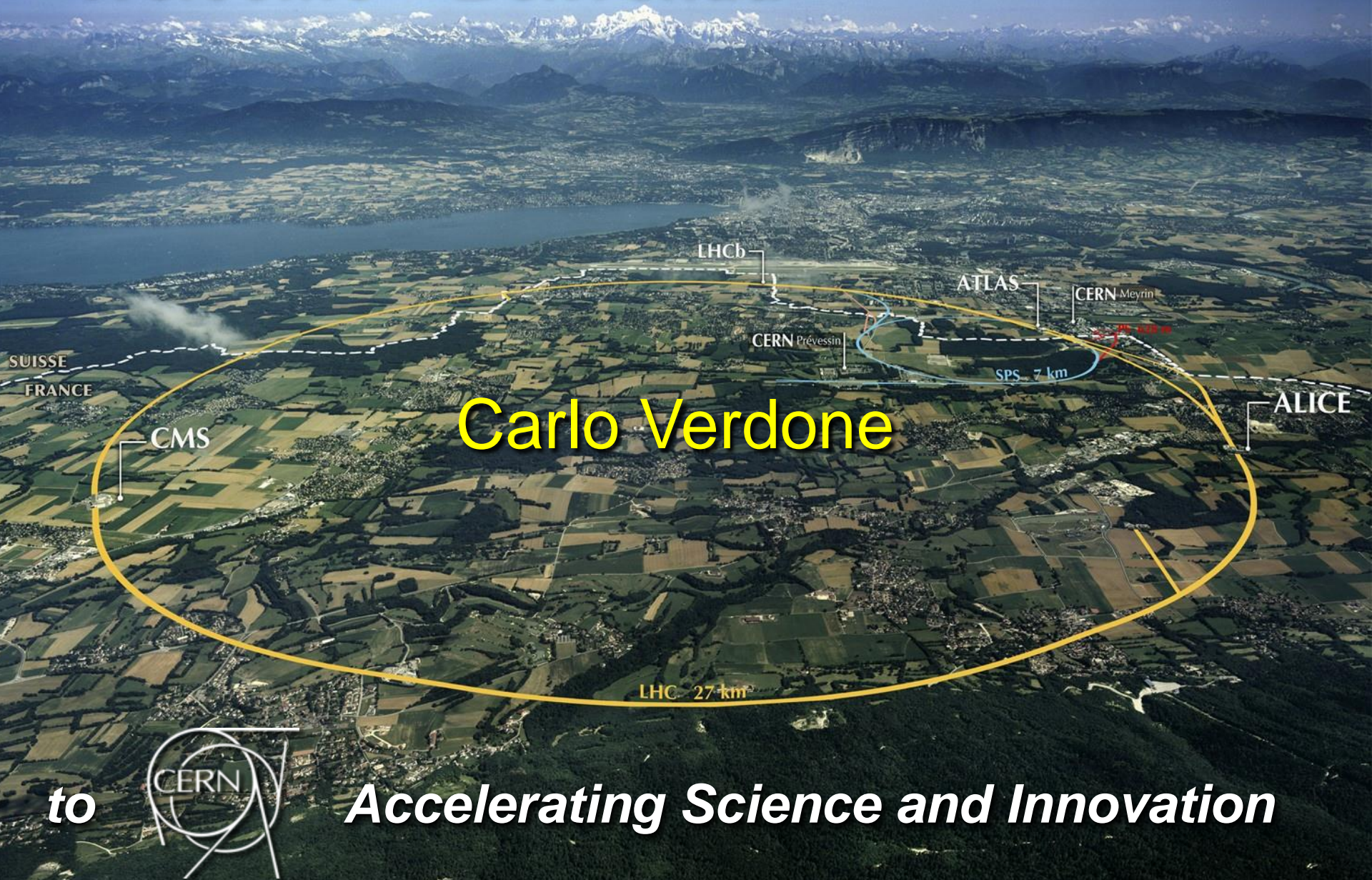


Welcome – Benvenuti



Carlo Verdone

to



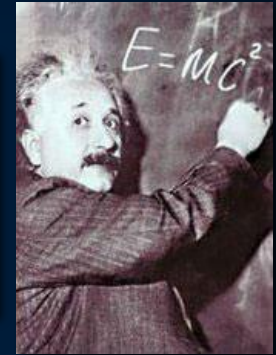
Accelerating Science and Innovation

The Mission of CERN



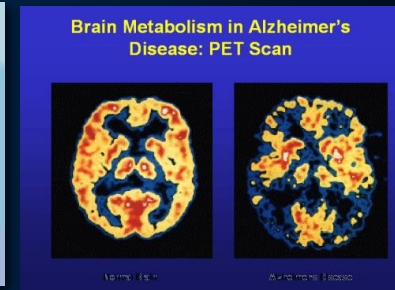
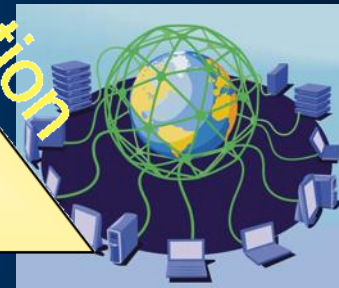
- ❑ **Push back** the frontiers of knowledge

E.g. the secrets of the Big Bang, what was the matter like within the first moments of the universe's existence?

