



Welcome !!
to the oPAC Grand
Challenges Workshop

Prof. Carsten P. Welsch



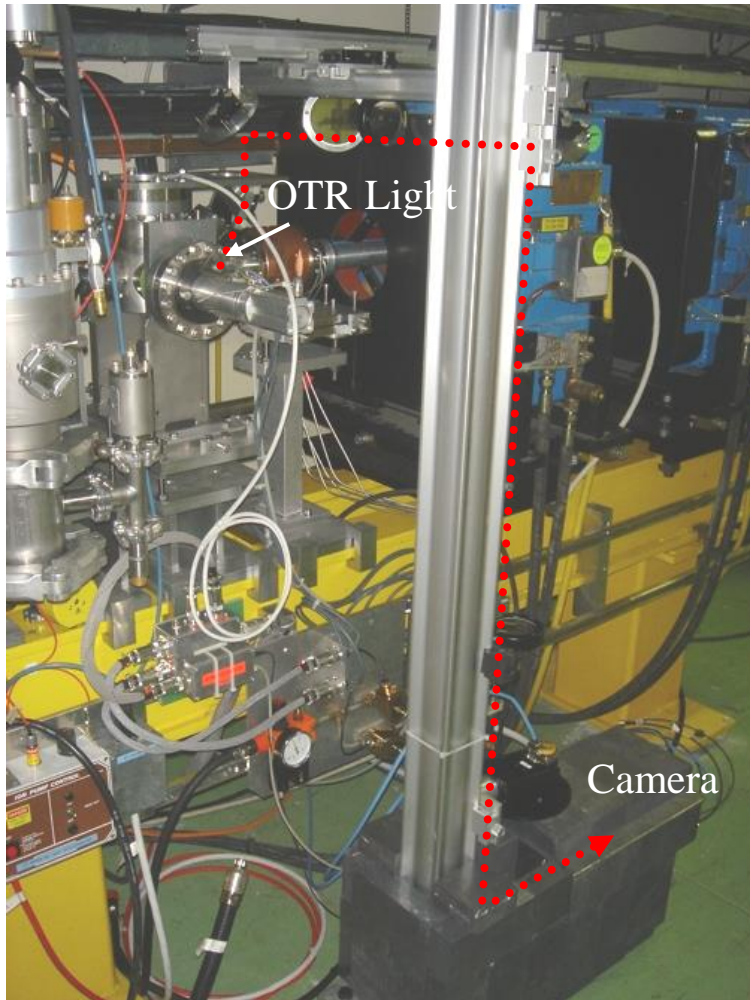
DITANET



« novel Diagnostics Techniques for future particle Accelerators:
A Marie Curie Initial Training NETwork »



A „typical“ Accelerator Diagnostics



- Material sciences
- Thermodynamics
- Electro-Magnetism
- Optics
- Mechanics
- Electronics
- Nuclear Physics
- ...

 Multi-disciplinary field !

What is / was DITANET ?



- Largest-ever EU funded training network in beam instrumentation and diagnostics (4.2 M€);
- Aim: Training of early stage researchers (*18 ESRs, 3 ERs*);
- Gives industry an important role;
- Recognized importance of beam diagnostics at European level !
(only 68 from 905 selected - with 11 in physics)

C.P. Welsch, Proc. BIW 2010, IPAC 2012

Researcher Training



2 Diagnostics Schools
London (2009) and Stockholm (2011)
Indico: 55242, 112220
> 80 participants and lecturers

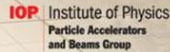


8 Topical Workshops
CI, France, Slovenia, Seville, Hamburg
Indico: 145063, 145066, 145070, 135829, 154172
~ 40 participants each



Diagnostics Conference and Symposium
Seville, Spain – CNA
Indico: 135831
Proceedings + PRST-AB special edition

Symposium: Quantum Systems and Research(ers) at Accelerators
Cockcroft Institute May 16th 2012



Now: What is oPAC ?



- Optimization of Particle Accelerators
 - 22 ESRs
 - >30 Partner Institutions
 - 6 M€



www.opac-project.eu

OPAC

OPEN POSITIONS WITHIN THE OPAC PROJECT

The optimization of the performance of any particle accelerator critically depends on an in-depth understanding of the beam dynamics in the machine and the availability of simulation tools to study and continuously improve all accelerator components. It also requires a complete set of beam diagnostic methods to monitor all important machine and beam parameters with high precision and a powerful control and data acquisition system.

Within the oPAC project these aspects will be closely linked with the aim to optimize the performance of present and future accelerators that lie at the heart of many research infrastructures.

The network is currently aiming to recruit a pool of talented, energetic, strongly motivated, early stage researchers with a degree in physics, electrical engineering or a closely related field. Possibilities for enrolling into a PhD program exist. Women are especially encouraged to apply.

