

Welcome to the 2<sup>nd</sup>

# DITANET

Topical Workshop  
*Longitudinal Beam Profile Measurements*

*Carsten P. Welsch*



# Outline

- The Cockcroft Institute
- What is DITANET ?
- Workshop Overview

# The Cockcroft Institute



# The Mission

*Navigate by the stars, not by the light of every ship passing by...*

- **Generic R&D at the frontier of Accelerator Science and Technology;**
- **Project-specific R&D in Accelerator Science and Technology;**
- **Leadership and management of national deliverables to international facilities;**
- **Support in design, construction and operation of national and international facilities;**
- **Technology transfer to (and Knowledge Exchange with) industry;**
- **Seamless involvement of the Universities and Research Councils ;**
- **Education and training to ensure a flourishing next generation of scientists.**



# Inauguration in 2006



**The Opening of the Cockcroft Institute  
by the Minister of Science, Lord Sainsbury**

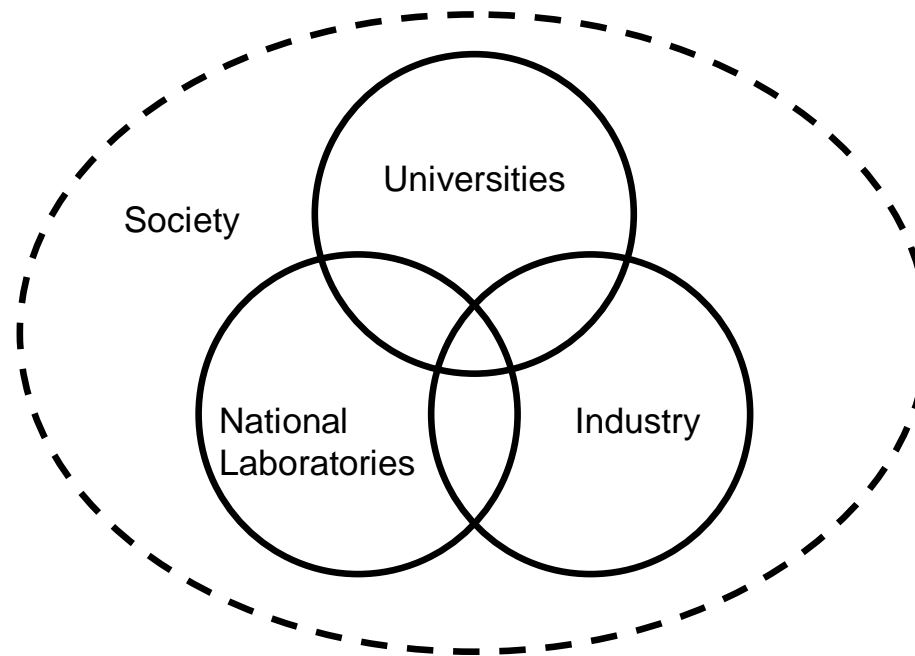
*“When we talk about world-class science we  
need look no further than the North West and  
the Cockcroft Institute”*

*- Prime Minister, Tony Blair (2006)*

# The Cockcroft Model

(Universities) + (STFC: ASTeC and elements at DL) + (NWDA)  
+  
(Integration of all the above)

CI is not separate from ASTeC or the universities but inclusive of all.



