A brief overview of the CERN School of Computing 2006 Helsinki, Finland

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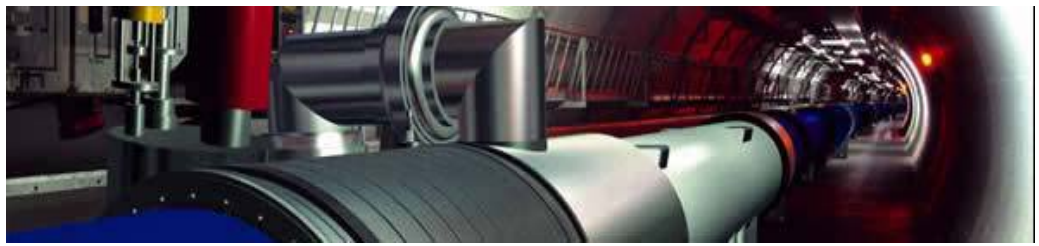
1st SPRACE Workshop

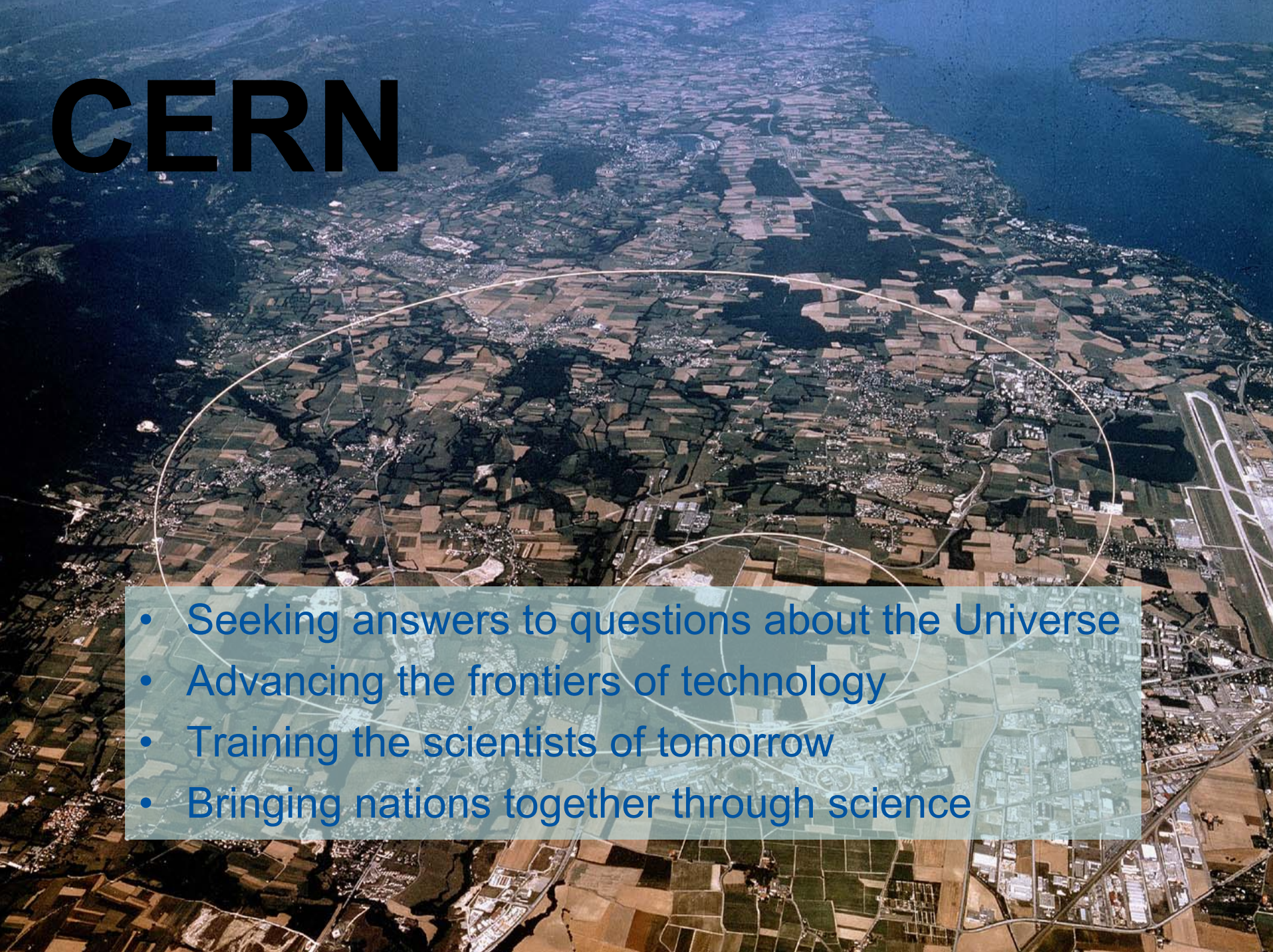
CERN's mission in Science

- Understand the fundamental laws of nature
  - They accelerate elementary particles and make them collide
  - They observe the results and compare them with the theory
- Provide a world-class laboratory to researchers in Europe and beyond



- A few numbers …
  - 2500 employees: physicists, engineers, technicians, craftsmen, administrators, secretaries, …
  - 6500 visiting scientists (half of the world's particle physicists), representing 500 universities and over 80 nationalities
  - Budget: ~1 Billion Swiss Francs per year
  - Additional contributions by participating institutes

CERN



- Seeking answers to questions about the Universe
- Advancing the frontiers of technology
- Training the scientists of tomorrow
- Bringing nations together through science

CSC in a nutshell

- A two-week intensive programme comprised of a series of lectures and hands-on exercises
- The hands-on part is a central component of the school
  - structured in the form of projects carried out by groups of students
- Students apply to the CSC from all over the world - selection process takes into account
  - technical background of the applicants
  - age and gender
  - areas of work and interest expectations
  - geographical origin
- A final examination is proposed to students - in case of success, formal certificates of proficiency are delivered by CERN

The CERN School of Computing 2006

- CSC 2006 was organized around 3 thematic tracks (each track comprising lectures and exercises)
  - Software Technologies
    - Coord: Patricia MacBride (Fermilab), Pere Mato (CERN)
  - Physics Computing
    - Coord: Rudi Frühwirth (HEPHY Vienna), Andreas Pfeiffer (CERN)
  - Grid Technologies
    - Coord: Erwin Laure (CERN), Heinz Stockinger (Univ. of Vienna)
- CSC 2006: 79 participants, 25 different nationalities

