing interferometry has been applied to flow-velocity measurements often aimed at biological applications, such as blood flow characterisation, Brownian motion and biological species dynamic studies. There has been high interest in this area resulting in a number of works with measurements of relatively small velocity from 0.1 mm/s to 10 cm/s with high accuracy.

The authors of the paper demonstrate how higher velocities can be measured and show the impact of different target geometries and characteristics on the quality of the detected signal. They use this as a basis to assess the potential for future gas-jet characterisation applications which would be an entirely new application for this technique. A detailed investigation into different targets is presented covering velocity measurements of solid targets of up to 50 m/s and flow velocities of up to 1 m/s.



Example of measurements from the experiments using a movable stage, which allows for a precise velocity measurement (straight solid line) in the range of 0.01 to 10.00 cm/s with a mirror (dot lines) and white paper (thick solid lines) with an error bar obtained at different distances between the laser and the target.

It should be noted that previous work related to self-mixing was more focused on the precision and spatial resolution of the method rather than the possibility of measuring high velocities and the presented results are entirely new. Previously reported maximum velocities for solid targets rarely exceeded 5 m/s with maximum velocities just above 20 m/s . For fluids there the current measurements exceed previous maxima by roughly a factor of ten.



Experimental setup for flow velocity measurements

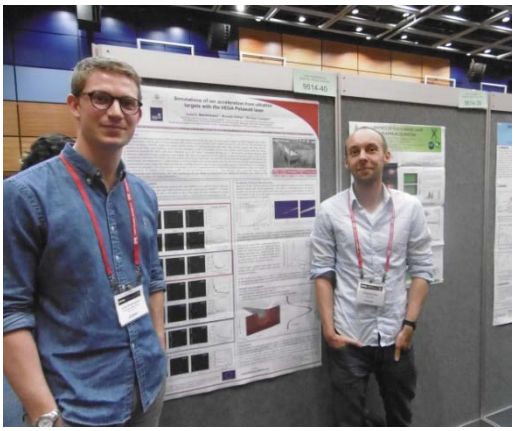
Article:
'Laser diode self-mixing interferometry for velocity Measurements', A.S. Alexandrova, V. Tzoganis and C.P. Welsch, Optical Engineering 54(3), 034104 (2015) (2195791)

Andreas Döpp and Luca Stockhausen's contributions at SPIE 2015 in Prague

SPIE. OPTICS+ OPTOELECTRONICS

Andreas Döpp gave a talk on 'Electron rephasing in laser-plasma accelerators' at the SPIE Optics + Optoelectronics 2015 conference in Prague. He presented results obtained from experimental work at Laboratoire d'Optique Appliquée in France.
Energy gain in laser wakefield accelerators is generally limited by dephasing between highly relativistic electrons and the driving laser pulse. But as the relative phase depends on both the driver and the cavity length, the effects of dephasing can be mitigated with appropriate tailoring of the plasma density along propagation. The ideal case would provide constant phase adaption, but such a target is difficult to design.
Andreas' talk presents a simplified approach, which uses a sharp upward plasma density transition, generated by introducing a knife edge into the gas jet. Depending on the position of the shock, it is observed that this onetime boost can augment the cutoff energy of electrons by almost 50 percent.

Based on:
Electron rephasing in a laser-plasma accelerator, A. Döpp, E. Guillaume, C. Thaury, K. Ta Phuoc, A. Lifschitz, J-P. Goddet, A. Tafzi, D. Douillet, G. Rey, S.W. Chou, L. Veisz, and V. Malka.



As a result of Andreas' cooperation with LOA, he also co-authored work on 'Demonstration of relativistic electron beam focusing by a laser-plasma lens' recently published in Nature Communications and a work on 'Physics of Laser-plasma acceleration in high-Z gases'.

At the same conference Luca Stockhausen presented a poster on 'Simulations of ion acceleration from ultrathin targets with the VEGA Petawatt laser'.
The PIC code OSIRIS [1] has been used to carry out 2D simulations of the acceleration of ions in ultrathin solid targets, with laser intensities up to 10^22 W/cm2 impinging normally on 5 – 40 nm thick overdense plasmas and with different polarizations. The authors of the work show how signatures of the radiation pressure dominated regime, such as layer compression and bunch formation, are only present with circular polarization. By actively shaping the laser pulse, they demonstrate an enhancement in peak energy up to tens of MeV and monoenergetic features. On the contrary linear polarization at the same intensity level causes the target to blow up, resulting in much lower energies and broader spectra. One limiting factor of Radiation Pressure Acceleration is the development of Rayleigh-Taylor like instabilities at the interface of the plasma and photon fluid. This results in the formation of 'bubbles' in the spatial profile of laser-accelerated proton beams. These structures were previously evidenced both experimentally and theoretically [2]. The authors of the work have performed 2D simulations to characterize this bubble-like structure and report on the dependency on laser and target parameters.