# Research Focus to date

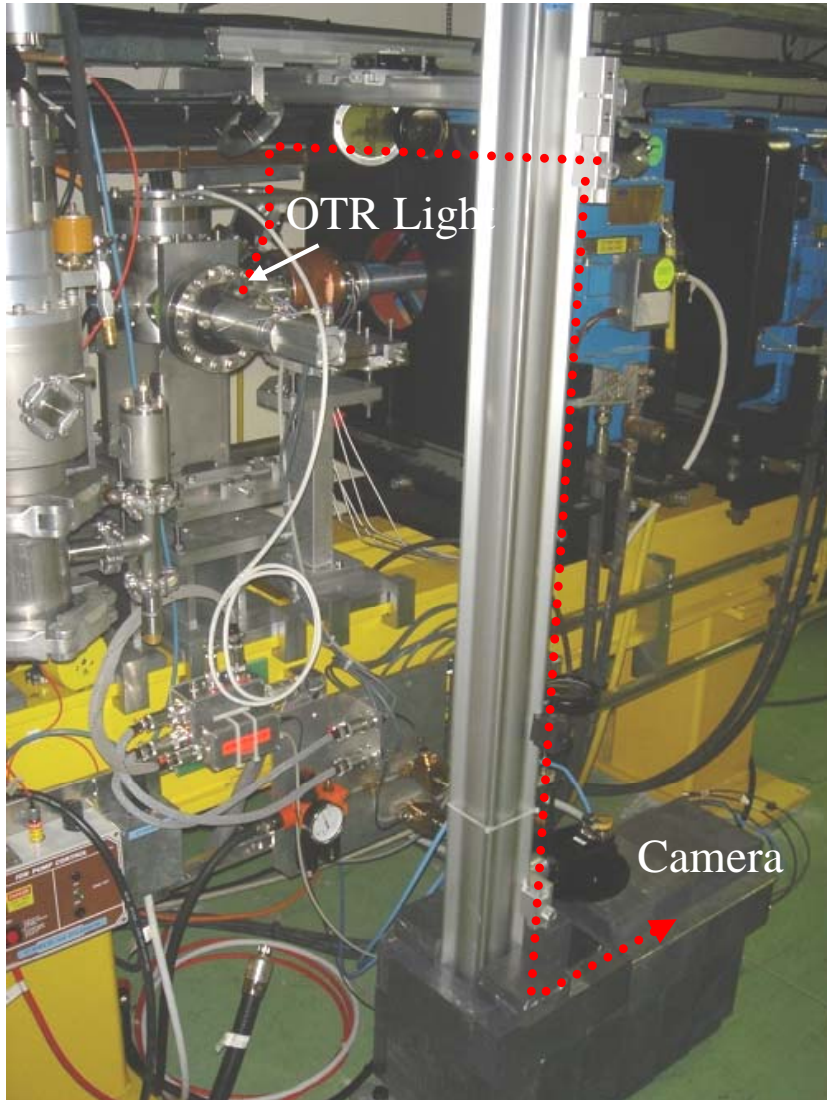
**The CI's major contributions to date in national and international projects have been focused on:**

- High energy particle physics facilities (e.g. ILC, MICE for Muon Cooling and Neutrino Factory, Super-B, CLIC);
- Fourth generation photon sources (e.g. Fermi@Elettra, FLASH, 4GLS, NLS, ALICE);
- Prototyping novel concepts (e.g. Energy Recovery in ALICE, electron FFAG in EMMA, laser-plasma studies in ALPHA-X collaboration and experiment).



**Open for new challenges !**

# A „typical“ Accelerator Diagnostics



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

 Multi-disciplinary field !



# What is DITANET ?

- One of the largest Marie Curie Initial Training Networks ever funded by European Union !
- Funding for 20 fellows (17 ESR and 3 ER)
- Gives industry an important role !
- Recognition of importance of beam diagnostics at European level !

(in physics top 11, 2007 – under extreme competition)

# The DITANET Consortium

## Network Participants



## Associated Partners



# Adjunct Partners

- Part of the long term strategy – DITANET is growing



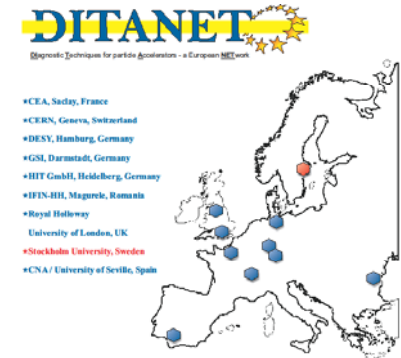
# Project Manager

- Mrs. Glenda Wall
- Experience in large collaborations
  - Virtual Montana
  - Network of European Geography Associations
  - HERODOT I: European Network for Higher Education Geography 2003-2006
  - HERODOT II: 2006-2009
  - EuroGEO: European Association of Geographers 2009
- Day-to-day contact point for partners



# 1<sup>st</sup> DITANET School, March 2009

- Beam Diagnostics, held at RHUL, UK
- > 70 participants and lecturers



**DITANET School on Beam Diagnostic Techniques**

Beam diagnostic systems are essential components of any particle accelerator. They are the eyes and ears of the accelerator, providing a wealth of diagnostic information. This information is indispensable to operate an accelerator safely and efficiently.