Deadline for applications:
March 9th 2012

Each researcher will benefit from a wide ranging training program that will take advantage of both local and network-wide activities, as well as of schools, conferences, and workshops. Excellent salaries will be offered. Most positions are for starting in summer 2012.

You will find more information about oPAC, all research projects and the application details at:
<http://www.liv.ac.uk/opac>

Contact and further detail:
Prof. Carsten P. Welsch
Cookcroft Institute of Accelerator Science and Technology
University of Liverpool
Department of Physics
L69 7ZE Liverpool, UK
carsten.welsch@quasar-group.org

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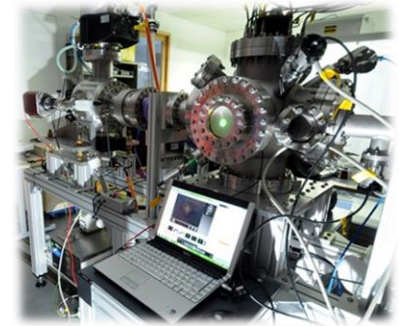
Bringing the community together



➔ Not the end - join us !

Why needed ?

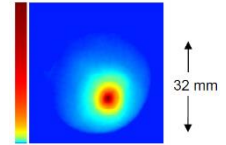
- Well suited as cross-sector collaboration is key to our research.
- Essentially all large-scale experiments require international cooperation



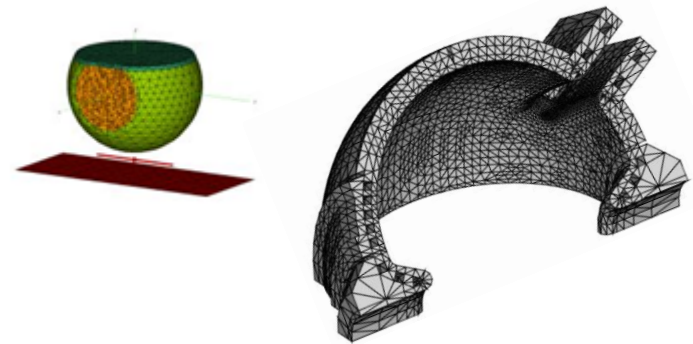
- Research area needs significantly more trained accelerator experts;
- Few universities in EU provide structured courses – oPAC drives innovation in researcher training

- Development of designs for possible LHC upgrade options
- Advanced beam physics problems at light sources
- Optics and lattice design studies for the interaction region design of the LHC experimental insertions
- LHeC as a future upgrade option of the LHC
- Simulation studies into halo generation in high brightness hadron beams
- Studies into beam loss patterns at ESS
- Design and development of resonant structures as Schottky noise detectors for various frequencies
- Optimization of the layout of the LHC collimation system
- Improvement of the understanding of non-linear beam dynamics effects in light sources

- Beam halo monitor development
- Optimization of beam instrumentation for light sources
- Cryogenic SQUID-based beam current monitor
- Beam Loss Monitors for use in Cryogenic Environments
- Methods for measuring the beam profile in high intensity beams
- Laser-wire beam profile monitor for measuring the transverse beam profile of an H- beam
- Optimization of ^{10}Be detection
- Design a detection system for verifying a 3D method of image reconstruction for Intensity Modulated Radiotherapy Treatment (IMRT)



- Included in most R&D project, plus:
- Development of a simulation suite based on the multilevel fast multipole method
- Development of a GPU-based PIC solver



- Links all R&D projects, plus:
- Adaptation of existing **open-source control systems** from compact accelerators to large scale facilities
- Improvement of the process to **identify the needs** for accelerator instrumentation



- Objective: Train the next generation of accelerator experts in **best possible way**
- Provide them with **ideal skills basis** for their future careers
- Promote **collaboration** and cross sector exchange
- **Secondments** to under how R&D works at different places

➔ Motivation: *Ideal* Training.

