

## LA<sup>3</sup>NET takes researchers back to school

The network's event series started off with a true highlight: almost 80 researchers working with lasers at accelerators came together for an **international school on laser applications at accelerators** at GANIL in Caen, France to learn about the state of the art in laser based particle sources, laser acceleration and beam diagnostics. We all had an exciting week during which we learned a lot about this important field and many new contacts between researchers from across the world were made possible. It was also the first time that all our newly recruited fellows got to meet each other and presented their background and projects in the form of short presentations.

Feedback from participants was excellent and will serve the network as a perfect motivation to maintain the present momentum and excellent atmosphere in all future events.

I would like to use this opportunity to cordially thank all lecturers for their excellent contributions and the enormous work they put in preparing their courses, the participants for many interesting discussions and our friends from GANIL for their excellent support and hard work during the whole week !

During the week in France meetings of both, the LA<sup>3</sup>NET Steering Committee and Supervisory Board, took place. All past activities including our international recruitment campaign were reviewed and and planning of future events started.

A key research area combining lasers and accelerators are laser-based particle sources.

Lasers have been successfully used to provide highest brightness electron and exotic ion beams that cannot be realized by any other technique. They have unmatched selectivity in multi-step resonant ionization by wavelength-tuneable lasers at ISOL facilities and are able to provide very high currents for energy applications in heavy ion fusion. Within LA<sup>3</sup>NET, laser-based sources are being developed at CERN/Switzerland, Helmholtz Centre Dresden-Rossendorf/Germany and GANIL/France. All three projects will challenge existing techniques and technologies and require to go significantly beyond the present state-of-the-art.

Given the importance of this research area the consortium decided to hold its first **Topical Workshop on 'Laser based Particle Sources'** at CERN between 20-22 February 2013. We plan to bring together all fellows working on this work package and the event will be open to researchers from inside and outside the collaboration. Workshops will discuss the current state-of-the-art with ample opportunity for developing possible collaboration, joint grant applications and/or researcher exchanges. They are a key part of the training program within LA<sup>3</sup>NET and I look forward to the start of a whole series of these workshops.

In this newsletter edition, we present you our recently recruited fellows and summarize the networks activities. In case you would like to disseminate information about R&D activities at your institution in one of the future editions – **get in touch !**



Prof. Carsten P. Welsch, Coordinator

### Special Interest Articles

- LA<sup>3</sup>NET brings together Laser and Accelerator Specialists

- New Fellows

### Individual Highlights

- Partner News 6
- Vacancies 8
- Upcoming Events 10

## LA<sup>3</sup>NET brings together Laser and Accelerator Specialists

The first international school on laser applications at accelerators was held at GANIL in Caen, France between October 15<sup>th</sup> and 19<sup>th</sup> 2012. 80 participants from inside and outside the LA<sup>3</sup>NET Consortium were introduced to the state of the art in this dynamic research area.



This five day event followed the successful format pioneered in the [DITANET project](#). Renowned lecturers covered topics such as introduction to lasers and accelerators, beam shaping, laser ion sources, laser acceleration, laser based beam diagnostics and industrial applications.

In addition to the lectures there were study groups, poster sessions and two seminars on major international initiatives in the laser and light sources field.

The poster session was particularly lively with around 30 presentations by delegates on

recent research and future plans. This was complemented by a number of industry stands featuring demonstrations of products and literature from the commercial world of lasers and accelerators. This two-hour session remained packed as delegates mingled and interrogated the poster authors and industry representatives.

**All 15 newly recruited LA<sup>3</sup>NET fellows joined this school and benefited not only from the excellent lectures, but also from discussions with participants from the wider community.**

A visit to the city of Caen and the accelerator and laser facilities at GANIL complemented the program of this event which initiates a series of international schools, topical workshops and conferences that will be organized by the network over the next few years.