This DITANET School provides an international forum for accelerator physicists to discuss their work and to learn from the experience of others. The school will be held at the University of Liverpool, UK, from 12-13 July 2010. The school is free of charge, but participants must pay for their travel and accommodation. The school is open to all accelerator physicists, regardless of their experience level.

For more information, please contact the organizers at [info@ditanet.net](mailto:info@ditanet.net).

March 2011

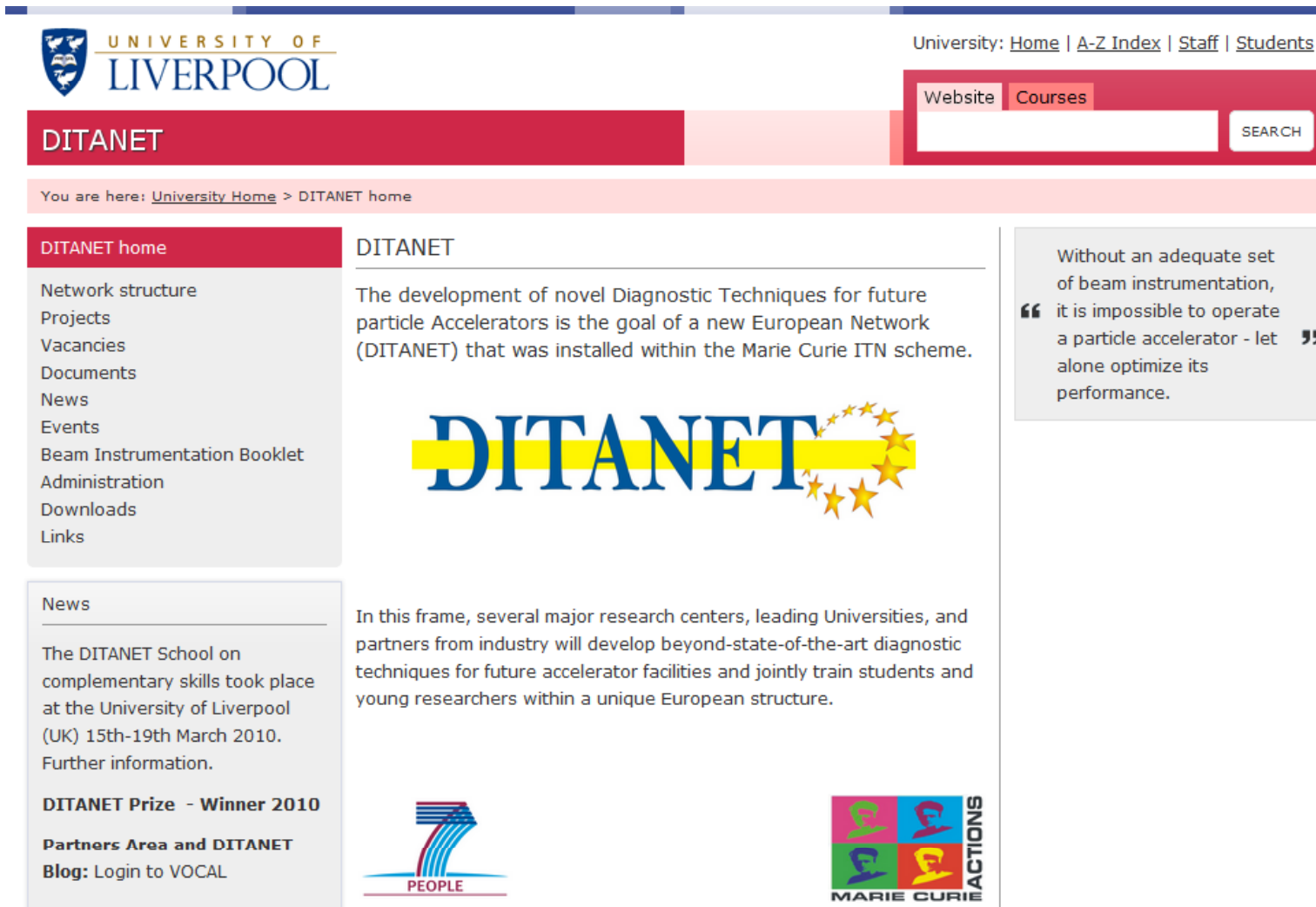
CERN Indico: 55242

Time	Monday	Tuesday	Wednesday-RAL	Thursday	Friday
8:30		Definition of Particle Beams (C.P. Welsch)	Board coaches	Emittance (G. Blair)	Special Session - only for DITANET trainees -
9:30		Current (J.C. Denard)	Transverse Beam Profile 1 (E. Bravin)	Position I (P. Forck)	Part. Detection (A. Drouart)
10:30					
11:00		Energy (S.Bernal)	Transverse Beam Profile 2 (E. Bravin)	Position II (P. Forck)	e <sup>-</sup> cloud Diagnostics (M. Covo)
12:00		Longitudinal Beam Profile I (T. Leffevre)	Beam Loss (Kay Wittenburg)	Tune (F. Zimmermann)	Industry I (Introduction, H. Smith, A. Beunias)
13:00					
14:30	Welcome / Introduction DITANET	Study Session <i>split in smaller groups</i>	Visits	Study Session <i>split in smaller groups</i>	Industry II (V. Hoffing, T. Chapman, C. Bocchetta)
15:30	Introduction to Accelerators I (H. Wiedemann)	Longitudinal Beam Profile II (P. Karataev)		Poster Session	Conclusion
16:30					
17:00	Introduction to Accelerators II (H. Wiedemann)	Seminar: Appl. of Synchrotron Light (H. Wiedemann)		Seminar: Acc. for medical applications (A. Peters)	
18:00					