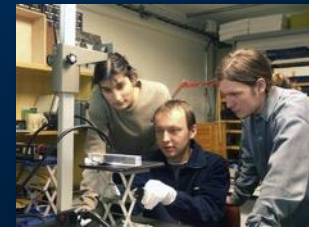


- ❑ **Develop** new technologies, accelerators and detectors

Information technology
Medicine - diagnosis and therapy



- ❑ **Train** scientists and engineers of tomorrow



- ❑ **Unite** people from different countries and cultures



CERN was founded 1954: 12 European States

“Science for Peace”

Today: 21 Member States

~ 2300 staff

~ 1600 other paid personnel

~ 10500 users

Budget (2014) ~1000 MCHF

Member States: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom

Candidate for Accession: Romania

Associate Member in Pre-Stage to Membership: Serbia

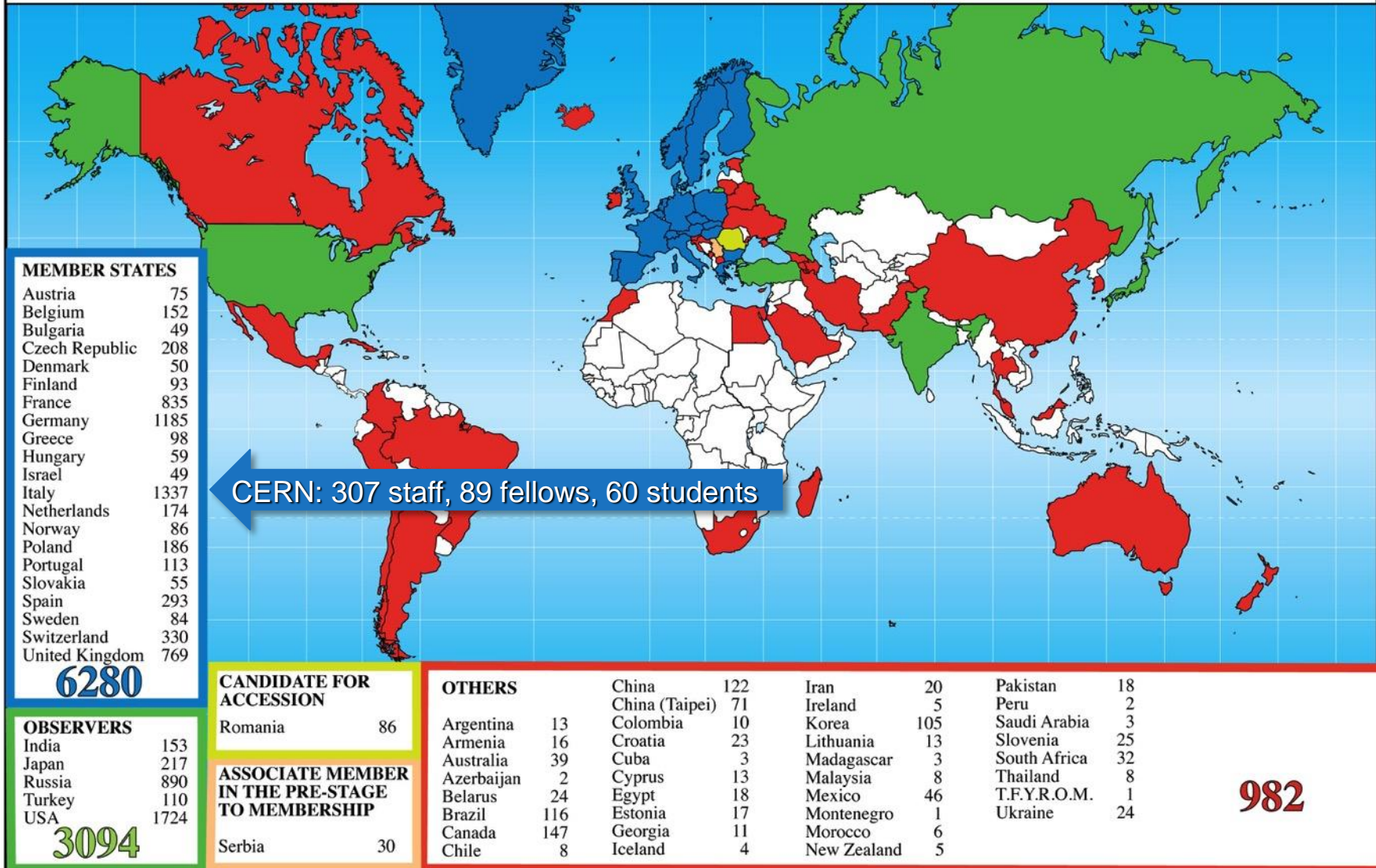
Applicant States for Membership or Associate Membership:

Brazil, Cyprus, Pakistan, Russia, Slovenia, Turkey, Ukraine

Observers to Council: India, Japan, Russia, Turkey, United States of America; European Commission and UNESCO

