



CERN-Teacher Programmes

Rolf Landua

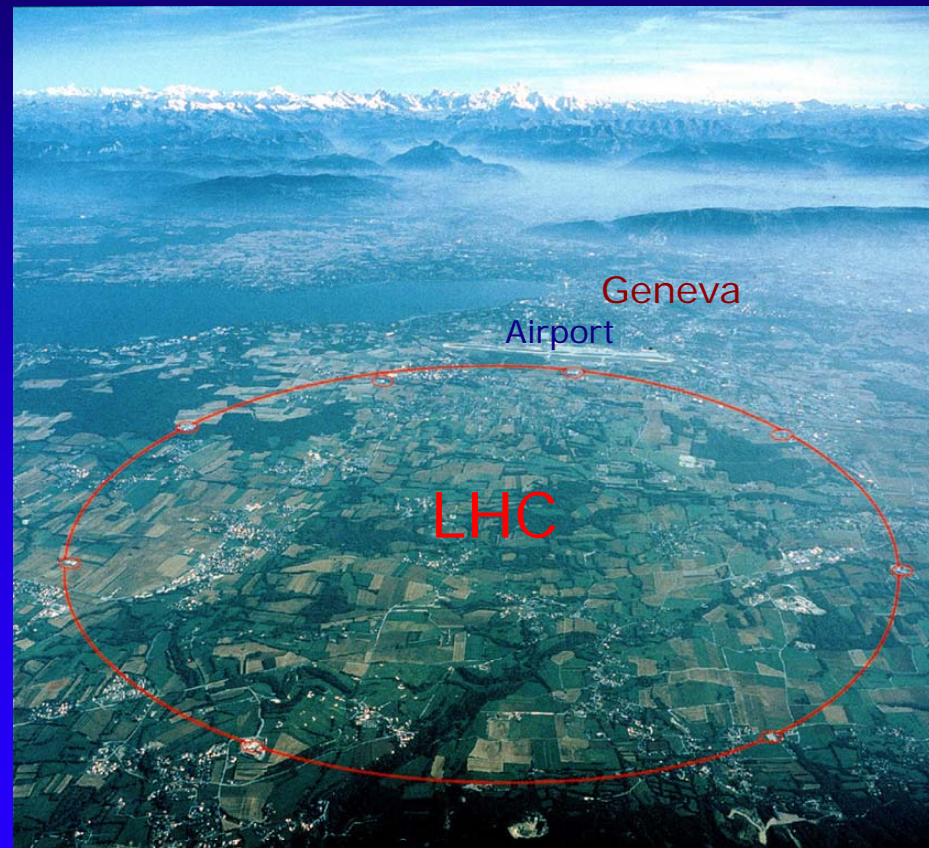
CERN
Research Physicist (Antimatter)
Head of Education

CERN Teacher Programme



What is CERN ?

CERN is the largest science laboratory in the world
CERN has built the largest particle accelerator in history - the LHC
The LHC will produce particles that existed only shortly after the Big Bang





Who works at CERN ?

