

WELCOME !

to the LA³NET Conference

Carsten P. Welsch

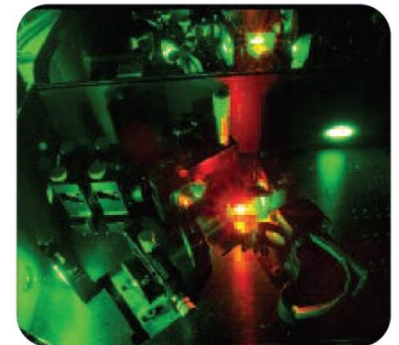
- Laser Applications for Accelerators – A Marie Curie Network

- 19 ESRs
- 36 Partner Institutions
- 4.6 M€



LAser Appplications at Accelerators a european NETwork

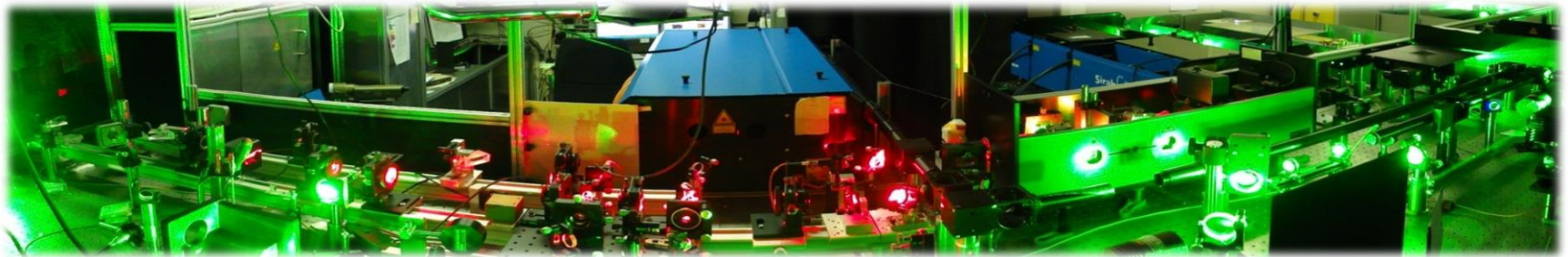
- More than 30,000 accelerators in the world;
- Lasers are becoming increasingly important
 - Beam generation;
 - Acceleration;
 - Characterization, etc.
- Few experts trained in both fields;
- Large scale facilities: International collaboration is key !



Research Program

■ Main areas:

- Particle Sources (WP2);
- Particle Beam Acceleration Schemes (WP3);
- Beam Diagnostics (WP4);
- System Integration (WP5);
- Laser and Photon Detector Technology (WP6).





LA³NET Web Site

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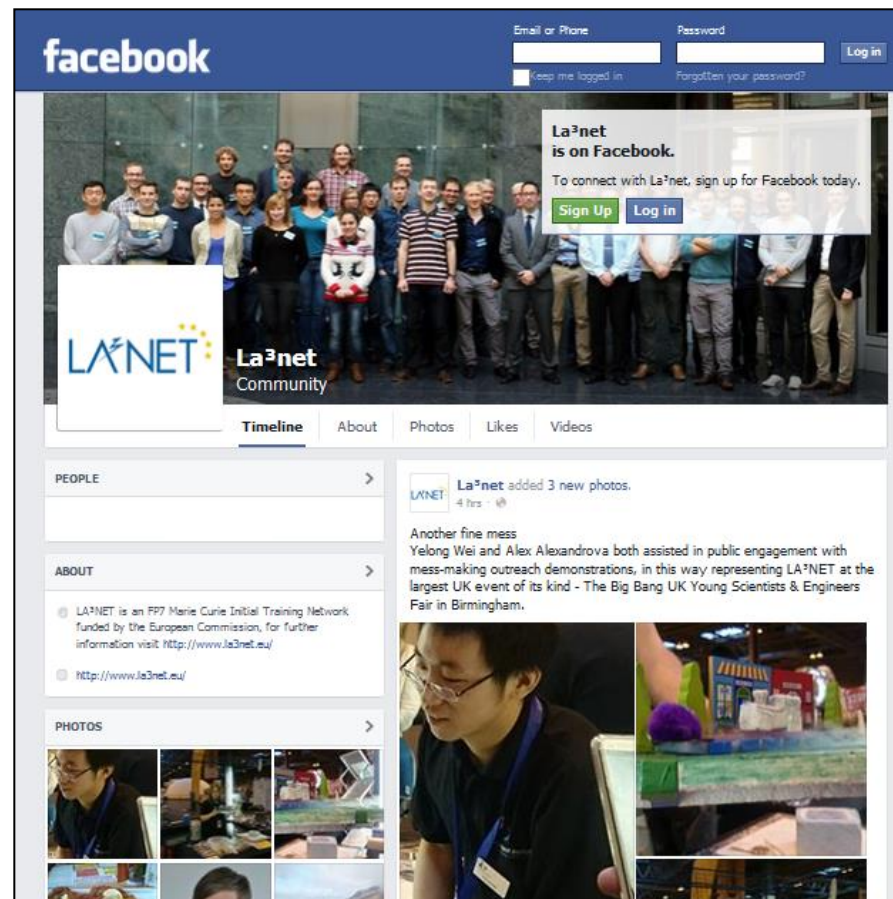
Research and development of laser-based applications for accelerators
17 early-stage researchers working on dedicated projects.
Find out more