# Dissemination: DITANET Website



The screenshot shows the DITANET website interface. At the top left is the University of Liverpool logo. To the right are navigation links: University: [Home](#) | [A-Z Index](#) | [Staff](#) | [Students](#). Below this is a search bar with tabs for 'Website' and 'Courses', and a 'SEARCH' button. A breadcrumb trail reads: You are here: [University Home](#) > DITANET home.

The main content area is titled 'DITANET'. It features a description: 'The development of novel Diagnostic Techniques for future particle Accelerators is the goal of a new European Network (DITANET) that was installed within the Marie Curie ITN scheme.' Below the text is the DITANET logo, which consists of the word 'DITANET' in blue capital letters with a yellow horizontal bar and several yellow stars to its right.

To the right of the main content is a quote in a grey box: 'Without an adequate set of beam instrumentation, it is impossible to operate a particle accelerator - let alone optimize its performance.'

On the left side, there is a sidebar with a 'DITANET home' menu containing: Network structure, Projects, Vacancies, Documents, News, Events, Beam Instrumentation Booklet, Administration, Downloads, and Links. Below this is a 'News' section with a headline: 'The DITANET School on complementary skills took place at the University of Liverpool (UK) 15th-19th March 2010. Further information.' Below the news is a 'DITANET Prize - Winner 2010' section and a 'Partners Area and DITANET Blog: Login to VOCAL' link.

At the bottom of the main content area, there are two logos: 'PEOPLE' (a stylized '7' with blue and red lines) and 'MARIE CURIE ACTIONS' (a colorful grid of letters).

[www.liv.ac.uk/ditanet](http://www.liv.ac.uk/ditanet)

- Part of the dissemination strategy
  - Contribution from all network partners
  - Announcement and review of activities
  - >400 recipients, growing
- Registration by **Email**.