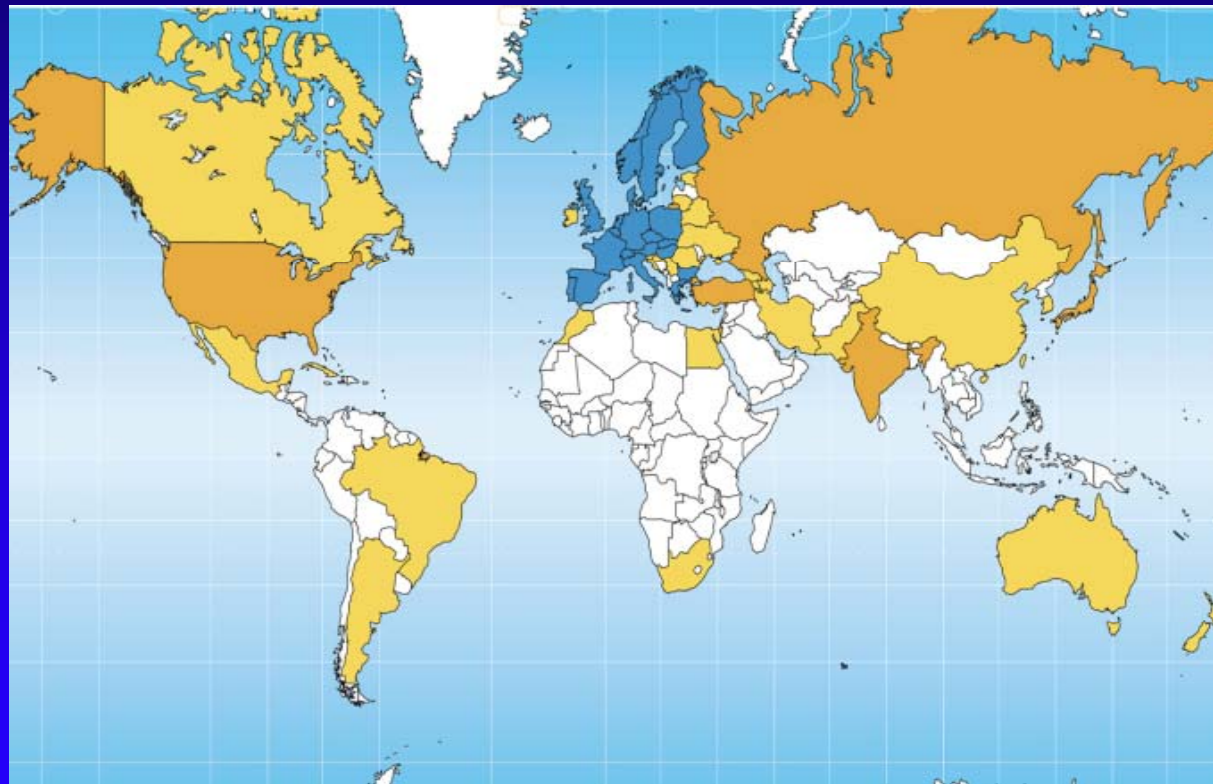
Scientists from 85 countries

2600 CERN Staff

+ 350 fellows + associates

7150 Visiting physicists

70 % from member states
25 % from observer states
5 % from other states





CERN has a broad range of communication activities

400-600 media visits per year (TV, newspapers, radio)

Visitor programme (60,000 visit request - 25,000 accepted - 50 % schools)

Permanent and temporary exhibitions (Microcosm, soon: 'Globe')

Open day (2004: 30,000 visitors)

Public webpages

Live webcasts



New: The Education Group

CERN teacher courses

Creation and provision of teaching resources

Video-"Chats" :

virtual meetings between CERN scientists and school classes

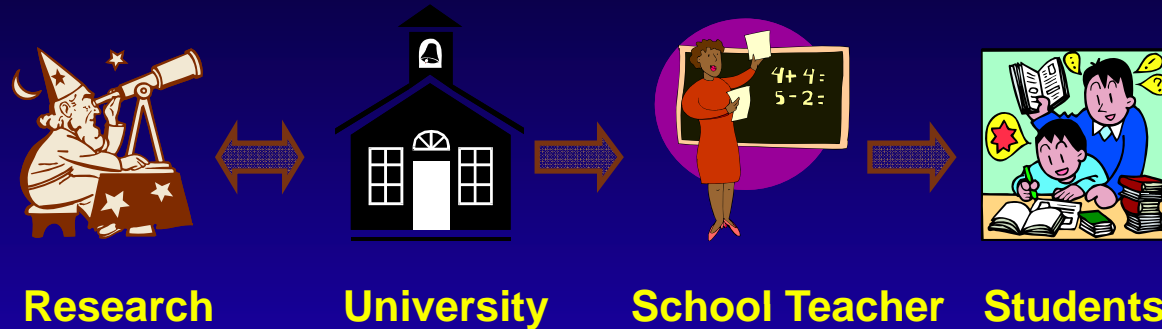
Web-Lectures (teacher courses, colloquia, seminars, etc)