Welcome to LA³NET
Our work focusses on the exploitation of lasers for applications at accelerator facilities for ion beam generation, acceleration and diagnostics. LA³NET is part of the FP7 Marie Curie Initial Training Network (ITN) scheme.

LA³NET

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(<http://www.la3net.eu>)



Like us.

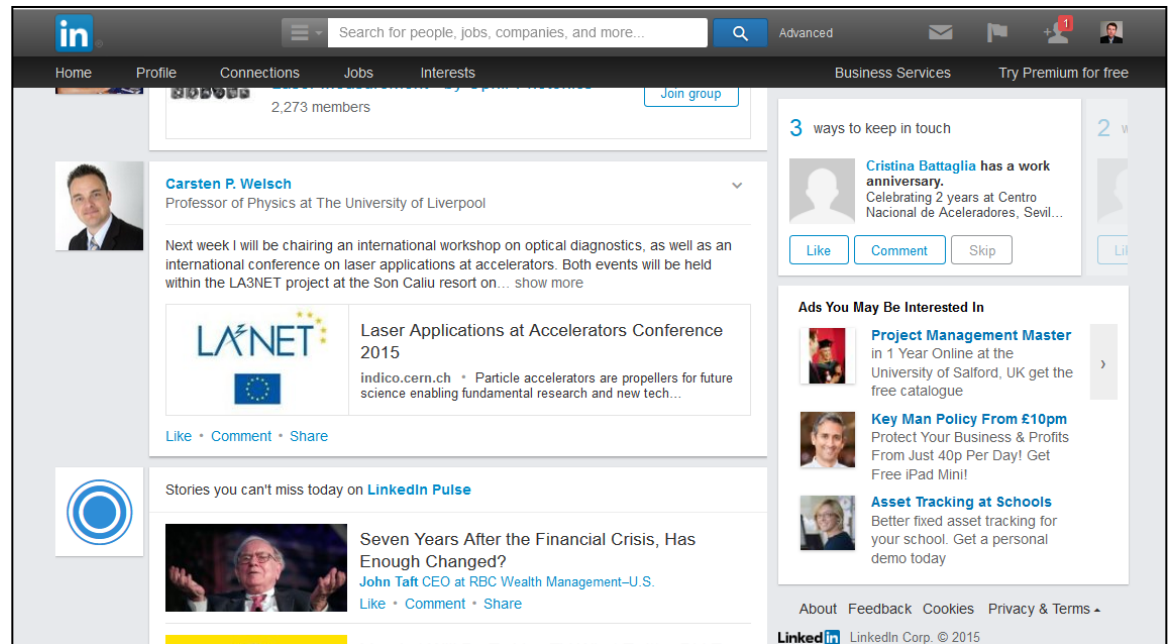
Future: The Cockcroft Institute FB.



LinkedIn

+1,000 followers via
personal profile

+ targeted discussion
groups



Quarterly Newsletter

- Part of the dissemination strategy
- Contribution from all network partners
- Announcement and review of activities
- > 500 recipients, growing
 - All available via home page.



Conference contributions

- Conferences 2012
 - IPAC stand
 - BIW, LAP, etc.
- Conferences 2013
 - FEL, IPAC, IBIC, HEA L&T, etc.
 - IBIC stand
- Conferences 2014
 - IPAC stand, ESOF
 - IBIC, IPAC
- IPAC, IBIC, Symposium





Events

International Schools

Topical Workshops

EU Project administration training

Conference



Outreach & sharing best practice

ESOF
2014
COPENHAGEN
EUROSCIENCE
OPEN
FORUM

- **Complementary skills training**
 - Communication, project management, IPR
- **Administrator training**
- **HEA seminar, Teaching & Learning**

Public engagement

- Fairs & conferences
- Project videos
- **Symposium on Accelerators & Lasers for Science and Society, Liverpool Convention Centre, 26 June 2015**



LA³NET Prize

- Annual prize of 1 k€ for E(S)R;
 - Within first 5 years of career;
 - Original contribution;
 - Letters of recommendation.
- Not limited to LA³NET partners.
- Application deadline: 30 June.