Group photograph at Le Domaine de la Baronnie, Caen

Several prizes were also awarded during an impressive banquet dinner at Le Domaine de la Baronnie. Here delegates were treated to an unforgettable experience of French tradition and culinary delights. During proceedings the €1,000 award for the LA<sup>3</sup>NET Young Researcher Prize 2012 was presented to Sebastian Rothe (U. Mainz, Germany) along with the three School prizes for outstanding

poster contributions which went to Jurjen Couperus (HZDR, Germany), Kyung Nam Kim (Kongju University, South Korea) and Andrii Borysenko (KIT, Germany). A highly entertaining band ensured that the high spirits of the evening were maintained into the early hours.



*Prof. Carsten Welsch and Dr. Nathalie Lecesne with the Prize Winners*

The final day of the School dawned with a joint session where the 15 research fellows recruited so far for LA<sup>3</sup>NET gave presentations to introduce themselves to the project supervisory board members. In a secret ballot of the fellows Andrii Borysenko was chosen to represent the fellows for the coming year on the steering committee. The supervisory board meeting was then held to review progress and discuss future obligations.

The School was brought to a close with an industry session comprising presentations from representatives of four of the industry partners in LA<sup>3</sup>NET: Danfysik from Denmark, Cosylab from Slovenia, Thorlabs from

Germany and Cobolt from Sweden. These perfectly complementary presentations gave both young researchers and experienced academics an insight into what it is like working in industry and where working practices and priorities differed from academia.

All contributions to this event can be found on the school's [indico page](#). A selection of pictures from the event can be viewed at [facebook](#). Further information about the project is available on its [home page](#). There is also an article in the [CERN Bulletin](#) and the University of Liverpool [news](#).

## Ten further Fellows take up Positions in LA<sup>3</sup>NET

**September saw five new starters with a further four on site in October. We would like to welcome:** Luca Stockhausen at CLPU in Spain, Alexandra Alexandrova and Amir Aimidula at the Cockcroft Institute/Liverpool University in the UK, Thomas Hofmann and Tom Day Goodacre at CERN, Andrii Borysenko at KIT in Germany; Mateusz Tyrk at Dundee University also in the UK and Jakob Krämer at Danfysik in Denmark. In addition, Jose Luis Henares started at GANIL in France although his formal Marie Curie contract will not be in place before November. Here are the first selected profiles :

### Luca Christopher Stockhausen

was born in Cologne, Germany. He studied Physics at the University of Liverpool and attained his master's degree in July 2012. In his master's thesis he evaluated the feasibility of using a Compton Camera detector system to analyse the gamma radiation released during Boron Neutron Capture Therapy (BNCT) to produce an image of the region being treated. BNCT is an advanced approach to treating cancer in humans. Luca had a strong focus on medical physics and radiotherapy and has been enrolled in various courses in this field. In the LA<sup>3</sup>NET project he

will investigate particle acceleration for hadron therapy at CLPU and will also be enrolled in the PhD program of the University of Salamanca. In his project he will identify adequate parameter sets, target geometries, and beam shaping and control schemes to obtain proton and ion beams which could be used for nuclear radiotracers at lower energies and therapy at higher energies. This will involve performing simulations of the generation of particle beams by means of plasma codes and experimental studies with the laser systems at CLPU.



**Alexandra Alexandrova** studied physics and engineering at the National Research Nuclear University MEPhI 'Moscow Engineering Physics Institute' from 2005 to 2012. Her speciality is "Condensed Matter Physics" with major subject "Laser Physics". Her specialization is "Concentrated flux of radiation – Matter Interaction". She has experience with laser interferometers and different laser systems for laser cleaning system for ITER (International Thermonuclear Experimental Reactor) and the Photonic Doppler Velocimeter for measurement of fast process and detecting shock waves in matter. As a result of her studying Laser Physics, she has knowledge of setting up laser systems, light-matter interaction, Laser Light, and

Signal Processing (programming), Speckle Phenomena in Laser light, Laser Interferometry, Laser Spectroscopy, Generation and amplification of short laser impulses, Physics of Solid Matter, and Non-linear Physics and Instabilities. She also has experience in signal calculation by Fourier Transforms and solving Bloch equations. In September 2012 Alexandra joined the LA<sup>3</sup>NET project working for the University of Liverpool based at the Cockcroft Institute, UK. She is working on a project to develop a laser velocimeter for in-detail characterization of the gas jet, allowing for investigations into the jet dynamics itself, probing simultaneously its density and velocity profile.