Science In School Journal

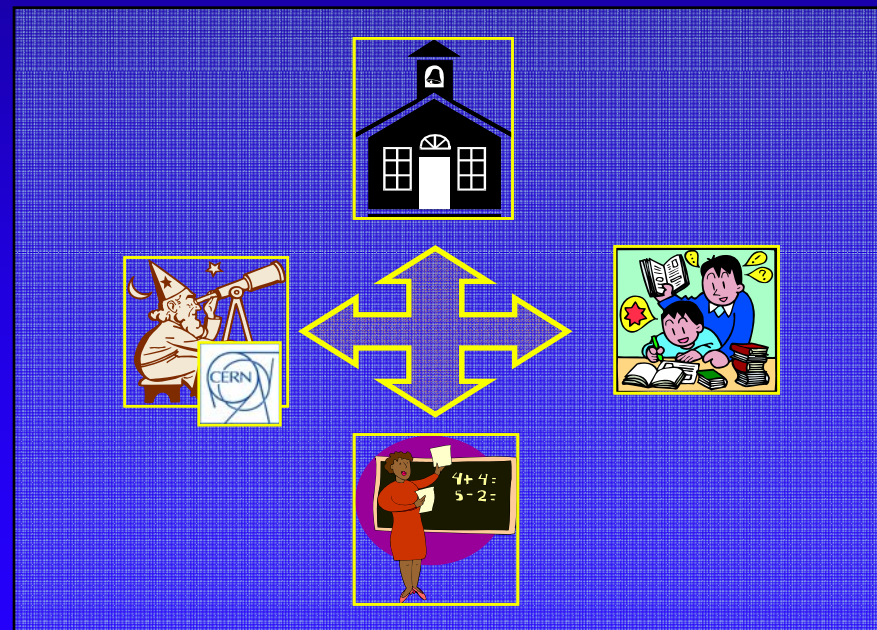


Bring modern research closer to schools

OLD



NEW



CERN Teacher Programme



What are we trying to achieve?

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 at universities
(Future generation of researchers)

IT'S ... ALIVE !