Science is getting more and more global

Distribution of All CERN Users by Location of Institute on 14 January 2014

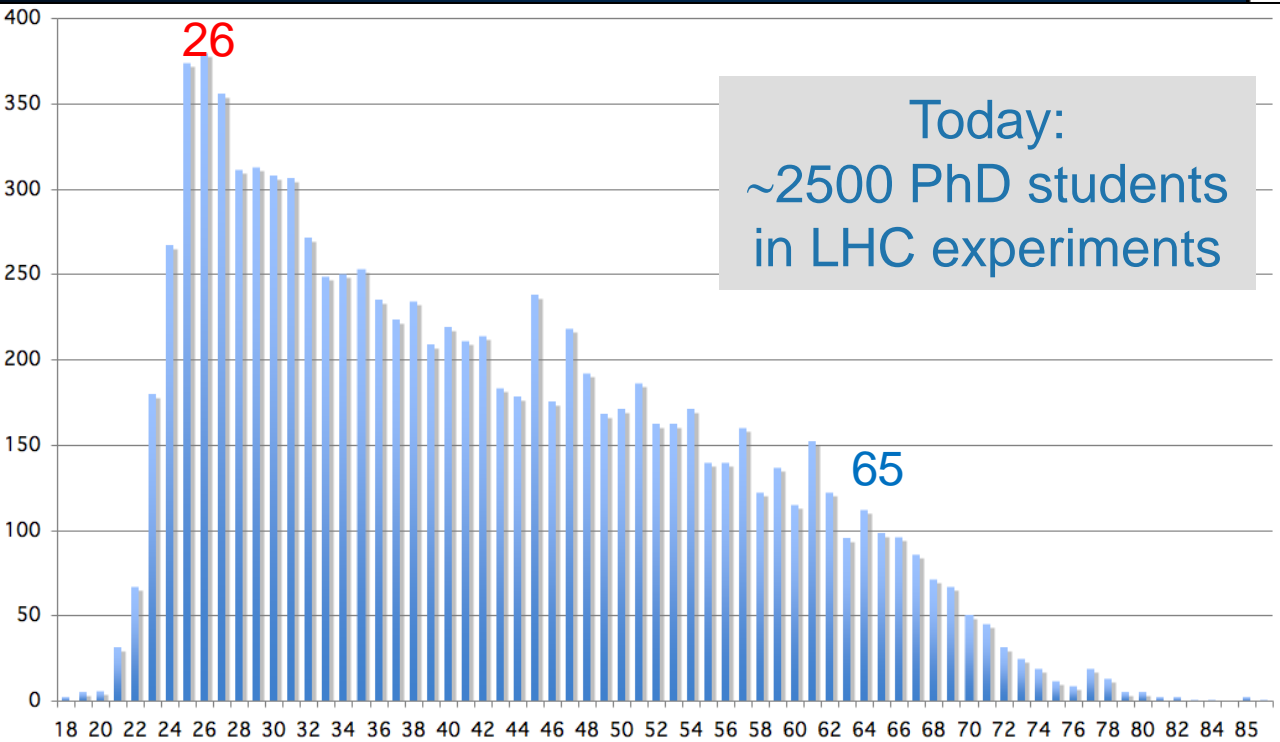




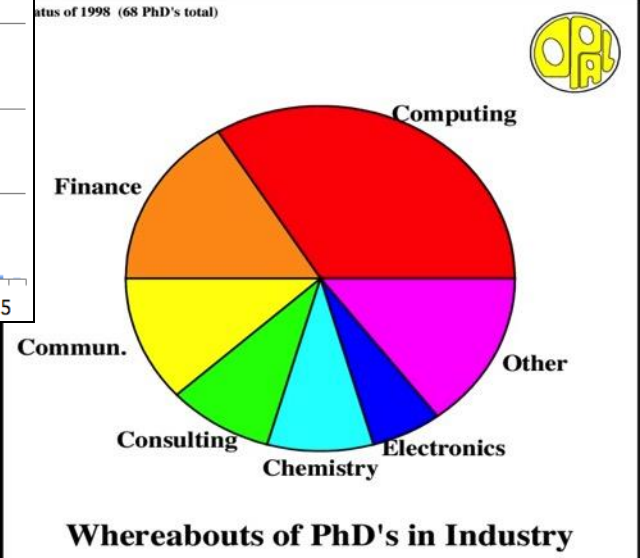
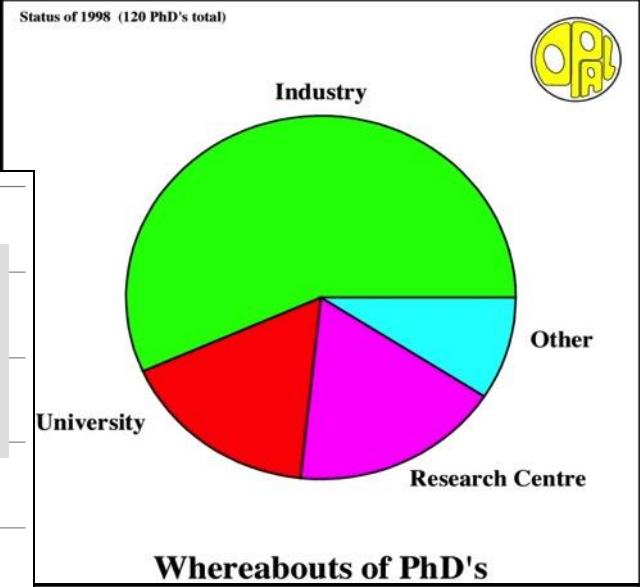
Age Distribution of Scientists