**NEWSLETTER**  
October 2009  
Issue 1

**DITANET**

**Welcome to the First Newsletter of the EU Network DITANET!**

Beam diagnostics systems are essential constituents of any particle accelerator; they reveal the properties of a beam and how it behaves in a machine. Without an appropriate set of diagnostic elements, it would simply be impossible to operate any accelerator complex let alone optimise its performance. Beam diagnostics is also a rich field in which a great variety of physical effects are made use of, and consequently provides a wide and solid base for the training of young researchers. Moreover, the principles that are used in any beam monitor or detector enter readily into industrial applications or the medical sector, which guarantees that training of young researchers in this field, is of relevance far beyond the pure field of particle accelerators.

The Marie Curie Initial Training Network DITANET – Diagnostic Techniques for Particle Accelerators - a European Network is the largest ever EU funded education action for PhD students and young Postdocs in beam instrumentation for accelerators with a project budget of up to 4.16 M€. The network presently consists of 27 partner institutions, including universities, research centres, and private companies. DITANET has now filled most of its position vacancies with first research results becoming visible, and already organised international meetings and schools. The network aims at strengthening the existing links in the beam diagnostics community and at building up new long-term partnerships.

With this newsletter, the network would ask you to participate in our activities and share with you our enthusiasm for this field. DITANET gives us a unique chance to further improve the performance of our research infrastructures: to push instrumentation beyond the present state of the art, and I am looking forward to exciting times!

*Carsten P. Welsch*  
Carsten P. Welsch, Coordinator

**DITANET Prize 2009**

The network announces its first Prize in Beam Diagnostic Techniques. It will award a 1,000 € cash prize for an outstanding contribution to the field of beam instrumentation for particle accelerators by a researcher in the first five years of his/her professional career. The deadline for applications is 31<sup>st</sup> January 2010 and full information on how to apply can be found on the DITANET website: [www.liv.ac.uk/ditanet](http://www.liv.ac.uk/ditanet)

**Individual Highlights**

Recent Events	2
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The LHC pushes accelerator science and technology in many different fields, including a number of beyond state-of-the-art developments in beam instrumentation. This requires close collaboration between partners, the exploitation of synergies wherever possible, and a long term R&D planning.

Besides its contributions to optimizing existing particle accelerators, the network is also involved in central developments for future facilities, such as the Facility for Antiproton and Ion Research (FAIR) in Germany. By bringing together early stage and experienced researchers from all over the world in its first topical workshop on low energy, low intensity beam diagnostics, DITANET follows its goal of encouraging knowledge exchange between partners and driving new developments.

2010 promises to be another very exciting year for our community with many interesting events such as the BIW and IPAC in May. DITANET will organize a number of training events and I would like to use this opportunity to encourage you checking our web page on a regular basis.

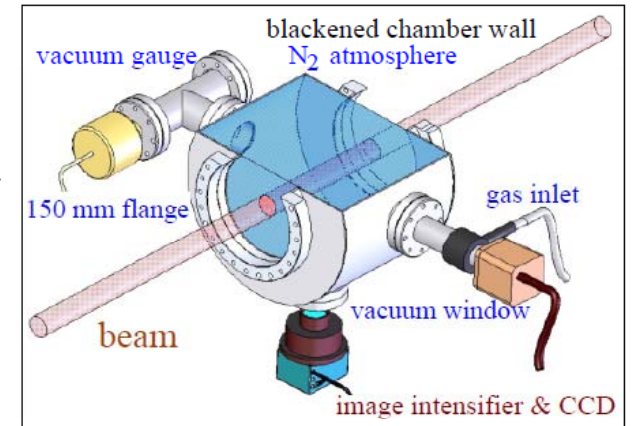
*Carsten P. Welsch*  
Carsten P. Welsch, Coordinator

**DITANET Prize 2009: Applications still open**

Applications are still open for the Network's first Prize in Beam Diagnostic Techniques. A 1,000 euros cash prize is awarded for an outstanding contribution to the field of beam instrumentation for particle accelerators by a researcher in the first five years of his/her professional career. The deadline for applications is 31<sup>st</sup> January 2010 and full information on how to apply can be found on the DITANET website: [www.liv.ac.uk/ditanet](http://www.liv.ac.uk/ditanet)

# Dissemination: DITANET Prize

- Dr. Frank Becker, GSI, Germany
- Beam Induced Fluorescence Monitor
- International Competition, open to external candidates