[1] Fonseca et al. Lec. No. in Com. Sc. 2331, Springer (2002)
[2] Palmer et al. PRL 108, 225002 (2012)

Based on:
Simulations of ion acceleration from ultrathin targets with the VEGA Petawatt laser, L. C. Stockhausen, R. Torres, E. Conejero Jarque.

LA³NET International Conference on Laser Applications at Accelerators - selection of presentations

Development of a laserwire emittance scanner for CERNs LINAC4 – Thomas Hofmann

In the framework of the High-Luminosity LHC, the new LINAC4 is currently in commissioning to replace CERNs current proton source, the LINAC2. After completion expected end of 2016 LINAC4 will accelerate H^- ions to 160 MeV. To measure the transverse emittance of the H^- beam, a method based on photo-detachment is proposed. This system operates with a pulsed laser that, focused through a thin slice of the H^- beam, has enough power to overcome the binding energy (0.75 eV) of the outer electrons and creates H^0/e^- pairs. In a downstream dipole, the created H^0 are separated from the unstripped H^- ions and their distribution can be measured by a dedicated detector. By scanning the laser beam through the H^- beam, the transverse emittance of the H^- beam can be reconstructed.

In his presentation Thomas discusses the concept, design and simulations of the laser emittance meter. Then, he presents the measurement results of a prototype system used during the LINAC4 3 MeV and 12 MeV commissioning and describes the concept for the final emittance station at 160 MeV.

Co-authors: BRAVIN, Enrico, RONCAROLO, Federico, ZOCCA, Francesca, RAICH, Uli, BOSCO, Alessio, GIBSON, Stephen, KRUCHININ, Konstantin, BOORMAN, Gary.

Numerical optimization on dielectric laser-driven acceleration of electrons in a grating-based microstructure – Yelong Wei

Dielectric laser driven accelerators (DLA) have good potential to become a strong candidate for ultra-compact electron accelerators and might even open up new avenues for future high energy physics accelerators and free-electron lasers. These microstructures can support accelerating fields that are orders of magnitude higher than what can be achieved in conventional radio-frequency cavity-based accelerators. This is a great advantage when it comes to the potential for reducing the size and cost of future accelerators.

In his talk Yelong presents detailed numerical studies into the acceleration of relativistic and non-relativistic electrons in double gratings silica structures. The optimization of these structures with regards to maximum acceleration efficiency for different spatial harmonics is discussed, CST Microwave Studio and VSIM codes are being used to carry out the numerical simulations on the grating-based microstructure where various parameters have been modified with the aim to obtain the maximum acceleration gradient. Initial studies focused on non-relativistic and relativistic electron beam and the results from these simulations are presented and an outlook on future experimental studies is also given.

Co-authors: Prof. WELSCH, Carsten, JAMISON, Steven Patrick, XIA, Guoxing, METE, Oznur.

Heavy element laser ionization spectroscopy – Lara Hijazi

In her talk Lara presented the assumptions of her project which aims to develop the existing Ti:Sa laser system in the GISELE setup in order to be adapted for the requirements of REGLIS device.

The Rare Element In Gas Laser Ion Source and spectroscopy (REGLIS) device will be installed at the S3 spectrometer which is currently under construction at the Spiral 2 facility at GANIL. Thus, REGLIS3 will be a source for the production of new and pure radioactive ion beams at low energy as well as it is a spectroscopic tool to measure nuclear hyperfine interactions, giving access to charged radii, electromagnetic moments and nuclear spins of exotic nuclei so far not studied. It consists of a gas cell in which the heavy-ion beam coming from S3 will be stopped and neutralized, coupled to a laser system that assures a selective re-ionization of the atoms of interest. Ionization can be performed in the gas cell or in the gas jet streaming out of the cell. A radiofrequency quadrupole is added to capture the photo-ions and to guide them to the low-pressure zone thereby achieving a good emittance of the produced low-energy beam that will be sent to a standard measurement station. The development of a new generation of an integrated ion source system for the production of very pure radioactive ion beams at low energy, including isomeric beams can be achieved by this device.