- and where they go afterwards

Survey in March 2009

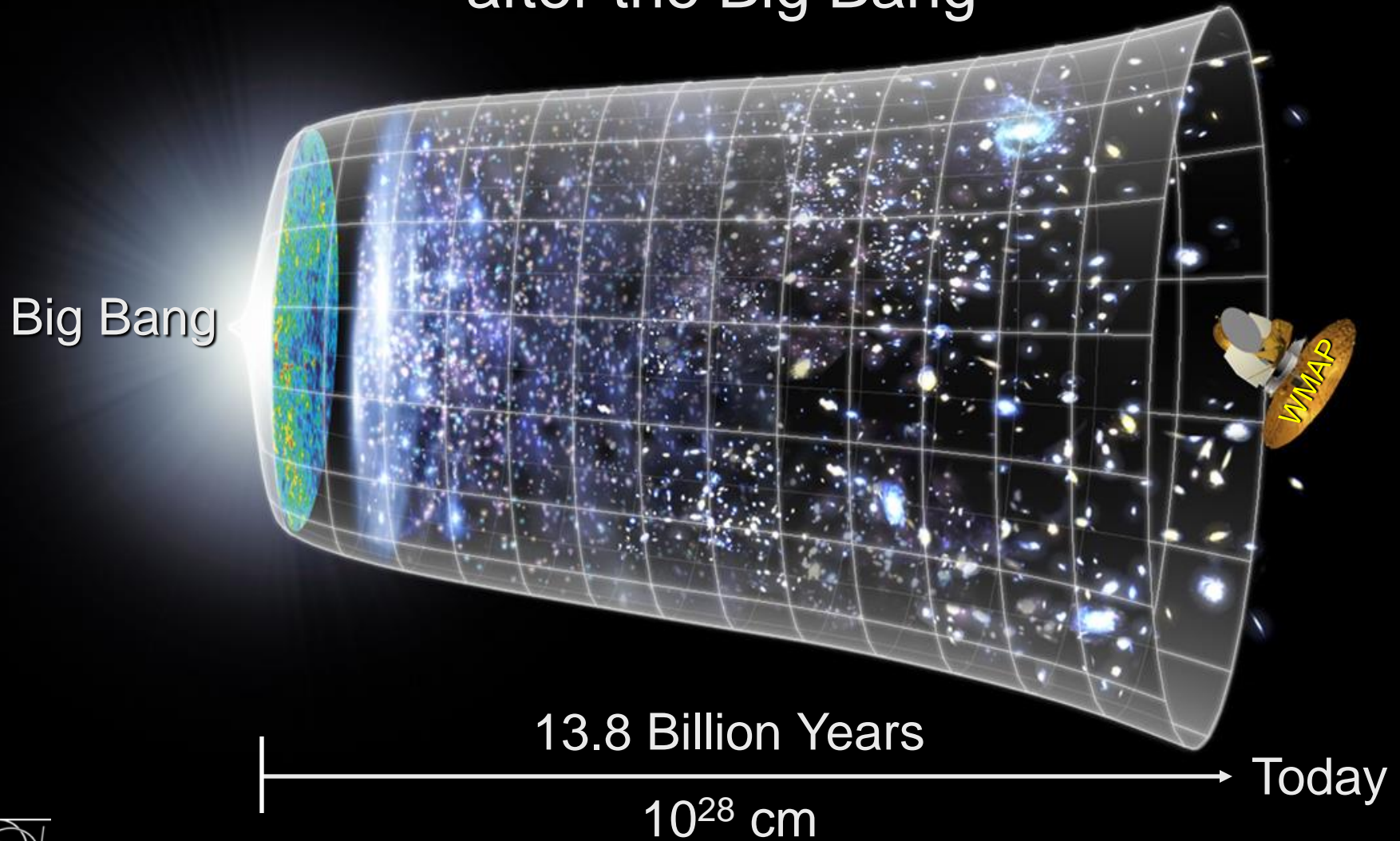


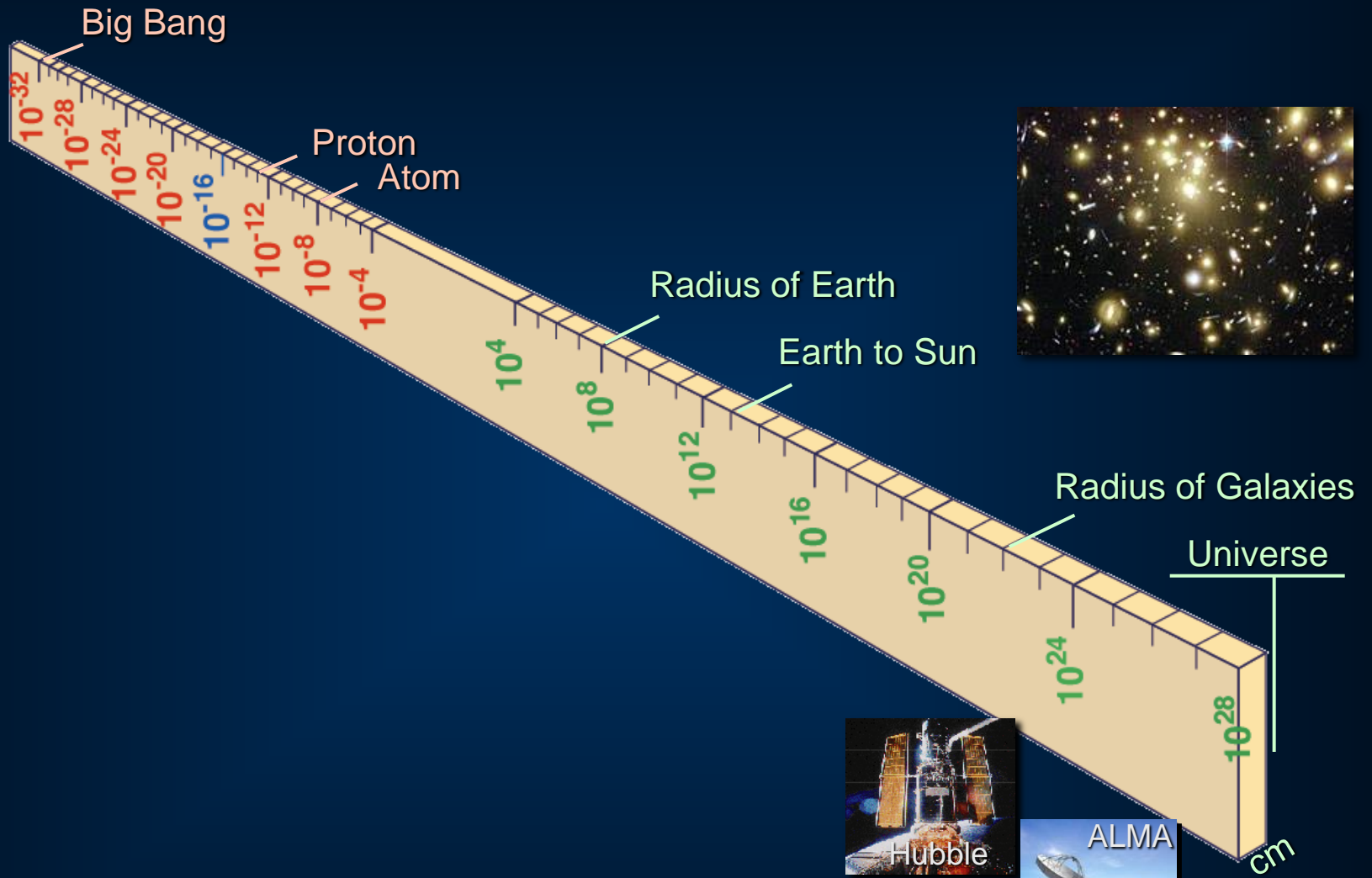
They do not all stay: where do they go?