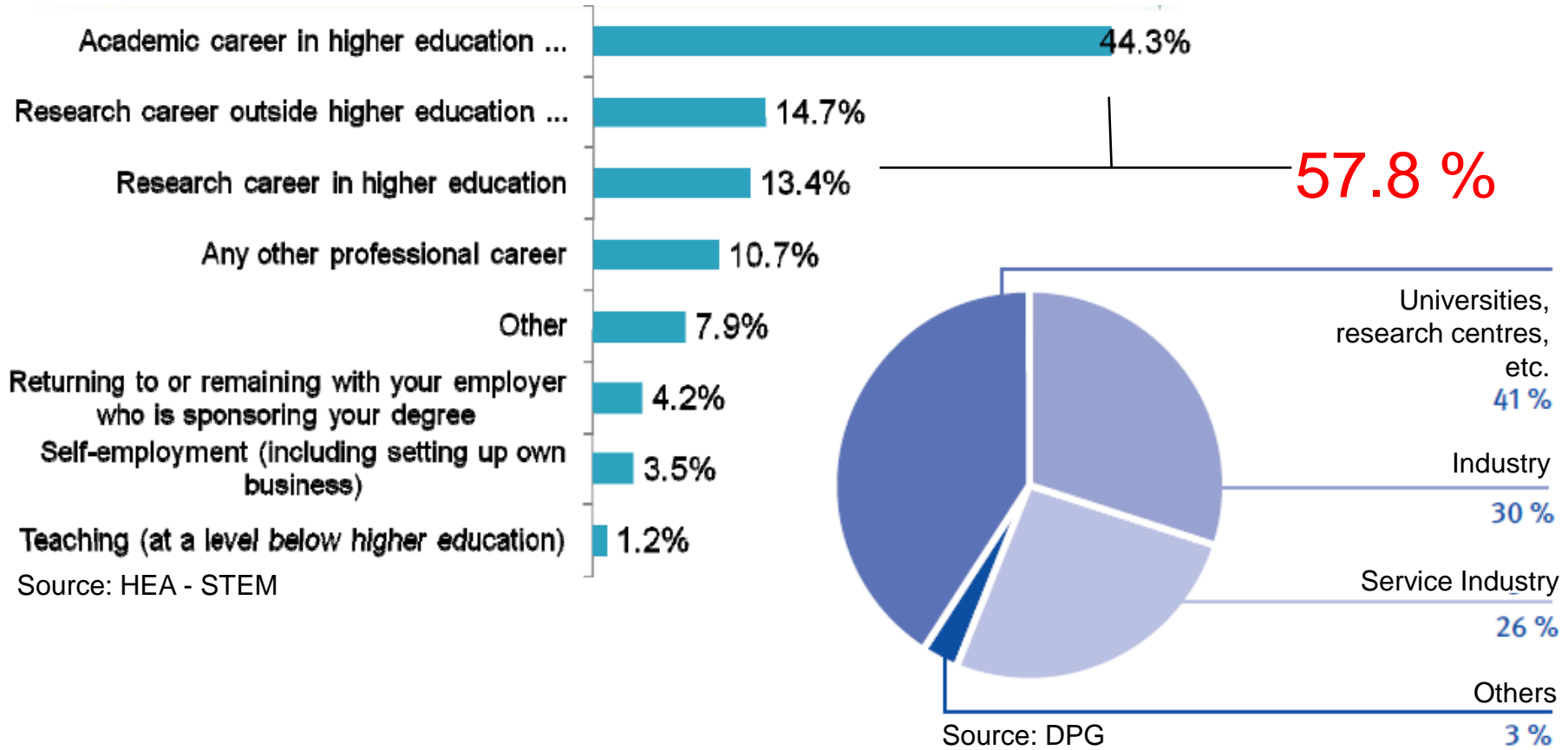


PhD Training in Europe

- MSc standard;
- PhD part of training
- Broad skills;
- Blue sky research vs. applied physics.



Career – Aspirations and Reality



- Focus on academic career path;
- Scientific papers as key quality indicator;
- Training through (often blue sky) research;
- Very little training in complementary skills – researchers often need to be (re)trained on the job;
- Students or researchers ?

Evolution: Initial training networks (ITNs)

- Introduced in EU Framework Program 7 – 4.8 B€ !
- 1996 – 2010: 50,000 Marie Curie researchers;
- Provides support for early career and experienced researchers (young Postdocs);

Goals

- Improve employability of researchers;
- Better training through demonstrated international mobility;
- Maintain Europe's leadership position in R&D.

- Local training by host;
- Network-wide schools on diagnostic techniques;
- Intra-network exchange of researchers;
- Secondments to partners from industry;
- Training in complementary skills

,Success Story': DITANET Events



2 Diagnostics School
Stockholm, Sweden – March
Indico: 112220
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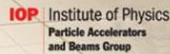