Worrying Skills Shortage in Accelerator R&D

There are more than thirty thousand particle accelerators in the world, ranging from the linear accelerators used for cancer therapy in modern hospitals to the giant 'atom-smashers' at international particle physics laboratories used to unlock the secrets of creation.

The vast majority of these machines are used for medical and industry applications and their advancement also pushes the development of other scientific fields such as informatics, cryogenics, vacuum, control systems and new materials.

Despite very significant investment in accelerator and clinical facilities across Europe, there are not many programs available at all that train the urgently required accelerator experts to design, build, operate and optimize these research infrastructures.

LA³NET is an outstanding example of a successful researcher training program in this important area. Despite many successes, much more still needs to be done as highlighted in an article that has just been published in medicalXpress.

Find out more.

Network News

We have the pleasure of welcoming Magdalena Klimontowska and Blaise Guénard to the network. Both joined the EU Project T.E.A.M at the University of Liverpool/Cockcroft Institute in March 2015. Welcome!

Magdalena Klimontowska joined the EU Project T.E.A.M. as the LA^{3}NET Project Manager to cover for Rob Ashworth's extended absence.

Magda graduated from Jagiellonian University in Krakow, Poland in 2009 with a Master of Arts degree in European Studies. The Socrates/Erasmus scholarship in Granada, Spain was part of her university education. Furthermore, in 2009 she finished postgraduate studies in "European Integration – European Funds".

She is interested in European policies, European Funds and international cooperation. Before joining the University of Liverpool she worked as European projects officer for regional government and regional development agency in Krakow, Poland. She implemented projects related to regional development, entrepreneurship, innovation and R&D promotion. She was also responsible for providing support to entrepreneurs, organized calls for proposals, grants assessment and advisory support to SMEs. During her professional work Magda has developed cooperation with many international project partners and stakeholders, among others from Spain, Germany, Switzerland, Greece, Romania, Bulgaria, as well as with regional and local partners.

Blaise Guénard joined the EU Project T.E.A.M as Project Assistant for both LA^{3}NET and oPAC projects.

Blaise graduated from the University of Caen Basse-Normandie, France with a Masters in European Project Management in September 2013. During his Higher Education journey, he has had the opportunity to travel and study in different countries, enabling him to discover the Other and reflect upon the Self. Blaise is passionate about how knowledge and resources can be shared on an international level and values the importance of Mentoring and Mutual Learning.

Blaise worked for two years for another EU funded FP7 project, Science in Society Catalyst, at the International Centre for Excellence in Educational Opportunities, University of Liverpool, where Blaise played a role of coordinator for an international partnership programme.

Welcome !!

We all wish good luck to Rob Ashworth with his operation and a speedy recovery !

We hope to have you back with us soon.

LA³NET Events

LA³NET Workshop and International Conference

The penultimate events for LA³NET: a Workshop on Beam Diagnostics and an International Conference on Laser Applications at Accelerators took place in Mallorca, Spain between 23rd-27th March. The workshop discussed the current state-of-the-art and future trends in optical diagnostics for charged particle beams, whilst the conference featured invited talks by research leaders, mixed with presentations on the R&D results of the networks' Fellows.

The week kicked off with an introduction to LA³NET and the state of the art of optical diagnostics by Dr. Rob Ashworth and Prof. Carsten Welsch, both from the University of Liverpool based at the Cockcroft Institute. LA³NET Fellows Thomas Hofmann and Andreas Döpp contributed to the session based around Optical beam diagnostic. In the afternoon session on Compton Backscattering Theory and Sources Cheng Chang presented his results on the first Compton backscattering energy measurements at ANKA and Pengnan Lu spoke about his work at HZDR.

The second day of the workshop started with Andrii Borysenko talking about measurements on the limit for bunch shape determination. It was followed by an extensive session on novel sensors and technologies. LA³NET network researchers featured here were Alexandra Alexandrova on laser self-mixing based velocity measurements and Kamil Nowacki presenting the company perspective from Foton's viewpoint with case studies related to supplying equipment for diagnostics technologies.