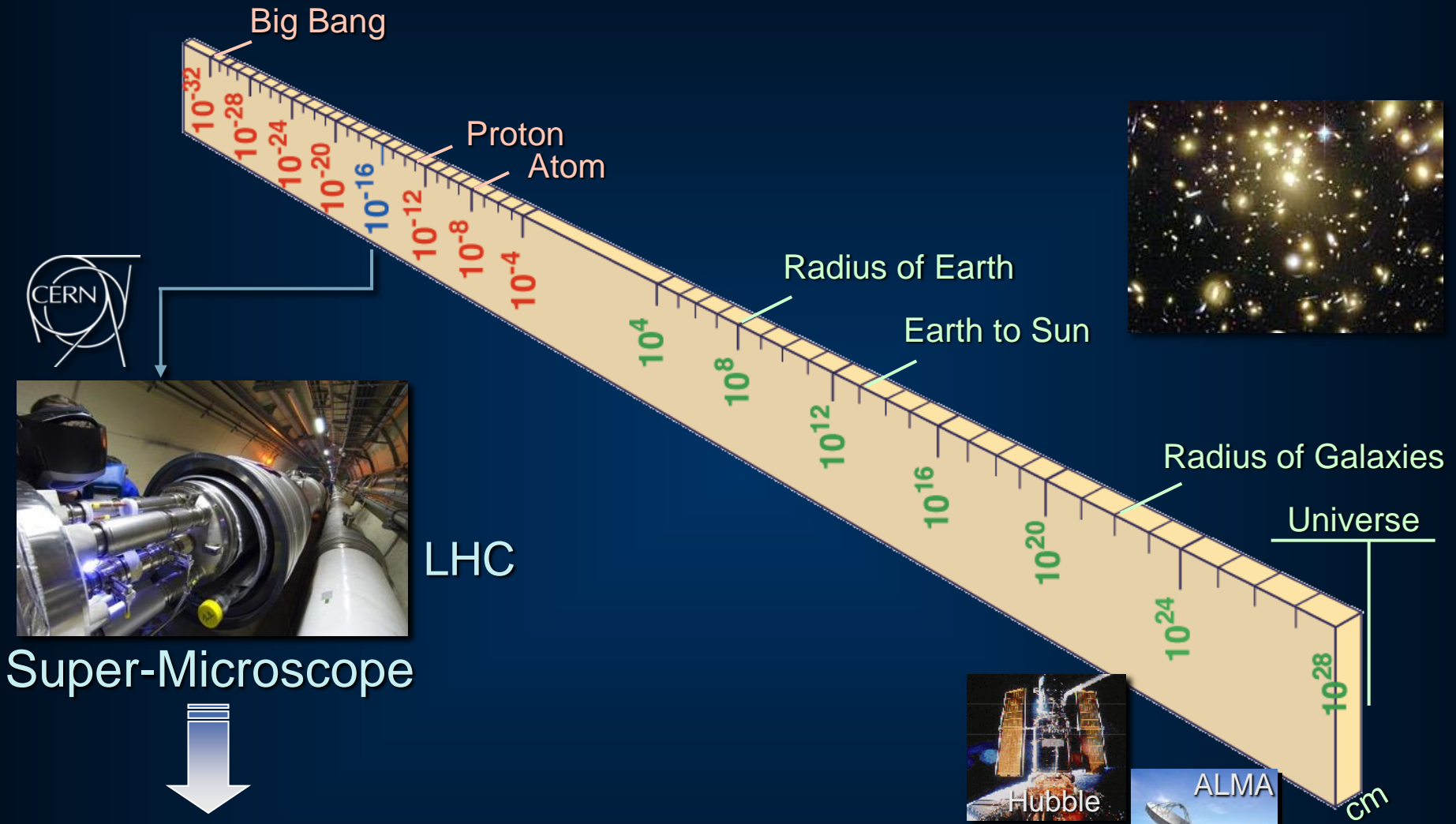


Next Scientific Challenge:

to understand the very first moments of our Universe
after the Big Bang







LHC

Super-Microscope



Study physics laws of first moments after Big Bang increasing Symbiosis between Particle Physics, Astrophysics and Cosmology