- University of Liverpool, UK
- CEA, Saclay, France
- CERN, Geneva, Switzerland
- DESY, Hamburg, Germany
- GSI, Darmstadt, Germany
- HfT GmbH, Heidelberg, Germany
- IFIN-HH, Magurele, Romania
- Royal Holloway University of London, UK
- Stockholm University, Sweden
- CNA / University of Seville, Spain



**New Call**

**Dead line: 31.10.2010**



**TUPSM020**

**DITANET Prize in Beam Diagnostic Techniques**

Beam diagnostic systems are essential constituents of any particle accelerator; they reveal the properties of a beam and how it behaves in a machine. Without an appropriate set of diagnostic elements, it would simply be impossible to operate any accelerator complex let alone optimise its performance.

The network will award a 1,000 € cash prize for an outstanding contribution to the field of beam instrumentation for particle accelerators by a researcher in the first five years of his/her professional career.

**How to apply**  
Applications must contain detailed information about the work and the contribution of the applicant. Two letters of recommendation need to be provided.

**Deadline for applications is 31.10.2010.** You will find more information about the prize and the application rules at <http://www.dita.ac.uk/ditand>

**Partners**



**Contact and further details:**  
Carsten P. Welsch  
Department of Physics  
University of Liverpool  
Liverpool, L69 7ZF, UK  
c.p.welsch@liverpool.ac.uk

# Workshop @ CI

## Second DITANET Topical Workshop

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*Cockcroft Institute, Warrington/UK, July 12<sup>th</sup>/13<sup>th</sup> 2010*

**09:00 – 09:30**

**Welcome**

*09:00 – 09:30*

*Welcome address, Introduction to DITANET  
(C.P. Welsch, Cockcroft Institute)*

**09:30 – 11:00**

**Electro-Optical Measurements**

*09:30 – 10:00*

*EO Techniques for Longitudinal Profile Measurements,  
Theory  
(S. Jamison, STFC)*

*10:00 – 10:30*

*Experimental Results from FLASH and FELIX Facilities  
(W.A. Gillespie, U Dundee)*

*10:30 – 11:00*

*Electro Optical Sampling of Coherent Synchrotron  
Radiation for Picosecond Electron Bunches With Sub-  
pC Charge  
(P. Peier, PSI)*

# All Information: Indico 93401



## 2nd DITANET Topical Workshop on Longitudinal Beam Profile Measurements

12-13 July 2010 *The Cockcroft Institute*  
Europe/Zurich timezone

  
Search

### Overview

Scientific Programme

Timetable

Contribution List

Author index

✉ Support

The exact determination of the time structure of ever shorter bunches in accelerators and light sources like the X-FEL, the ILC or CLIC is of high importance for the successful operation of these next-generation machines. It is also a key to the optimization of existing scientific infrastructures.

The exact measurement of the time structure poses a number of challenges to the beam diagnostics system: The monitors should be non-destructive, easy to maintain and provide time resolutions down to the femtosecond regime!

Within DITANET CERN, DESY, GSI, LBNL, PSI, Royal Holloway, STFC, U Dundee and U Liverpool are active in this research area. These partners have led many of the developments during the last decade and are helping to pave the way for future facilities.

This two day workshop will bring together experts from the beam diagnostics community to provide a forum for knowledge exchange, a review of the state of the art, and discuss future developments and challenges. The following topics will be covered:

- RF deflecting structures for bunch length monitoring;
- Beam profile monitoring using Electro-Optics techniques;
- Exploitation of diffraction and synchrotron radiation for non-invasive diagnostics;
- Bunch shape monitoring in hadron accelerators.

**Dates:** from 12 July 2010 08:30 to 13 July 2010 17:00

**Timezone:** Europe/Zurich

**Location:** *The Cockcroft Institute*  
Keckwick Lane  
Darsbury  
Warrington  
WA4 4AD  
United Kingdom

**Chairs:** [Welsch](#), [Carsten](#)



# Aims

- Review of state-of-the-art
- Knowledge exchange
- Future developments and challenges
- Funding opportunities

Enjoy the workshop !