The events enjoyed broad media coverage in the local press:

http://www.diariobalear.es/?p=17715
http://ibeconomia.com/la-aceleracion-de-particulas-toma-forma-en-mallorca/
http://www.manacornoticias.com/comunicat.php?id=11374

Wednesday welcomed the opening of the LA³NET Conference on Laser Applications at Accelerators. Around 70 delegates from all across Europe participated in this event. Following an introductory talk from Prof. Carsten Welsch the event started with a session on particle beam generation. This extensive session included presentations from LA³NET Fellows Tom Day Goodacre, Jose Luis Henares, Lara Hijazi, Irene Martini, Pengnan Lu and Matthieu Veinhard. Luca Stockhausen contributed to the Laser-based Ion Acceleration session in the afternoon and so did Yelong Wei giving a presentation on dielectric laser accelerators.

The second day of the conference comprised sessions on laser-based electron acceleration and associated industrial and medical applications. LA³NET contributions came from Jurjen Couperus, Andreas Doepp, Jakob Kramer, Kamil Nowacki and Stanimir Kisyov giving talks about their work.
The poster session was held in the afternoon engaging more delegates and it was followed by a seminar talk on the Extreme Light Infrastructure from Dr. Sydney Gales of ELI.

The final day dawned on the conference with a packed morning programme all about aspects associated with beam diagnostics including talks from Andrii Borysenko, Prof. Amin Abdolvand on behalf of Mateusz Tyrk, Rui Pan, Thomas Hofmann, Cheng Chang and Alexander Alexandrova.
Prof. Carsten Welsch who hosted the event and is coordinating the LA³NET project summarises the week's successed: "Lasers and accelerators are closely linked in a number of R&D applications: They allow for the generation of beams with ever higher brightness, the realization of unprecedented acceleration gradients, as well as the design of beam monitors with better time and spatial resolution, dynamic range and robustness. Our two events joined these two communities and stimulated many interesting discussions throughout the week."

Further information about the LA³NET project and both events can be found on the network homepage.

Upcoming Events

Final LA^{3}NET events coming soon in Liverpool, UK to celebrate the achievements of the Fellows

Symposium on Accelerators & Lasers for Science and Society

Arena and Convention Centre Liverpool, UK, 26th June 2015

The symposium will be held at the prestigious Liverpool Convention Centre and feature world-renowned scientists that will present highlights in accelerator and laser research and the enormous impact these tools had on science and society.

Prof. Grahame Blair (STFC), Prof. Brian Cox (University of Manchester), Prof. Katia Parodi (Ludwig Maximilians University) , Prof. Victor Malka (LOA), Prof. Marc Vrakking (Max Born Institute) and Dr. Ralph Assmann (Desy) are amongst the confirmed speakers.

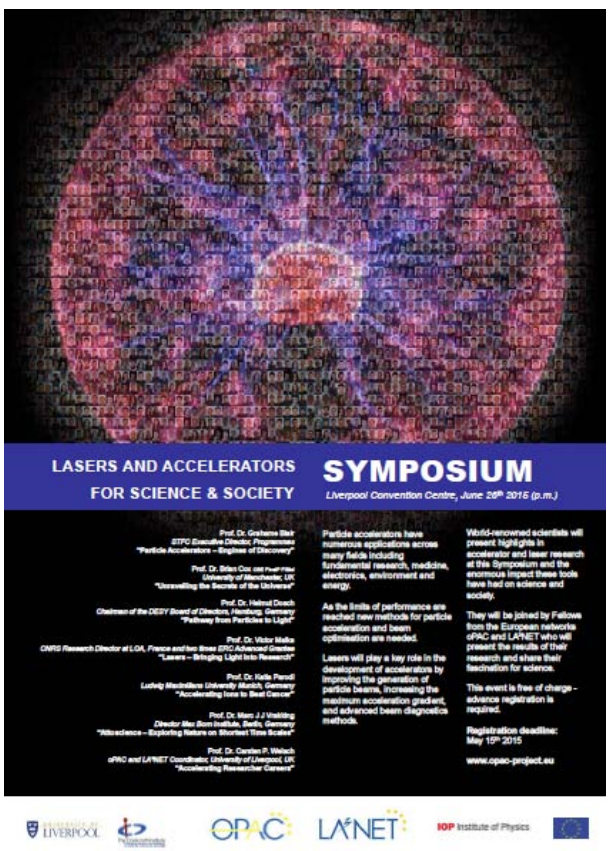
They will be joined by Fellows from the LA^{3}NET and oPAC networks who will present the results of their research. Their work will be reviewed by the Supervisory Boards of both networks.