Hubble



ALMA



AMS

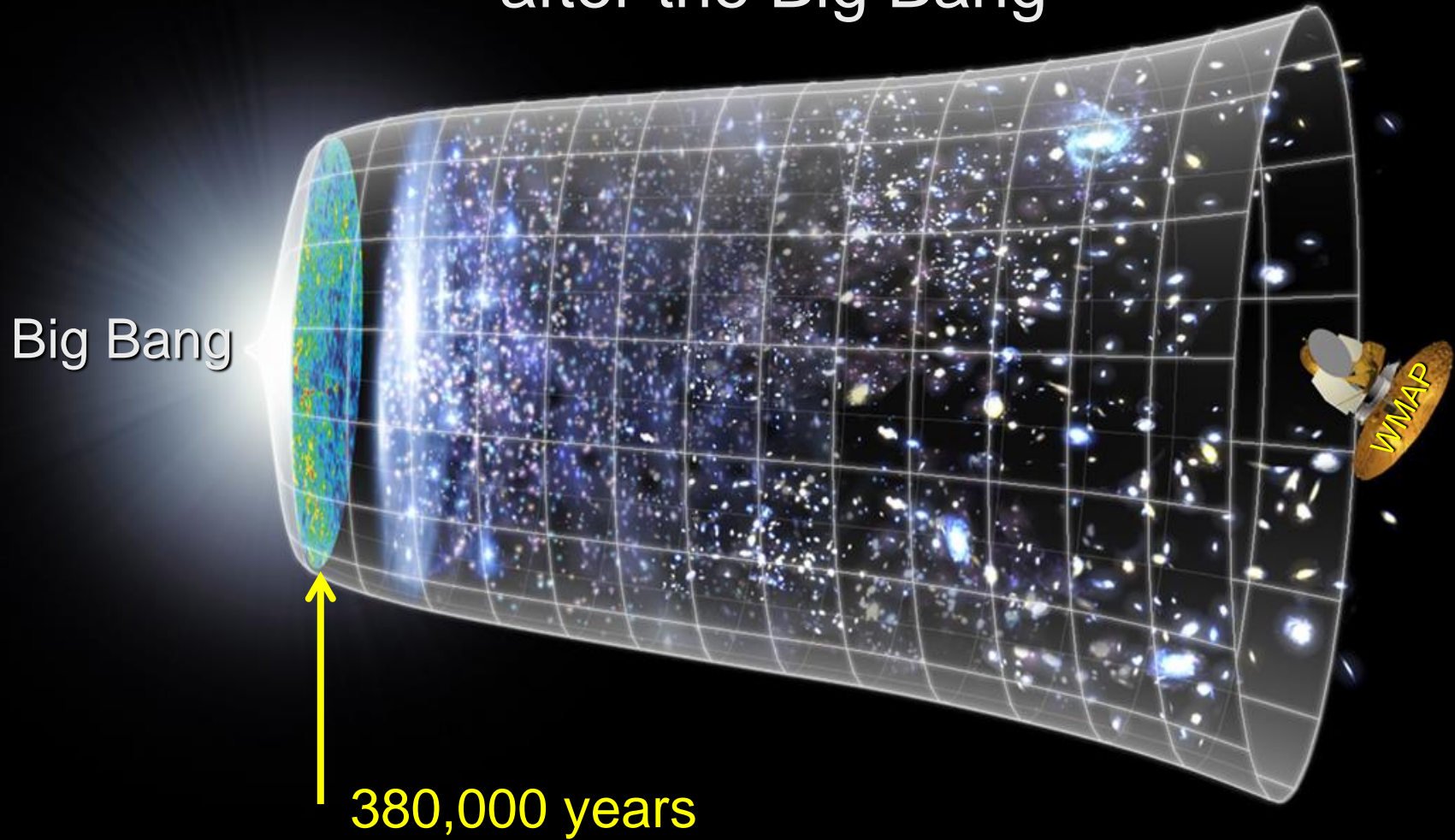


VLT



Next Scientific Challenge:

to understand the very first moments of our Universe
after the Big Bang



2010: a New Era in Fundamental Science



The highlight of a remarkable year 2012

Volume 712, Issue 3, 6 June 2012 ISSN 0370-2693

ELSEVIER

PHYSICS LETTERS B

Available online at www.sciencedirect.com
SciVerse ScienceDirect

The cover features two main plots. The top plot shows the $S/(S+B)$ Weighted Events / 1.5 GeV versus m_H (GeV) for the ATLAS experiment. It includes data points (black dots), a total fit (red line), and individual fit components for 1σ (green) and 2σ (yellow) regions. A magnifying glass highlights the 1σ region. The bottom plot is the ATLAS 2011-12 $\sqrt{s} = 7-8$ TeV Local p_0 versus m_H [GeV]. It shows the observed data (black line) and the expected signal (blue shaded area) with significance contours for 2σ , 3σ , 4σ , 5σ , and 6σ .

<http://www.elsevier.com/locate/physletb>

The Economist

JULY 30th - 13th 2012 Economist.com

In praise of charter schools
Britain's banking scandal spreads
Volkswagen overtakes the rest
A power struggle at the Vatican
When Lonesome George met Nora

A giant leap for science

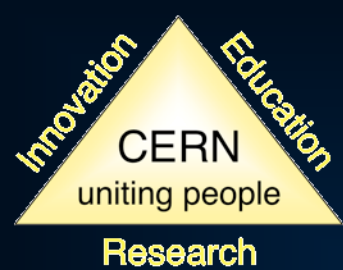
The cover features a central image of a man in a dark suit jumping through a vibrant, multi-colored particle collision visualization. The colors range from blue and purple to orange and red, representing different energy levels or particle interactions.

Finding the Higgs boson

Nobel Prize in Physics 2013



The Nobel Prize in Physics 2013 was awarded jointly to François Englert and Peter W. Higgs *"for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN's Large Hadron Collider"*.



CERN: Particle Physics and Innovation

- **Interfacing** between fundamental science and key technological developments



- **CERN Technologies and Innovation**



Accelerating particle beams



Detecting particles



Large-scale computing (Grid)

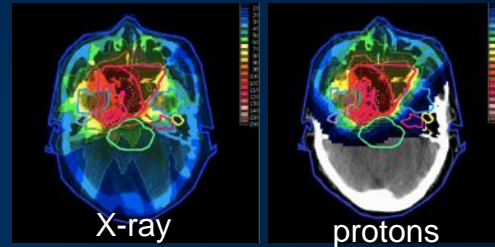
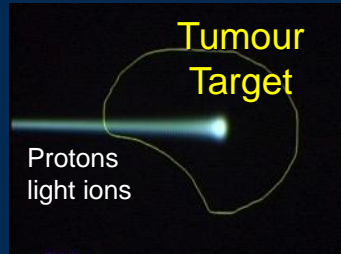
Medical Application as an Example of Particle Physics Spin-off

Combining Physics, ICT, Biology and Medicine to fight cancer



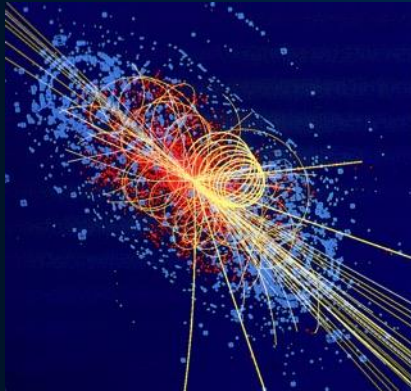
Hadron Therapy

Accelerating particle beams
~30'000 accelerators worldwide
~17'000 used for medicine