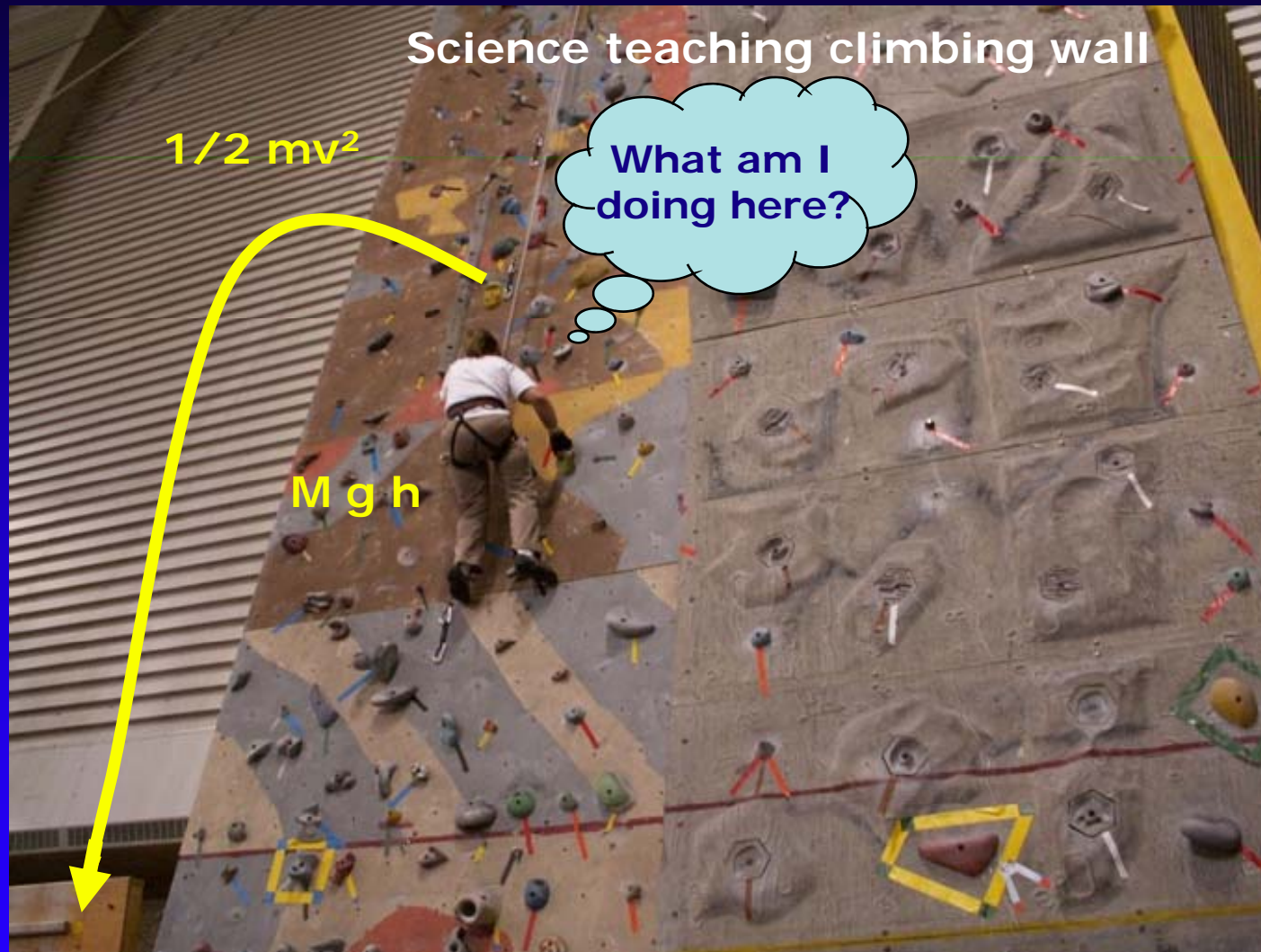


How researchers view science





How school students view science





Take students on a sight-seeing tour ...

The origin

Universe

Dark Matter

Antimatter



180,000 copies per month

Black holes
Big Bang

CERN teaching materials (web-based) can be used within existing syllabus

CERN Teacher Programme



Goal: Link modern physics to school curriculum

Target

Topic	<12 yr	13-16	>16 yr	University
Mechanics	Inquiry Based learning	Mystery; Discovery potential	Discovery Potential; Model description	
Electro-magnetism				
Optics				
Thermo-dynamics				



CERN Teacher Programmes

International teacher school (3 weeks)

Fully funded by CERN for MS participants (programme, travel, accommodation)
Participants from US, Asia, South America (HELEN) funded externally

In English

In-depth overview, practical workshops, lesson plan development
International network of alumni teachers - still in touch after 5 years and more

National schools (1 week)

1-week programme for physics teachers from member states (free of charge)
External funding of travel, accommodation

In their mother tongue (speakers from the national community at CERN)

Enable networks between teachers inside country
Encourage contacts with national physics community



Content of CERN Teacher Schools

Lectures:

Particle Physics
Cosmology
Accelerators (LHC)
Detectors
Applications (IT, Medicine)

Guided tours:

LHC experiments
Antimatter factory (AD)
CLIC
Microcosm exhibition

Activities:

Interactive teacher lab
Educational Resources
Games, Quiz
Lesson reviews (Q+A)

Detailed programme depends on the duration of the school:
normally: 1 week
(International programme in Summer: 3 weeks)