The event will gather around 250 delegates from both projects, local schools students and other registered participants.

An LA^{3}NET Steering Committee meeting will kick off a busy day on Friday morning 26th June. This will be followed by a poster session from 12.00 to 14.00. There, all Fellows will present posters showing the results of their research especially to the school students and the general public.

The main Symposium will then take place all afternoon, followed by a dinner for all network members.

Find out more.



4th LA3NET School – Advanced Researcher Skills

University of Liverpool, UK, 22nd -23rd June 2015

6th LA3NET Topical Workshop – Knowledge Transfer & Spin-offs

University of Liverpool, UK, 24th -25th June 2015

A career skills training from Monday to Thursday will provide our Fellows with skills and knowledge that will be useful for their future careers. It will help them design their career plans within and outside of academia, identify opportunities that are realistically open to them and learn how to present their skills to future employers. There will be components related to project management, grant writing, dealing with the media, CV and interview training, etc.

The training is only open to the network Fellows and will be funded from the central training budget, including accommodation and most meals. Travel costs will need to be paid from the Fellows' individual training budgets. Note that the training will start after lunch on Monday to allow travel on Monday morning where possible. Fellows will also need to attend the Symposium on the Friday with an evening event so accommodation will be provided for departure on Saturday.

International Beam Instrumentation Conference

Melbourne, Australia, 13th - 17th September

IBIC 2015, hosted by the Australian Synchrotron, will bring together beam instrumentation specialists from international accelerator facilities, in the major research hub of Melbourne, Australia.

IBIC is dedicated to exploring the physics and engineering challenges of beam diagnostic and measurement techniques for charged particle accelerators worldwide.

Abstracts Close 2nd June 2015, Early Registration Closes 28th July 2015.

Register now!
ibic2015.org

The conference program will include the latest developments in:

- Overview and Commissioning
- BPMs and Beam Stability
- Time Resolved Diagnostics and Synchronization
- Beam Loss Detection
- Beam Profile Monitors
- Beam Charge Monitors and General Diagnostics
- Collider Specific Instrumentation

LA³NET Prize 2015

LA³NET is proud to offer an annual €1,000 prize and certificate to a young researcher judged to have made an outstanding contribution to research into the application of lasers at accelerator facilities.

To be eligible to be considered for the prize the researcher must be within the first five years of their professional career (starting from the date that they were awarded the qualification that would enable them to register for a PhD).
To apply send a description of your research contribution along with a letter from your supervisor verifying your application and a brief CV to the LA³NET coordinator Prof. Carsten P. Welsch.

The winner will be announced at the Symposium on Accelerators & Lasers for Science and Society.

The deadline for applications is
7th June 2015 !

Fellows Activity

Kamil Nowacki secures job with company located in Devon, UK

One of the aims of LA³NET is to assist in the employability of our Fellows. Kamil is the first one in the network to demonstrate how LA³NET training has helped with career development having successfully obtained a job in the UK.
This is a position of Electrical Design Engineer at TDK-Lambda UK, Britain's largest designer and manufacturer of both standard and configurable AC-DC and DC-DC power supplies between 100W and 1,5kW. TDK-Lambda offers solutions for a wide spectrum of applications within many segments including the medical and industrial markets. Kamil will join a group working on design and development of new generation of modular AC–DC power supplies, for high volume applications.

We congratulate and wish Kamil every success in his new job !

Fellows' Videos

The LA³NET Fellows have started to release short videos about their research that present the challenges and impact of their work. Prof. Carsten Welsch, coordinator of the networks, says: "I believe that our Fellows are doing an excellent job in presenting their work through these short videos. Their videos will be a lasting output of the R&D carried out within our networks and an excellent resource for anyone interested in accelerator science."
The videos are successively posted on YouTube channel and LA³NET webpage. We look forward to seeing new videos!

A few examples can be found below.

Thomas Hofmann , Irene Martini, Tom Day Goodacre and Matthieu Veinhard describe their work and the ways lasers are used in different projects at CERN.