Leadership in Ion Beam Therapy now in Europe and Japan

>100'000 patients treated worldwide (45 facilities)
>50'000 patients treated in Europe (14 facilities)

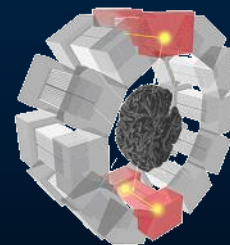


Imaging

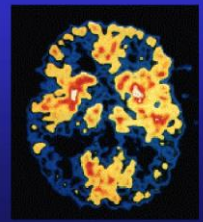
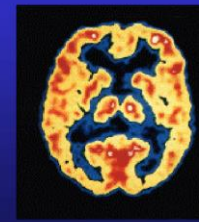
Clinical trial in Portugal, France and Italy for new breast imaging system (ClearPEM)



PET Scanner



Brain Metabolism in Alzheimer's Disease: PET Scan



Normal Brain

Alzheimer's Disease



Detecting particles

CERN Education Activities

Scientists at CERN

Academic Training Programme



Latin American School
Natal, Brazil, 2011
Arequipa, Peru, 2013



Young Researchers

CERN School of High Energy Physics
CERN School of Computing
CERN Accelerator School



Physics Students

Summer Students
Programme

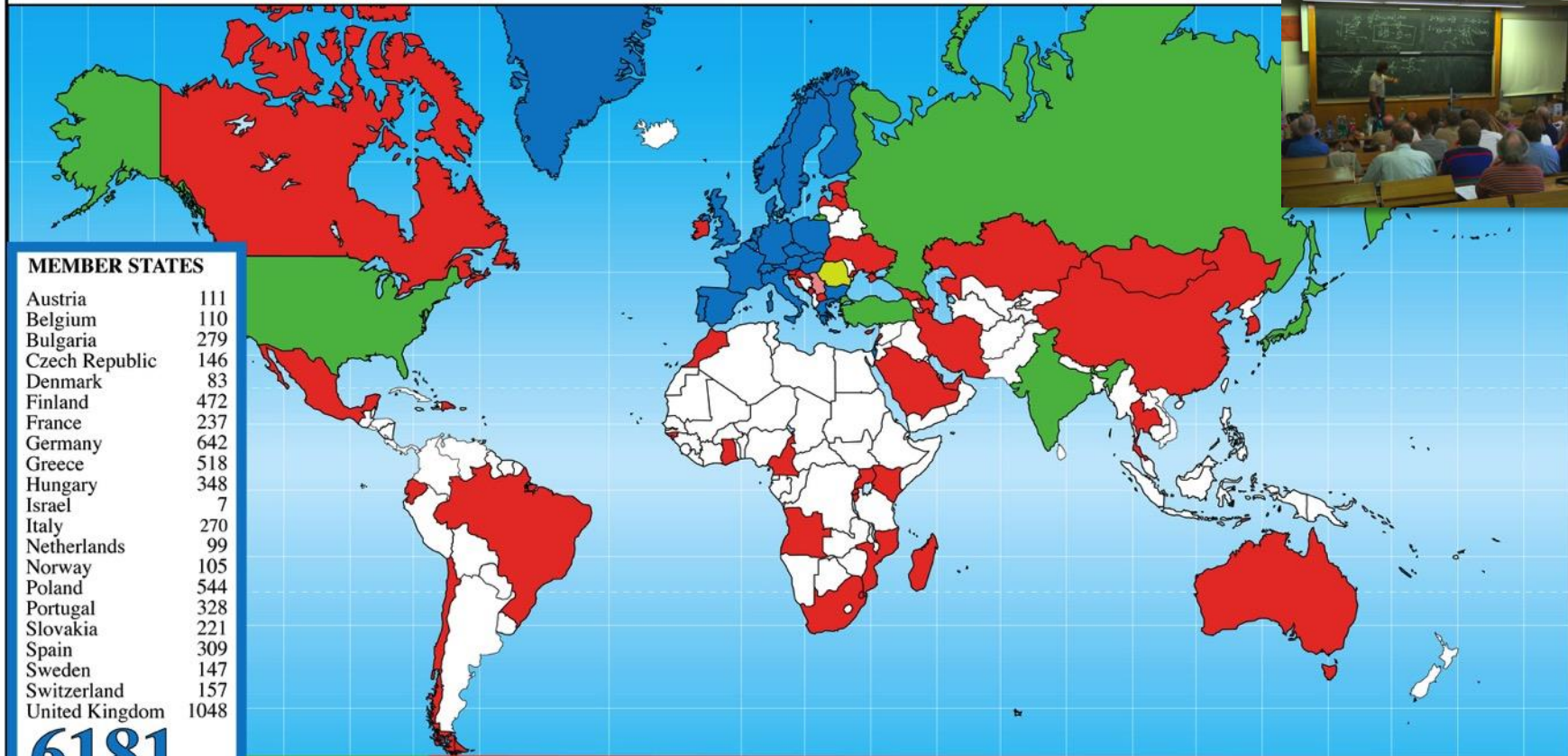


CERN Teacher Schools

International and National
Programmes

CERN Teacher Programme

Teacher Programme Participants 1998 - 2013 (Total: 7067)



MEMBER STATES

Austria	111
Belgium	110
Bulgaria	279
Czech Republic	146
Denmark	83
Finland	472
France	237
Germany	642
Greece	518
Hungary	348
Israel	7
Italy	270
Netherlands	99
Norway	105
Poland	544
Portugal	328
Slovakia	221
Spain	309
Sweden	147
Switzerland	157
United Kingdom	1048