**Thomas Hofmann** finished his electrical engineering studies at the University of Nuremberg in 2007. Thereafter he continued with a Master's course on photonic engineering. In this time he acquired techniques for optical simulation and instrumentation as well as laser principles and applications. Since 2009 Thomas has been working for Thermosensorik GmbH, a company building infrared high precision camera systems. His past projects were always application targeted. In his diploma thesis at Infratec GmbH in Dresden Thomas built a test station for a pyroelectric infrared detector with fabry-perot-interferometer. His

Master's thesis which he did at the POF-Application Centre concerned a CMOS-camera module for POF (Polymer Optic Fibres) and at Thermosensorik he worked at the calibration process for infrared cameras. All of these activities involved a combination of optical engineering and electrical engineering which is his main focus. In September 2012 Thomas Hofmann started his fellowship at CERN. His task is to develop a laser emittance meter for the linear particle accelerator LINAC4. The main focus will be the simulation of the interaction of the laser with the ions as well as the design and test of a laser-scanner setup.



**Andrii Borysenko** studied physics in the Taras Shevchenko National University of Kyiv, Department of Nuclear Physics and Engineering. In 2010 he obtained his bachelor's degree and was a participant in a summer student program at the Institute for Nuclear Physics of the Research Centre Jülich. There he worked on developing the software track-finder for processing the data from the PANDA detector (component of the FAIR facility). After that Andrii enrolled in the master's program in Nuclear and High Energy Physics in the Taras Shevchenko National University of Kyiv during which time he had a two-month internship at the Max Planck Institute for Nuclear Physics. There he gained

experience with investigation of beam-target interactions at the storage ring. He graduated in 2012 with a specialization in "Nuclear physics, high-energy and particle physics". In September 2012 Andrii started a fellowship at Karlsruhe Institute of Technology (KIT) where he will be working on measurements of the electron bunch shape with electro-optical sampling in an electron accelerator. His main goal here will be: improving an EOS system, which is currently implemented at the ANKA storage ring and adapting it to the linear accelerator FLUTE, which is presently being designed at KIT. Measurements will be compared to simulations.



## LA<sup>3</sup>NET Young Researcher Prize

Sebastian Rothe was awarded the LA<sup>3</sup>NET Young Researcher Prize 2012 at the Laser School in GANIL. This was for his contribution to the RILIS laser system and ionisation research.

The LA<sup>3</sup>NET Young Researcher Prize is an annual award of €1,000 open to all researchers in the first five years of their research careers both from within or outside of the network. Applicants are encouraged to submit their entries for 2013 prize that will close on 30 June 2013.



## Partner News

### GANIL makes Nuclear Physics accessible to the Public

As part of the 2012 French Science Festival ("Fête de la Science") GANIL-SPIRAL2 shared a 100 m<sup>2</sup> booth with the neighbouring lab LPC to present research activities on Nuclear Physics. About 30 GANIL-SPIRAL2 staff tended the booth at the Village des sciences de Caen which received over 10,000 visitors. Video and games were used to make nuclear physics accessible to all ages along with demonstrations of vacuum effects, radioactivity and optics. Visits to GANIL were also organised to present the current and future facilities to schools and the public. For more information see:

[www.relais-sciences.org/...present](http://www.relais-sciences.org/...present)



GANIL also contributed to a Physics exhibition in Caen focused on the "two infinities" that will subsequently tour Normandy:

[www.relais-sciences.org/...invit\\_physique](http://www.relais-sciences.org/...invit_physique).