Overview 2007: 19 CERN Teacher Schools

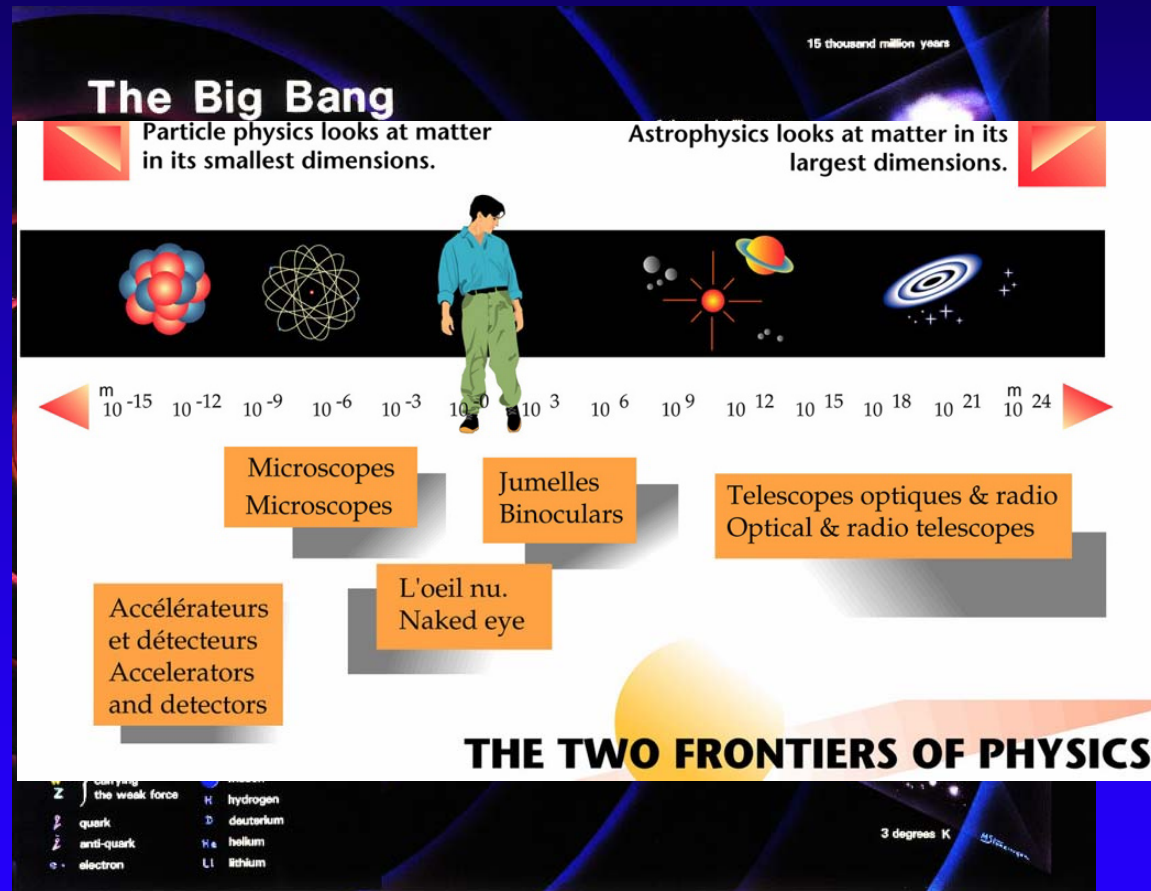
Participants from	Language	Number	Date
Europe, World (HST,3 wk)	English	43	2 - 21/ 7 / 2007
Europe (PhT, 3 d)	English	50	March 2007
UK (Science Learning Centres, 3d)	English	48	10 - 13 / 4 / 2007
Poland (2 schools)	Polish	83	April, May 2007
Slovak Republic	Slovak	44	22 - 28 / 4 / 2007
Finland (4 schools)	Finnish	62	April, June 2007
Germany (3 schools)	German	120	June, Sep, Oct 2007
Spain (Catalonia)	Spanish	40	22 - 28 / 7 / 2007
Hungary	Hungarian	40	19 - 25 / 8 / 2007
Portugal	Portugese	40	9 - 15 / 9 / 2007
Denmark	Danish	30	Oct 2007
France	French	30	Nov 2007
Norway	Norwegian	40	Nov 2007

670 teachers



Educational Resources (1)

