CERN and Education

Rolf Landua

CERN
Head of Education Group
CERN’s research: generator of scientific knowledge

Use research as a “motivator” in science education
CERN engages in communication and education

Communication

Press office (~400-600 visits of journalists/year)
Public webpages
CERN public visits (among them: 15,000 school students+their teachers)
Exhibitions, public lectures, events (“Globe”, Microcosm, Open Day)

Education

CERN teacher programmes (HST, 1-week programmes)
Development of teaching resources suitable for schools
Dedicated webcasts for schools (on selected topics, 10-15’)
Science On Stage 2005, 2007 - European Teacher Programme
‘Science In School’ - Journal
Reduce the gap between frontier research and schools

OLD

NEW

Research University School Teacher Students
Why?

1: RAISE INTEREST OF STUDENTS IN MODERN SCIENCE

Motivate them to continue scientific education at school
Help them to better understand the physical world
(Scientific literacy)

2: INSTIL A FEELING OF MYSTERY AND DISCOVERY POTENTIAL

Motivate them to take up physics (science) at universities
(Future generation of researchers)

HOW?
How researchers view science
How school students view science

Science teaching climbing wall

1/2 mv^2

M g h

What am I doing here?
Take students on a sight-seeing tour ...
Bring modern physics into schools
Some examples of CERN activities in education

**Science On Stage** - Innovation in teaching

**Science In School** - Interdisciplinary journal for teachers

**CERN Teacher Schools**
- High School Teachers (3 weeks)
- Weekend Programme (3 days)
- 1-week programmes (in different languages)
EIROForum Activities in Education

Collaboration of seven leading \textbf{European Intergovernmental Research Organisations}

- Cutting-edge research
- Competitive on world scale
- European dimension
- Engaged in Education
- “Science On Stage”
- “Science In School” journal
Science On Stage: European teacher programme

Teachers from 29 countries (NSCs)

Exchange successful, innovative teaching methods

Increase attractiveness of science lessons

Competitions, Workshops, Performances

International festivals:

2005 CERN (Geneva)

2007 ESRF/ILL (Grenoble)
Science On Stage 1 - Many excellent ideas

Web-catalog:
www.scienceonstage.net --> SoS1

170 Video-clips, descriptions, addresses
Practical + tested (!) projects

170 good ideas!
Science on Stage 2
ESRF-ILL, Grenoble
April 2007
Science In School: New journal for Science Teachers

Medium for communication between science teachers, scientists, educators, ...

Highlighting the best in teaching and cutting-edge research (interdisciplinary !)

Teaching Materials, new books, interviews with scientists + teachers, ...

Talk at 16:30
CERN Teacher Programmes

High School Teachers Programme “HST” [ 3 weeks ]

- 30-40 participants, mainly from Europe - held in English
- **Fully funded** by CERN (travel, accommodation, food, lectures)
- Lectures: Particle physics, cosmology, accelerators, detectors
- Seminars: Antimatter, spin-offs, ...
- Workshops: Bubble chambers, teacher lab, stories, ...
- Guided Tours: LHC experiments, AD, SM18, ...
- Social events - networking - HST Alumni

Weekend Programme [ 3 days ]

- 40-50 participants, mainly from Europe - held in English
- **Partially funded** by CERN (accommodation, food, lectures)
- Lectures + (few) seminars: Particle physics, cosmology, accelerators; antimatter, neutrinos
- Guided Tours: LHC experiments, AD, SM18, ...
New 1-week Teacher Programmes

Language- and curriculum oriented
~ 10+ courses per year

20-30 participants, from same Member State or language group
Lectures given in language of member state
Lecture programme funded by CERN
Travel, accommodation, food funded externally (ministry, foundations)

2006: Several pilot schools
[e.g. Finland, Hungary, Germany, Spain, Greece, Norway, Italy ...]
# CERN Teacher Programmes

## Time table

<table>
<thead>
<tr>
<th></th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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</thead>
<tbody>
<tr>
<td><strong>Morning</strong></td>
<td>ARRIVAL</td>
<td>CERN Particle Physics Accelerators</td>
<td>CERN Particle Physics Detectors</td>
<td>Detectors Cosmology Lecture review</td>
<td>Cosmology Spin-offs Educational resources</td>
<td>Lecture review Programme review WG Reports</td>
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<tr>
<td><strong>Afternoon</strong></td>
<td>Welcome Introduction</td>
<td>Visit (AD) Teachers lab/WG</td>
<td>Lecture review Teachers lab/WG</td>
<td>Visit (LHC exp.)</td>
<td>Educational resources Teachers lab</td>
<td>DEPARTURE</td>
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<tr>
<td><strong>Evening</strong></td>
<td>Team building</td>
<td>Evening activity</td>
<td>Free evening</td>
<td>Dinner</td>
<td>Quiz</td>
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</tbody>
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### Arrival Day
- Welcome Introduction
- Visit (AD) Teachers lab/WG
- Lecture review Teachers lab/WG

### Afternoon
- Visit (LHC exp.)
- Educational resources Teachers lab
- DEPARTURE
Bring modern physics into schools

- Creation of teaching materials (presentations, teacher sheets, photos, animations)
- Educational web-site giving easy access to educational resources
- For teachers, students, and scientists
- Useful for public understanding of modern physics (> 1900)

<table>
<thead>
<tr>
<th>Topic</th>
<th>&lt;12 yr</th>
<th>13-16</th>
<th>&gt;16 yr</th>
<th>University</th>
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<tbody>
<tr>
<td>Mechanics</td>
<td>Playful learning</td>
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<td>Electro-magnetism</td>
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<td>Optics</td>
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<td>Thermo-dynamics</td>
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## CERN Teacher Programmes

### Support activities

| Teacher in residence | 2-3 months grants  
| Joint development of educational tools |
| Teachers lab | Demo experiments on particle physics  
| (for classroom use) |
| Web-Site | Clear structure  
| Creation of suitable material  
| Feedback ! |