### Daresbury celebrates 50 years of outstanding science

The world renowned Daresbury Laboratory was conceived fifty years ago to deliver a particle physics facility in the form of the NINA synchrotron. The programme of 50<sup>th</sup> anniversary celebrations includes this month a symposium on the development of the facilities over the years and future plans. Compact accelerators, cleaner fuel, safer aircraft and new medicines, not to mention Nobel prizes, great tasting chocolate and iPods have all been influenced or made possible by the world leading scientific research at Daresbury. Today, building on its

strong legacy, Daresbury Laboratory continues its cutting edge research, pushing the frontiers of basic science while contributing to solutions to major societal challenges such as finding cures for serious disease or significantly improving the prediction of natural disasters such as earthquakes and floods. The laboratory is core to SciTech Daresbury, the home of the Cockcroft Institute from where the University of Liverpool coordinates LA<sup>3</sup>NET.

## New adjunct partners Litron Lasers and SLAC

**UK company Litron Lasers and the US Stanford Linear Accelerator Centre (SLAC) are two new additions to LA<sup>3</sup>NET.**

**Litron Lasers** is a UK company specialising in the design and manufacture of pulsed Nd:YAG laser systems for scientific and industrial applications. They are the market leader in high power, high repetition rate lasers offering both standard and custom options. Litron currently has an installed base of several thousand units, many of which are used in industrial 24/7 applications.

Litron's philosophy is to keep all design and a significant proportion of manufacturing in-house. As a result all electronics, both digital and analogue, mechanics, software and all optics for the lasers are designed at Litron. This means they have gained significant expertise to design and produce complex custom Nd:YAG and other solid-state laser systems.

A large proportion of Litron's products are being used in scientific applications and so this market has been targeted for future growth and expansion. In addition, Litron are receiving an increasing number of enquiries from customers who are interested in exploiting laser technology in new scientific fields of research relating to accelerator facilities. It is often the case that new innovations take years to refine and require close cooperation between the researcher and the partnering laser company.

If researchers were aware that Litron is willing to collaborate with the researcher and

help them achieve their research goals then this would be a significant step forward.

Litron is involved in many different areas of research that use lasers in accelerator based applications at CERN, SLAC and numerous other research institutes across the globe in applications ranging from Ti:Sa to OPO pumping. Litron's participation in LA<sup>3</sup>NET will be a two way process as there are many ways in which Litron can add value and collaborate with the ITN:

- Collaboration with the network to develop new laser systems
- Loan of laser systems
- Hosting of secondments at Litron
- Provision of research facilities to assist with projects associated with the centre.
- Exposure to industrial collaborators and facilitator of knowledge exploitation.
- Access to expertise
- Delivery of laser related training courses.

Gary Newham added that 'Litron lasers are very excited at the opportunity to be involved in such an inspiring initiative and my colleagues and I at look forward to working with you and helping to make the new organisation a success.'

blocks of matter and created the first website in North America.

SLAC's state of the art research facilities attract thousands of scientists from all over the world each year to work with local staff to discover new drugs for healing, new materials for electronics and new ways to produce clean energy and clean up the environment.



SLAC's revolutionary X-ray laser is revealing intimate details of atoms and chemical reactions and making stop-motion movies of this tiny realm, with the goal of doing the same for living cells. Their scientists are also exploring the cosmos from the origin of the universe to the nature of dark energy and

developing the smaller, more efficient particle accelerators of the future. Six scientists have been awarded Nobel prizes for work done at SLAC and more than 1,000 scientific papers are published each year based on research at the lab.

## Vacancies

### Job opportunity: Timing Diagnostics Scientist at XFEL

**There is a position at the European X-Ray Free Electron Laser Facility GmbH (European XFEL GmbH) that is part of a collaboration with SLAC.** For the first year or two the position would be based mainly at SLAC's LCLS working with Ryan Coffee on a timing and diagnostics project. Subsequently, the successful candidate would take up the

longer term scientist position at XFEL taking the knowledge learned back there.