Graphics, Video clips





Evolution of the Universe



17 posters

Key concepts of the evolution of matter

telescopes - télescopes

accelerators - accélérateurs

Join us for a journey to the beginning of time
Une machine à remonter le temps

Today / Aujourd'hui

10 billion / depuis 10 milliards
9.2 billion / milliards
7.8 billion / milliards
200 million / millions
380 000
before / avant 380 000

10⁻¹⁰
10⁻¹²
10⁻¹³
10⁻¹⁴
10⁻¹⁵
10⁻¹⁶

Seconds / Secondes

BIG BANG

CERN

Our Universe is expanding. By watching distant stars and galaxies through telescopes we can observe the Universe of the past, when it was smaller and hotter. But we have a challenge to meet: the first instants of the Universe are hidden from view. In particle collisions at CERN, we recreate the conditions just one millionth of a second after the beginning of the Universe!

Notre Univers est en expansion. En observant les étoiles et galaxies les plus lointaines, nous regardons l'Univers tel qu'il fut, beaucoup plus petit et plus chaud. Nous devons relever un défi: les tout premiers instants de l'Univers nous sont invisibles. Au CERN, dans les collisions de particules, nous recréons les conditions qui prévalaient juste un millionième de millionième de seconde après le Big Bang.



Evolution of the Universe (2)

Life on Earth

De la matière à la vie

Human-like beings have only existed for a few million years and if we squeezed all the Earth's 4.500 million-year history into one day, human civilization fits easily into the last second - before midnight. Dinosaurs appeared 225 million years ago, the oldest fossils are 540 million years old, and the first life forms are 3500 million years old.

Everything - rocks, plants, animals, humans - is made of the same particles. And these were born 13,700 million years ago at the Big Bang.

Les humains exist depuis quelques millions d'années et nous vivons dans l'histoire de la Terre, longue de 4,5 milliards d'années. En une journée, la civilisation humaine représente à peine la dernière seconde avant minuit... Les dinosaures apparaissent il y a 225 millions d'années ; les plus vieux fossiles ont 540 millions d'années et les premières formes de la vie 3,5 milliards d'années.

TOUT - minéraux, plantes, animaux, humains - est fait des mêmes particules, celles qui naquirent lors du Big Bang il y a 13,7 milliards d'années.

Human-like beings
Êtres humains

Fossils
- 540 million years
- 540 millions d'années

Dinosaurs
- 225 million years
- 225 millions d'années

First life forms
- 3500 million years
- 3500 millions d'années

A star is born Une étoile est née

Our journey back in time continues... The formation of the Earth and the solar system happened about 4500 million years ago. The Solar System formed from a cloud of interstellar dust made of hydrogen and helium with just 1 % of heavier elements.

Remontons encore le fil du temps... Il y a environ 4,5 milliards d'années apparemment la Terre et le système solaire - fruits d'un nuage de poussière interstellaire, constituée d'hydrogène, d'hélium, et de 1% seulement d'éléments lourds.

TODAY →

BIG BANG



Evolution of the Universe (3)

accelerators - accélérateurs

Seeing in the dark L'âge obscur

Lighting and dark matter before stars and galaxies...
The first stars and galaxies formed during the dark age of the universe...
The first stars and galaxies formed during the dark age of the universe...
The first stars and galaxies formed during the dark age of the universe...

CERN

Les neutrinos, témoins fantômes de la naissance Neutrinos – ghostly messengers from the early Universe

The first stars and galaxies formed during the dark age of the universe...
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The first stars and galaxies formed during the dark age of the universe...
The first stars and galaxies formed during the dark age of the universe...

CERN

Pushing back the frontiers Repousser les limites

The first stars and galaxies formed during the dark age of the universe...
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Educational Resources (2)