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oPAC skills workshop



Time	Monday	Tuesday	Wednesday	Thursday	Friday
8.30 – 9.30	Introduction <i>Paired Introductions: Participants generate flip chart poster of interview partner then present them to whole group.</i>	Career Prospects in Industry & Academia Independent Teamwork Dreamer, Realist, Critic <i>Teams to come up with a response to the challenge</i> <i>Teams choose their project topic and plan the team-working process.</i>	Presentation skills <i>Introduction</i> <i>Participants will give 5 minute presentation in small groups about their PhD projects</i> <i>All presentations will be video recorded</i> <i>Feedback by:</i> (1) presenter, (2) (2) fellow students, (3) Tutor	Advanced Project Management Independent Team Work <i>Teams work on the project according to their plan</i> Chairs meeting <i>Present summary of report structure</i> <i>Teams review project following feedback</i>	Introduction to Peer Review The Presentation <i>(Followed by Questions)</i> Peer Review preparation Peer Review <i>Teams present assessment and feedback</i>
9.30 – 10.30					
10.30 - Break	Presentation skills <i>Basics of research presentations – an introduction to the Do's and Don'ts of conference presentation</i>	Target Setting Milestones & deliverables session – assessment of targets for the project	Lunch	International collaboration	Peer Review <i>Teams present assessment and feedback</i> Forward Planning
11.00 – 12.30					
12.30 – 13.30	Lunch				
13.30 – 15.00	Introduction to Project Management <i>Theoretical Background</i> <i>Action: Plan PhD project</i> <i>Update description</i> <i>Stakeholder analysis</i> <i>Milestones</i> <i>Deliverables</i>	Scientific Writing <i>Focus on writing research papers.</i> <ul style="list-style-type: none"> • <i>The writing process and structure</i> • <i>Thinking about the audience</i> • <i>Target journals</i> • <i>Tips</i> <i>Writing for the general public.</i>	Visit to Cockcroft Institute <i>Introduction</i> <i>Tour of facilities</i>	Network diagrams <i>(Understanding dependencies)</i> Independent Team Work <i>Teams continue collaborating on project.</i> <ul style="list-style-type: none"> • <i>Produce report</i> • <i>Create presentation</i> Assessing Risks	
15.00 – Break					
15.30 – 16.30					
16.30 – 17.30					

- **PhD project-specific part**
 - Presentation skills
 - Scientific writing
 - Project management
- **Generic skills through outreach project**
 - Team working
 - Proposal writing
 - Project management
 - Peer review
 - Working under (time) pressure



"I hadn't really thought of myself as a project manager until today!"

Stay tuned !!



- URL: (http://www.)**opac-project.eu**

The screenshot shows the OPAC website homepage. At the top left is the University of Liverpool logo. A search bar is located at the top right. The main content area is divided into a left sidebar and a main body. The sidebar contains a navigation menu with items like 'oPAC home', 'Network Structure', 'Projects', 'Vacancies', 'News', 'Events', 'Press', 'Downloads', 'Links', 'Contact', and 'EU Project T.E.A.M.'. Below this is a 'Vacancies' section with an 'APPLICATION DEADLINE: July 31st 2012' and a 'Watch the Video !' link. There are also sections for 'News' and 'Vocal'. The main body features a large image of the LHC tunnel with the caption 'Cern - LHC'. Below the image is a paragraph explaining the goal of the oPAC project: 'The optimization of the performance of any Particle Accelerator (oPAC) is the goal of this new network within the FP7 Marie Curie Initial Training Network (ITN) scheme.' Another paragraph states: 'oPAC aims at developing long term collaboration and links between the involved teams across sectors and disciplinary boundaries and to thus help defining improved research and training standards.' At the bottom of the main body, it says 'oPAC is funded by the European Commission under Grant Agreement Number 289485'. To the right of the main body is a section titled 'Upcoming Events' listing three events: 'July 11th - 15th 2012 Euroscience Open Forum, Dublin, Ireland (ESOF12)', 'August 6th - 10th 2012 2012 Workshop on Accelerator Operations (WAO 2012)', and 'October 28th - November 9th 2012 Cern Accelerator School "Introduction to Accelerator Physics" (CAS)'. At the bottom of the page are logos for the University of Liverpool, the European Union, and the OPAC project.



A red-bordered box containing a Facebook logo and the text 'Follow us on Facebook'.

- Promotes research, training and admin internationally: HEASTEM, IPAC, IBIC, etc.
- Coordinates and links oPAC activities
- Stay in close contact !!



Future events:

- *Libera with i-tech, spring 2014*
- *Diagnostics with CIVIDEC, spring 2014*
- *Technology transfer with UoL/CI, autumn 2014*
- *Accelerator School with RHUL, summer 2014*
- *Symposium with UoL/CI, summer 2014*
- *Conference with US/CNA, late summer 2015*

Summary: Goals of oPAC



- Promote international Collaboration
- Provide access to world-class research infrastructures
- Include Blue sky and applied research
- Strengthen Industry – Academia partnership
- Organize workshops and conferences as drivers for knowledge exchange



Be part of it !!

This Workshop



- Session matched to oPAC's R&D program;
- World-leading speakers
- Discussions strongly encouraged !
- Build new links – join the initiative.
- Poster session and special seminar

- oPAC Steering Committee (6-2-4) and Supervisory Board (6-R-12) meetings in parallel.