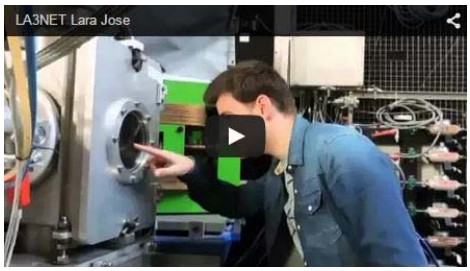
youtu.be/zUWskE-TkvY

Pengnan Lu at HZDR produced a video about his work for the SRF Gun at the ELBE accelerator facility.

youtu.be/XJ-y6WWI67s

LA³NET Fellows Lara Hijazi and Jose Luis Henares present interesting facts about their projects at GANIL.

youtu.be/J3bnso6GyAI



Back to School

Thomas Hofmann headed back to school in Germany to present his research work to school children. The youngsters liked the way he presented complicated technical issues in an accessible way and they took the opportunity to ask many questions about his research work at CERN.

The feedback was so positive, that the school already invited Thomas for another visit next year.

Source: http://lsh-wiesentheid.de

Making a Mess in the Name of Science

Yelong Wei and Alexandra Alexandrova are back to their LA³NET projects after their big contribution to the largest celebration of science, technology, engineering and maths for young people in the UK. The Big Bang UK Young Scientists & Engineers Fair took place from Wednesday 11th to Saturday 14th March at The NEC in Birmingham. The event aims to inspire the future scientists and engineers through exciting hands on activities and interactive exhibits.

Demonstrations of exciting experiments included a levitating train, hair-raising experiments and the very messy magic flying paper - it was like Argentina 1978 all over again. A table-top magnetic accelerator with the potential to give a painful shock was also constructed to help explain the wonderful and magical world of physics. Alex said, 'It was a real pleasure to speak about science with children and young future scientists!'

More information about BIG BANG 2015 can be found here

Secondments

Mateusz Tyrk recently returned from Research Instruments in Cologne where he had spent two weeks on secondment away from Dundee. There, he was greeted by a friendly atmosphere in the novel-looking offices and lots of high tech equipment.

His initial assignment was to carry out preliminary calculations for a new cryogenic system that was designed to change 4 Kelvin liquid helium into 2 Kelvin for cooling of superconducting radio frequency (rf) cavity modules. His work allowed Mateusz to apply his knowledge of cryogenics, fluid dynamics, SRF cavities, heat exchange processes and engineering devices that could do the job – including for example the Joule-Thomson valve. Working independently and with appropriate background literature searches including studying YouTube videos on fluid dynamics Mateusz was able to complete the required calculations using Bernoulli equations in Excel.

At the end of the second week Mateusz presented all of his calculations to the board of directors including Hanspeter Vogel (MD) and Michael Pekeler (Head of superconducting rfs) and Daniel Trompetter who supervised his work. The presentation also included his LA³NET project and LA³NET in general which all created much interest.

All in all, a good piece of work was completed while expanding Mateusz's experience and the only thing that defeated him was a 1,2 kg Schnitzel in an XXL food challenge.

Jose Luis Henares has arranged a secondment to Laser Quantum (Germany) from 27th July to 7th August. The placement is hosted by Albrecht Bertels and will entail finding out what goes on in the company in terms of design, R&D and fabrication followed by the tracking of one specific project.

Other Activity

Irene Martini spent two weeks at Daresbury Laboratory doing experimental work in collaboration with the ASTEC/STFC Vacuum Science Group. Such collaborative work was motivated by the shared interest in copper for photoinjector applications. At CERN OFE copper is used as a substrate for photocathodes production by thin film deposition, and a team at DL is studying metallic photocathodes (copper included) for use in NCRF guns. The impact of different surface cleaning procedures, such as chemical pickling and oxygen plasma cleaning, was investigated with X-ray photoemission spectroscopy, for evaluating the cleanliness, and white light interferometry, for measuring the roughness.

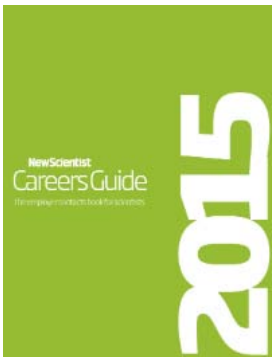
Partner News

Research Instruments adds photon instrumentation to list of services

In the current International Year of Light LA^{3}NET partner Research Instruments celebrate with the announcement that they have acquired and will continue to operate the vacuum, insertion device, beamline, cryo-cooler, X-Ray and XUV activities of Bruker ASC. RI are renowned players in the field of particle accelerators, photon instrumentation & special manufacturing and this new photon instrumentation business will complete the service for innovative solutions at the cutting edge of technology. RI and the former Bruker ASC Beamlines have a common history. Before 2009, their businesses were both parts of the former company ACCEL. These common roots are a good basis for a smooth integration of former colleagues and processes including the quality management and manufacturing facilities back into RI.