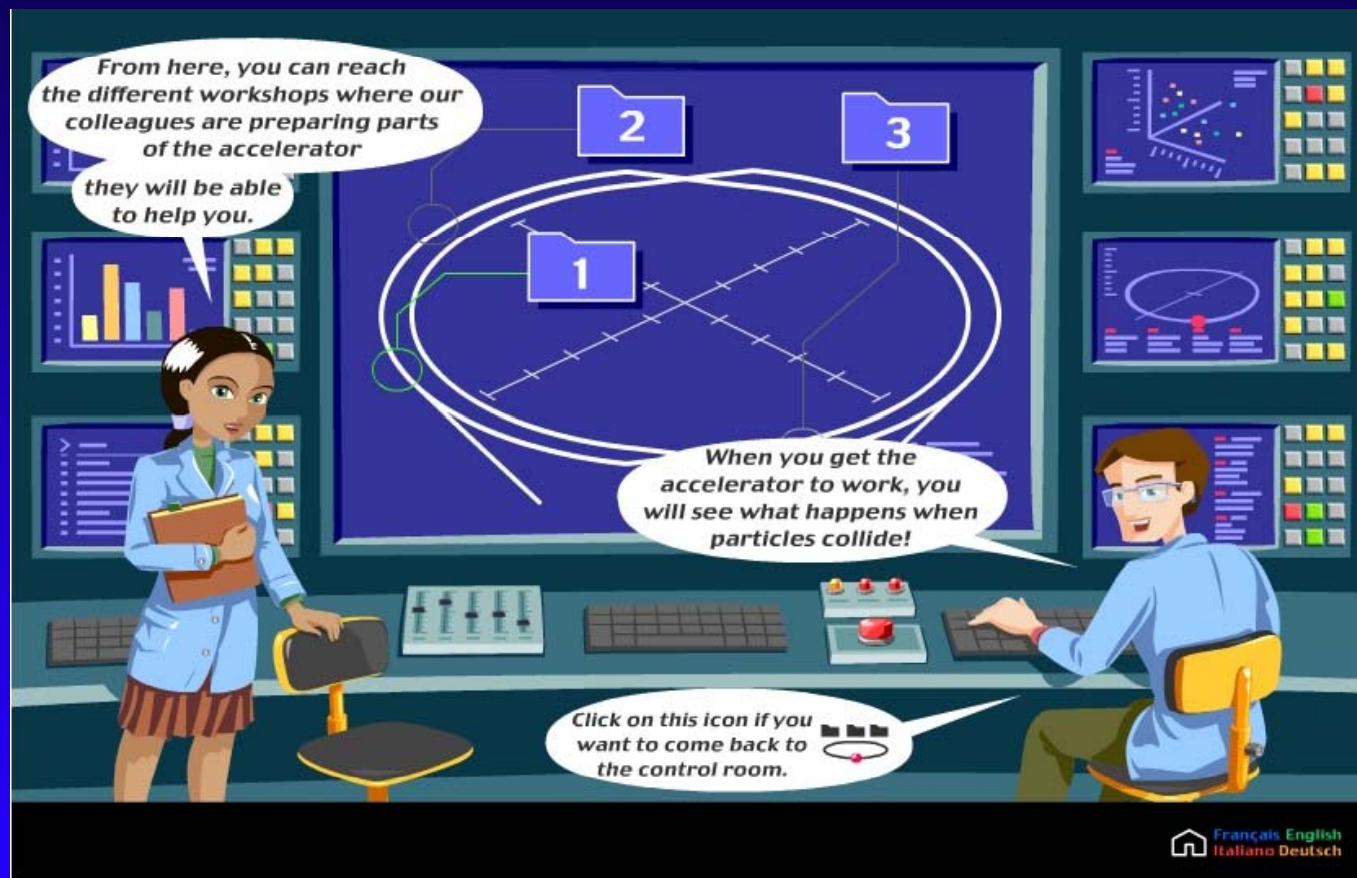
Video clips

QuickTime™ and a
H.264 decompressor
are needed to see this picture.



Educational Resources (3)

Games



microcosm.web.cern.ch/microcosm/LHCGame/LHCGame.html

CERN Teacher Programme



Educational Resources (4)

Topical websites (e.g. Antimatter)



livefromcern.web.cern.ch/livefromcern/antimatter

CERN Teacher Programme



Educational Resources Development

Teacher in residence

2-3 months grants
Joint development of
educational resources

Teachers lab

Particle physics
experiments for school
classes

Web-Site

Distribution of material
Feedback