Administrative Support

- Promotes LA³NET research, training and administration internationally
- Contributions to IPAC, HEASTEM, IBIC, etc.
- ‚Best practice‘ in Europe (EC)



International Partnership

THORLABS

INFN
LNS

CLPU
CENTRO DE LASERES
PULSADOS
ULTRACORTOS
ULTRAIINTENSOS

FOTON


UPPSALA
UNIVERSITET

IFIN-HH

KIT
Karlsruhe Institute of Technology

 **DANFYSIK**

PAUL SCHERRER INSTITUT
PSI

HZDR


CERN

GANIL
GRAND ACCELERATEUR NATIONAL D'IONS LOURDS
LABORATOIRE COMMUN DSM/CEA-IN2P3/CNRS

UNIVERSITY OF

DUNDEE

SLAC
NATIONAL ACCELERATOR LABORATORY

aquenos
software & more


Max-Planck-Institut
für Kernphysik

 UNIVERSITY OF
LIVERPOOL

 Science & Technology
Facilities Council

LMU
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN

 **Fraunhofer**
ILT

 **Cobolt**

cosylab
CONTROL SYSTEM LABORATORY


UNIVERSITÀ DI PADOVA

 **CNA**


UNIVERSITY OF AMSTERDAM
SCIENTIA 1600 SINCE 1632


loa


Royal Holloway
University of London

GIGAOPTICS
femtosecond technologies

 **Litron Lasers**

edgewave

HIGH Q LASER
THINK ULTRAFAST!™

 **research
instruments**

 UNIVERSITY OF
LIVERPOOL

The Cockcroft Institute
of Accelerator Science and Technology

Prof. Carsten P. Welsch – LA³NET Conference, Mallorca 2015


QUASAR
QUANTUM

Accelerators & Lasers

Drivers of Innovation

Prof. Carsten P. Welsch

Where do we want/need to go ?



- EU capacity: infrastructure and human ,capital‘



Grand Challenges

- oPAC Workshop @ CERN
- IndicoID: 243 336



Grand Challenges in Accelerator Optimisation

CERN, Switzerland: 26th/27th June 2013

Speakers include

Green and Compact Magnet Technology for Optimisation of Particle Accelerators
Dr. Gianni Rogier Hudson, CEO, CERN

Challenges of High Intensity Accelerators
Dr. Miki Lindfors, Head of Accelerator Division, ESS

Research on Ultra-short Timescales – FELs
Dr. Daniel Ruesch, SLAC

Laser Acceleration – Towards Highest Gradients
Prof. Luis Rosi, Director, CLPU

Unravelling the Secrets of the Universe
Dr. Richard Hawkins, CERN

Accelerators are key instruments for fundamental research, health and industry applications. International collaboration is very important for their continued optimisation.

This two-day international workshop will provide an overview of the current state of the art in beam physics, numerical simulations and beam instrumentation and highlight existing limitations. It will discuss research and development being undertaken and ambitions to further improve the performance of existing and future facilities.

In addition to invited talks, there will be industry displays and a special seminar covering recent LHC discoveries. All participants will have an opportunity to contribute a poster.

This event is open to all and free of charge. Advance registration is required; places are strictly limited.

Full details and registration:
www.opac-project.eu

Contact:
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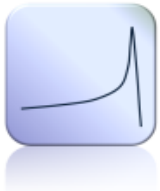
Accelerator Optimization

- **Particle tracking codes:** beam-plasma interaction, dynamic handling of input data, inclusion of time-dependent processes
- **Physical effects modeling:** Include beam, signal and detector physics in comprehensive toolkit; move towards real-time simulations
- **Beam analysis and control:** Interface diagnostics to beam physics codes, feed into control system

Medical Accelerators



- (online) beam monitors
- Improved calorimeters and Si detectors



- Enhanced Monte Carlo codes (FLUKA)
- Systematic studies into e.g. ion effects



- Common software bus
- Improved beam delivery schemes

Beam Diagnostics

- **Profile:** Sub 100 nm resolution, increased DR, non-invasive, real-time
- **Particle Detectors:** Diamond, EO crystals, Si pixels, neutron detectors
- **Emittance:** Space charge dominated beams, high energy frontier, high current electron accelerators
- **Position:** Resolution and sensitivity, tune measurement automation for LC and FELs.

Novel Accelerators

- Dielectric Laser Accelerators
- Particle-driven laser plasma acceleration
- Laser plasma acceleration

...all require improved simulation studies, better understanding of beam/field/plasma interaction and a coordinated R&D effort.

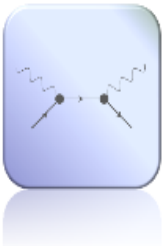
Antimatter Facilities



- Better facility design
- New beam handling techniques



- Online diagnostics
- Improved detectors



- Experiments: Novel cooling schemes
- Spectroscopy on antihydrogen.

Summary

- LA³NET is a world-wide unique training effort that has yielded very good R&D results
- Cohort of 19 Fellows successfully trained
- Role model: Enhanced training program to improve career perspectives
- A number of large-scale accelerator and laser projects are in the planning – but where are the experts !?

Many more initiatives are urgently required !