Users of synchrotrons, FELs and XUV light source will profit from a higher flexibility regarding designs and from allocation security of manufacturing resources. Access to clean and highly specialized manufacturing and testing facilities as well as to larger floor space are other benefits. The experience in series production of more than 400 superconducting cavities and almost as many advanced RF couplers for the XFEL project will have a positive impact on component standardization and leaner manufacturing. On the other hand, colleagues from the photon instrumentation team will introduce new and advanced technologies. In this way, RI's combined expertise in designing, engineering and high precision machining, welding and brazing processes, chemical and physical coating and clean room assembly is now complemented with photon instrumentation.

Don’t know what to do next?



New Scientist magazine has put together an online magazine full of career advice for scientists: New Scientist Careers Guide 2015 UK digital edition.

Follow this link to launch the digital edition.

Other News

2015 FEL Prize and 2015 Young Scientist FEL Award

Nominations are invited for the 2015 FEL Prize and 2015 Young Scientist FEL Award, which will be awarded at the FEL 2015 conference in August. The FEL prize is given to a person who has contributed significantly to the advancement of the field of Free-Electron Lasers. In addition, it gives the international FEL community the opportunity to recognize one of its members their outstanding achievements. The Young Scientist FEL Award is intended to honour an important contribution to FEL science and technology from a person who is less than 35 years of age. A date of birth or current age is necessary information. The nomination letter for this prize must have an attachment of selected paper(s) published by the nominee. Nominations should detail the outstanding achievements which the nominated person should be recognized for. A brief proposed citation should be part of the nomination letter. It is recommended that contributions are accompanied by support letters, (no more than 3) substantiating the significant contributions to the science of FEL relevant to the nomination.
Deadline for nominations and supporting letter: May 31, 2015.

For contact details please follow this link.

Selected Publications

'Laser diode self-mixing interferometry for velocity Measurements', A.S. Alexandrova, V. Tzoganis and C.P. Welsch, Optical Engineering 54(3), 034104 (2015) (2195791)

'Demonstration of relativistic electron beam focusing by a laser-plasma lens', C. Thaury, E. Guillaume, A. Döpp, R. Lehe, A. Lifschitz, K. Ta Phuoc, J. Gautier, J-P Goddet, A. Tafzi, A. Flacco, F. Tissandier, S. Sebban, A. Rousse & V. Malka, Nature Communications 6, 6860 (2015).

Meet us at IPAC'15 in Richmond !

Joke Box

Where does bad light end up?

In a prism.

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Find us on Facebook

www.la3net.eu

LA³NET Events

June 22nd - 23rd 2015	Advanced researcher skills school, Liverpool, UK
June 24th - 25th 2015	Knowledge transfer and spin-off workshop, Liverpool, UK
June 26th 2015	Symposium on Accelerators for Science & Society, Convention Centre, Liverpool, UK

Other Events

May 3rd – 8th 2015	IPAC15, Richmond, Virginia, USA
May 25th – June 5th 2015	Accelerators for Medical Applications, Vösendorf, Austria
June 7th – 10th 2015	Laser Probing (LAP2015), East Lansing, Michigan, USA
Aug 23rd–28th 2015	FEL 2015, Daejeon, South Korea
Sep 13th – 17th 2015	IBIC, Melbourne, Australia
Oct 7th - 9th 2015	oPAC Accelerator Optimization Conference, Seville, Spain

NOTICE BOARD

In order to increase the reach and impact of our activities through Facebook we have decided to merge the Facebook pages of our twin projects, LA³NET and oPAC, into that of The Cockcroft Institute . Be aware that the old page will no longer receive posts, so please 'like' the new page to stay up-to-date!

DEADLINE FOR THE NEXT NEWSLETTER 30th June 2015

About LA³NET

The exploitation of Lasers for Applications at Accelerator facilities for ion beam generation, acceleration and diagnostics is the goal of this new Network within the FP7 Marie Curie Initial Training Network (ITN) scheme. In this frame, research centers, universities and industry partners from across Europe will develop beyond-state-of-the-art techniques and technologies through a joint inter-sectorial training program for early stage researchers within a unique European partnership.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 289191.