More information can be found at:

[www.xfel.eu/organization/job\\_offers](http://www.xfel.eu/organization/job_offers)



## Vacancies in the Network

**Two posts remain open in LA<sup>3</sup>NET hosted by STFC in the UK and IFIN-HH in Romania and applicants can apply via the web site:**

[www.liv.ac.uk/la3net/vacancies/how-to-apply](http://www.liv.ac.uk/la3net/vacancies/how-to-apply)

If you are able to publicise these vacancies at your organisation to generate the non-UK or non-Romanian candidates required by the Marie-Curie rules then please get in touch for more details. Successful applicants will work on one of the following projects:

### Optical Timing with fs Stability

STFC Daresbury National Laboratory and University of Manchester, Photon Science Institute, UK. For further details or a flyer to advertise the position contact: [steven.jamison@stfc.ac.uk](mailto:steven.jamison@stfc.ac.uk)

### Development of a 3D neutron detector for complex geometries.

Institutul National pentru Fizica si Inginerie Nucleara Horia Hulubei in Romania. For further details please contact Florin Negoita: [negoita@nipne.ro](mailto:negoita@nipne.ro)



## Management of LA<sup>3</sup>NET

### EU Project T.E.A.M.

At the University of Liverpool we have established a dedicated EU Project T.E.A.M which is based at The Cockcroft Institute. In addition to LA<sup>3</sup>NET the T.E.A.M is currently also managing a second FP7 Marie Curie Initial Training Network (ITN) coordinated by Prof. Dr. Carsten P. Welsch concerning the optimisation of particle accelerators (oPAC).

Within the EU Project T.E.A.M, Dr. Rob Ashworth is the project manager for LA<sup>3</sup>NET, Dr. Glenda Wall is managing oPAC whilst Sue Davies is responsible for the financial project administration. Helen Williams provides administrative support via the coordinator and Alexandra Welsch is responsible for developing and managing the web presence and newsletters.



Dr. Rob Ashworth

+44 (0)1925 86 4051  
[rob.ashworth@liverpool.ac.uk](mailto:rob.ashworth@liverpool.ac.uk)  
 Skype- *ulivrobashworth*



Dr. Glenda Wall

+44 (0)1925 86 4346  
[g.p.wall@liverpool.ac.uk](mailto:g.p.wall@liverpool.ac.uk)  
 Skype- *ulivglendawall*



Sue Davies

+44 (0)1925 86 4046  
[sue.davies@liverpool.ac.uk](mailto:sue.davies@liverpool.ac.uk)  
 Skype- *uolsuedavies*



Helen Williams

+44 (0)1925 86 4050  
[helen.williams3@liverpool.ac.uk](mailto:helen.williams3@liverpool.ac.uk)  
 Skype- *ulivhelenwilliams*



Alexandra Welsch

+44 (0)1925 86 4046  
[alexandra.welsch@liverpool.ac.uk](mailto:alexandra.welsch@liverpool.ac.uk)  
 Skype- *alexandra\_welsch*



## UPCOMING LA<sup>3</sup>NET EVENTS

### The first Topical Workshop on Laser Particle Sources, 20<sup>th</sup> to 22<sup>nd</sup> February 2013



**This Topical Workshop will address generation of electron and ion beams with laser methods.** It will take place at CERN where an expertise on production of electron beams with photoinjectors and resonance laser ionization of radioactive isotopes has

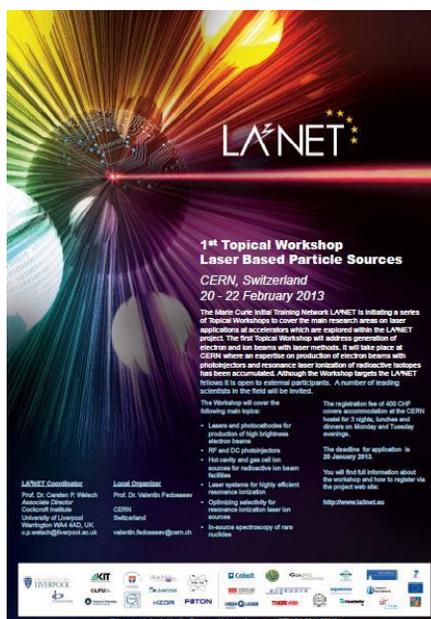
been accumulated. Although the Workshop targets the LA<sup>3</sup>NET fellows it is open to external participants. A number of leading scientists in the field will be invited.