CSC 2006: 21 August - 1 September 2006 in Helsinki, Finland

Organized in collaboration with the Helsinki Institute of Physics

Programme Highlights

GRID Technologies

The Grid track delivers unique theoretical and **hands-on** education on some of the most advanced GRID topics.

Software Technologies

The Software track addresses the most relevant modern techniques and tools for large scale distributed software development and handling as well as for computer security.

Physics Computing

The Physics Computing track focuses on informatics topics specific to the HEP community. After setting-the-scene lectures, it addresses experiment simulation and visualization.

Lecturers

Helene Cordier
François Fluckiger
Rudi Frühwirth
Robert G. Jacobsen
Erwin Laure
Martin Liendl
Alberto Pace
Klaus Schossmaier
Heinz Stockinger

CSC2006 Organization

Central Management	Director	Francois Flückiger
	Administrative Manager	Fabienne Baud-Lavigne
	Technical Manager	Andreas Hirstius
Advisory Committee	Chairman	Rudi Frühwirth
	Examination Coordinator	Wisla Carena
	Equal Opportunities Officer	
	Track coordinators	Rudi Frühwirth
		Erwin Laure
		Pere Mato
		Patricia McBride
		Andreas Pfeiffer
		Heinz Stockinger
	Ex-officio members	Wolfgang von Rüden
		Veikko Karimäki
		Jorma Tuominiemi
Local Organizing Committee	Chairman	Veikko Karimäki

History of schools

1970	Varenna	Italy
1972	Pertisau	Austria
1974	Godöysund	Norway
1976	La Gr. Motte	France
1978	Jadwisin	Poland
1980	Vraona	Greece
1982	Zinal	Switzerland
1984	Aiguablava	Spain
1986	Renesse	The Nether.
1987	Troia	Portugal
1988	Oxford	Great Britain
1989	Bad Herrenhalb	Germany
1990	Ysemonde	Belgium
1991	Ystad	Sweden
1992	L'Aquila	Italy
1993	L'Aquila	Italy
1994	Sopron	Hungary
1995	Arles	France
1996	Egmond an Zee	The Nether.
1997	Pruhonice	Czech Rep.
1998	Funchal	Portugal
1999	St. Jablonki	Poland
2000	Marathon	Greece
2001	Santander	Spain
2002	Vico Equense	Italy
2003	Krems a.d. Donau	Austria
2004	Vico Equense	Italy
2005	Saint Malo	France
2006	Helsinki	Finland