The Workshop will cover the following main topics:

- Lasers and photocathodes for production of high brightness electron beams
- RF and DC photoinjectors
- Hot cavity and gas cell ion sources for radioactive ion beam facilities
- Laser systems for highly efficient resonance ionization
- Optimizing selectivity for resonance ionization laser ion sources
- In-source spectroscopy of rare nuclides

The registration fee of 400 CHF covers full board accommodation at the CERN hostel for 3 nights. There is a reduced rate for local delegates not requiring accommodation. The deadline for registration on the CERN Indico

site is **16 January 2013**. You will find full information about the workshop and how to register via the LA<sup>3</sup>NET project web site: [www.la3net.eu](http://www.la3net.eu)



## Dates finalised for Complementary Skills School in Liverpool

The network's fellows are privileged to be going to attend the second LA<sup>3</sup>NET School from the 17<sup>th</sup> to 22<sup>nd</sup> March 2013. This will help them to develop their competencies and build links across the network. There are no

fees to attend this School as accommodation, meals and speaker costs are covered by the Central Category 3 budget - fellows only need to arrange and pay for their own travel.



This school will provide the LA<sup>3</sup>NET early stage researchers with the non-technical skills that will be invaluable for their future careers whether that be in academia or industry. Training will be based around the following topics:

- Presentation skills
- Group presentation sessions
- Scientific writing
- Group discussions on working within an international network
- Building bridges with industry
- Patent issues and IPR (Intellectual Property Rights)
- Project management
- Time management
- Problem solving
- Self management and work-life balance

Note that the UK is not within the Schengen area and so non-EC visitors working outside of the UK will need to apply for a UK visa in addition to their work permits.

### Joke Box

**A photon checks into a hotel. The receptionists asks " Can I help you with your luggage?"**

**To which the photon replies, "I don't have any. I'm travelling light."**

**Project Coordinator**  
 Prof. Carsten P. Welsch  
 Cockcroft Institute  
 4, Keckwick Lane  
 Warrington, WA4 4AD  
 United Kingdom

PHONE:  
 +44 (0) 1925 86 4352

FAX:  
 +44 (0) 1925 60 3192

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

**Project Manager**  
 Dr. Rob Ashworth

PHONE:  
 +44 (0) 1925 86 4051

FAX:  
 +44 (0) 1925 60 4206

E-MAIL:  
 robash@liverpool.ac.uk

**Newsletter Editor**  
 Alexandra Welsch

PHONE:  
 +44 (0) 1925 86 4046

FAX:  
 +44 (0) 1925 60 4206

E-MAIL:  
 a.welsch@liverpool.ac.uk



[www.la3net.eu](http://www.la3net.eu)

### LA<sup>3</sup>NET Events

Feb 20 <sup>th</sup> -22 <sup>nd</sup> 2013	Particle sources Topical Workshop, CERN, Switzerland
Mar 17 <sup>th</sup> -22 <sup>nd</sup> 2013	Complementary skills school, Liverpool, UK

### Other Events

Dec 9 <sup>th</sup> -12 <sup>th</sup> 2012	Photonics 2012, Madras, India
April 15 <sup>th</sup> -18 <sup>th</sup> 2013	SPIE Optics + Electronics Symposium, Prague, Czech Republic
May 12 <sup>th</sup> -17 <sup>th</sup> 2013	IPAC 13, Shanghai, China

## NOTICE BOARD

### BRANDING AND ACKNOWLEDGEMENT OF FUNDING FROM THE EC

LA<sup>3</sup>NET is a fully funded Marie Curie Action from the EC. Consequently, this needs to be acknowledged in externally published material such as posters for conferences and articles sent to journals. This acknowledgement should refer to the grant as follows: **LA<sup>3</sup>NET is funded by the European Commission under Grant Agreement Number GA-ITN-2011-289191**

In addition, all materials for dissemination both internally and externally should contain the LA<sup>3</sup>NET project logo along with the FP7, EC flag and Marie Curie logos all available from VOCAL. The EC logos should be set out in the following order for consistency either horizontally or vertically:



**DEADLINE FOR THE NEXT NEWSLETTER**  
 31st January 2013

## About LA<sup>3</sup>NET

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 centres, 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.

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