CSC 2006 Software Technologies Track

- Overview of modern techniques for software design and modern tools and technologies for understanding and improving existing software
- Emphasis on large software projects and large executables common in HEP

- Tools and Techniques
  - Introduction
  - Tools you can use
  - Tools for collaboration
  - Software engineering review
- Introduction to Web Services
  - Introduction to HTTP
  - Introduction to XML
  - Web Services, XMLRPC, SOAP
- Computer Security
  - Introduction to Cryptography
  - Introduction to PKI
  - Introduction to Kerberos
- Networking QoS and performance
  - Internet QoS options
  - TCP and congestion control
  - Multimedia over the Internet

CSC 2006 Physics Computing Track

- Introduced the fundamental concepts of Physics Computing
- Addressed central aspects of simulation and visualization , including simulation of the experimental setup to
  - optimize detectors
  - test and improve the reconstruction software
  - gain a detailed understanding of the data

- Introduction to Physics Computing
  - Event filtering
  - Reconstruction and simulation
- Experiment simulation
  - General overview (four very difficult lectures!)
  - Online data acquisition systems
  - Lots of exercises using GEANT4

CSC 2006 Grid Technologies Track

- Covered several aspects of Grid computing and provided the ability to get hand-on experience with modern Grid tools
- Centered on Grid software that is deployed by the LCG and EGEE projects
- Emphasis on Grid architecture and and specific middleware issues in job submission and data
- T-infrastructure based on the GILDA testbed, a virtual lab developed at INFN

- Grid Technologies
  - Introduction to Grid Computing
  - Job submission and Workload Management
  - Data management
  - Information systems
  - Grid Service technologies
  - Lots of practical exercises
- Grid operation
- Grid Optimization techniques
- Grid mini-project
  - accomplished in teams of 4 or 5 students

Some CSC 2006 pictures

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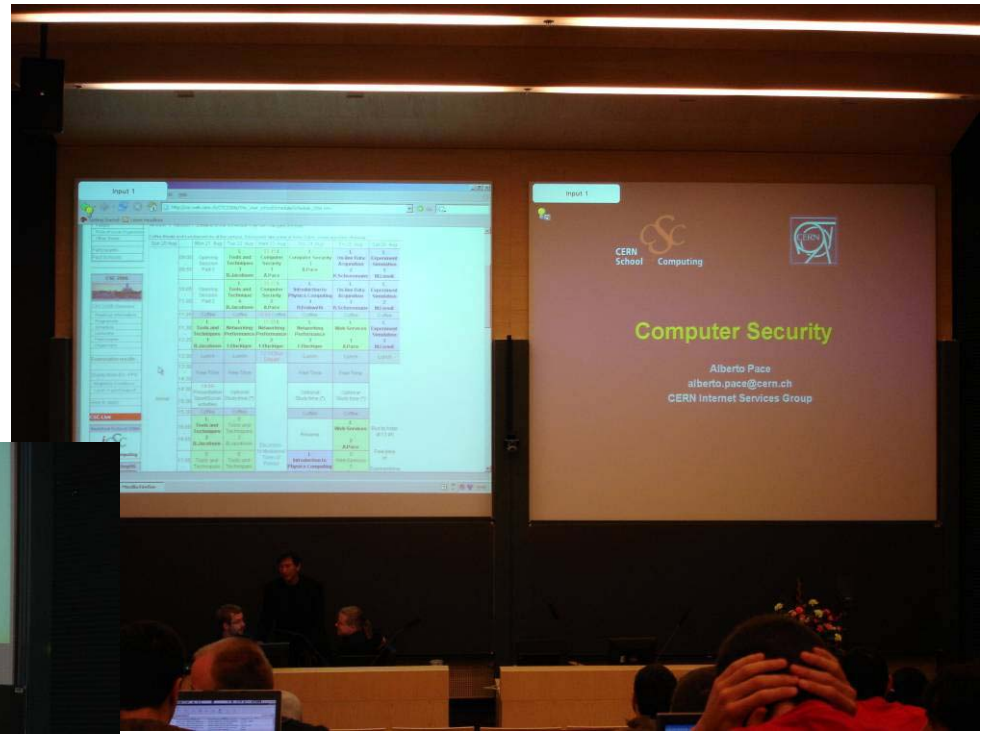
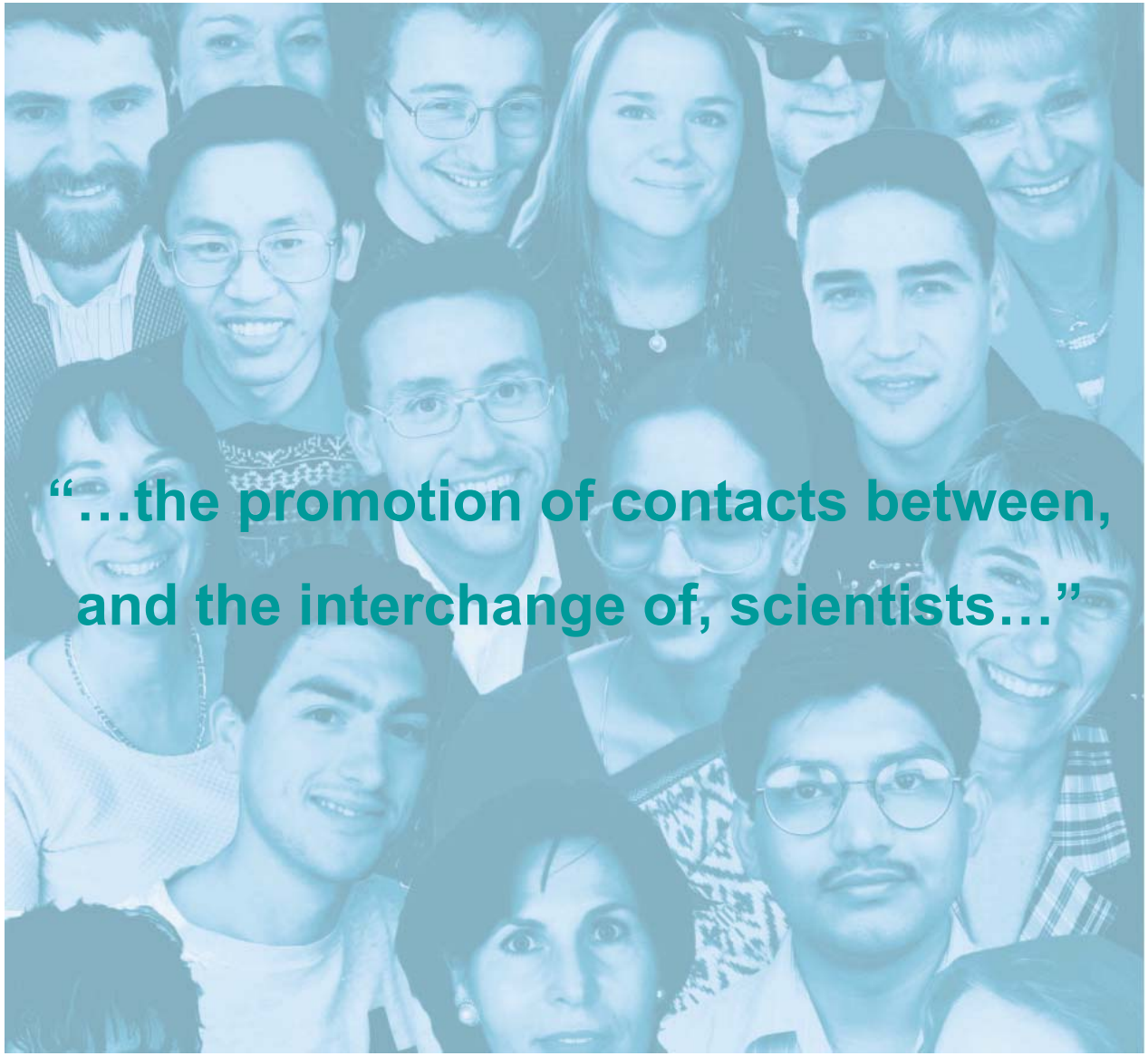


Some CSC 2006 pictures

CERN: bringing Nations together



Extra: CSC 2006 booklet