6181

CANDIDATE FOR ACCESSION

Romania	12
---------	----

ASSOCIATE MEMBER IN THE PRE-STAGE TO MEMBERSHIP

Serbia	14
--------	----

OBSERVER STATES

India	2
Japan	5
Russia	193
Turkey	3
USA	65

268

OTHERS

Angola	4	China	1	Ireland	5	Morocco	2	Swaziland	1
Australia	5	Croatia	1	Kazakhstan	3	Mozambique	17	Thailand	7
Azerbaijan	1	Cyprus	8	Kenya	4	Qatar	1	T.F.Y.R.O.M.	11
Brazil	114	Dominican Rep.	21	Latvia	1	Rwanda	17	Timor-Leste	7
Burundi	1	Ecuador	2	Lebanon	1	Sao Tome	4	Uganda	3
Cameroon	3	Estonia	46	Madagascar	2	Saudi Arabia	1	Ukraine	77
Canada	3	Georgia	74	Malta	36	Singapore	2	U.A.E.	1
Cape Verde	3	Ghana	6	Mexico	6	Slovenia	21		
Chile	3	Guinea Bissau	1	Mongolia	1	South Africa	6		
		Iran	1	Montenegro	13	South Korea	44		

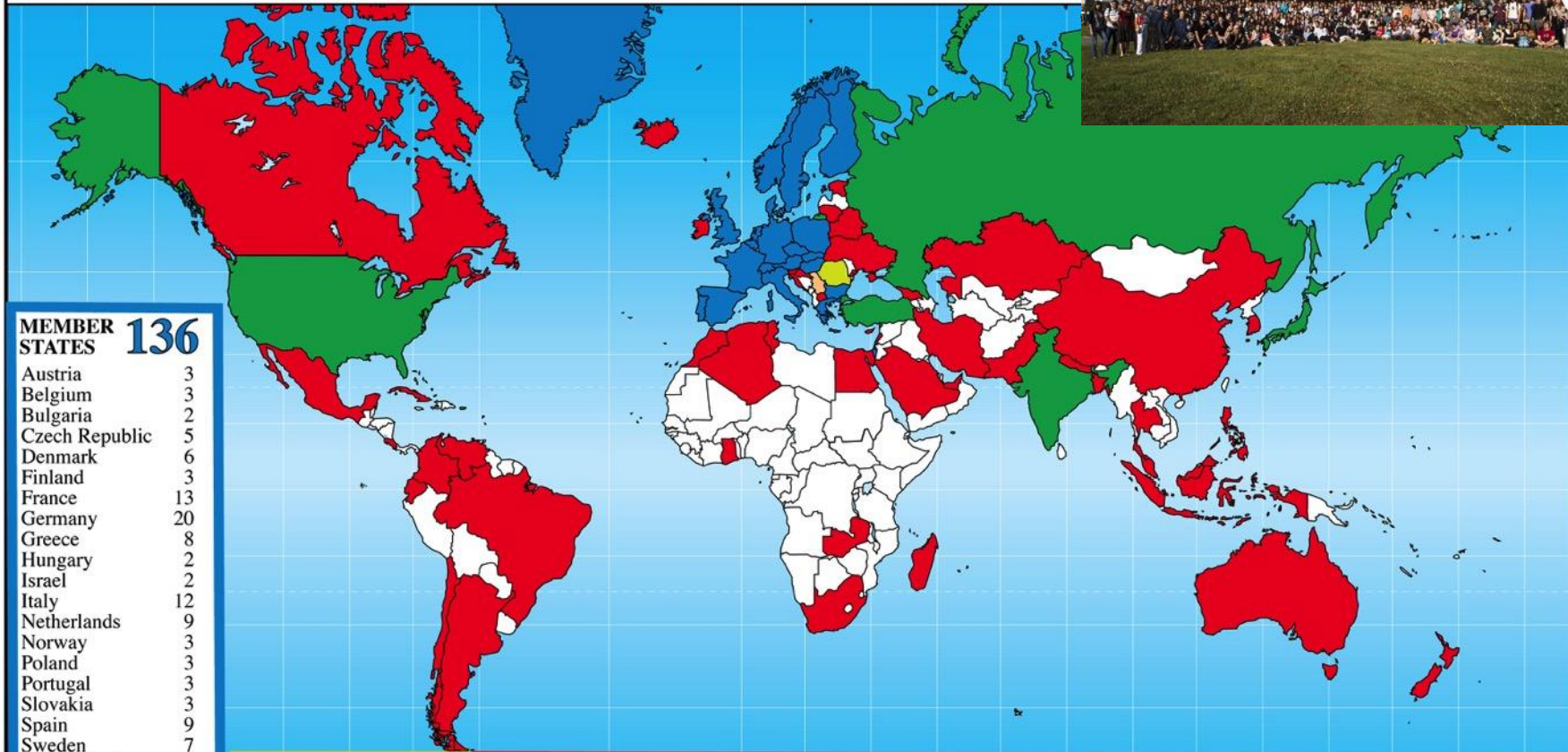
592



Summer Students 2013



Summer Students 2013



MEMBER STATES 136

Austria	3
Belgium	3
Bulgaria	2
Czech Republic	5
Denmark	6
Finland	3
France	13
Germany	20
Greece	8
Hungary	2
Israel	2
Italy	12
Netherlands	9
Norway	3
Poland	3
Portugal	3
Slovakia	3
Spain	9
Sweden	7
Switzerland	4
United Kingdom	16

OBSERVERS 43

India	7
Japan	5
Russia	9
Turkey	6
USA	16

CANDIDATE FOR ACCESSION

Romania	3
---------	---

ASSOCIATE MEMBER IN THE PRE-STAGE TO MEMBERSHIP

Serbia	2
--------	---

OTHERS

Algeria	2	China	5	Estonia	4	Korea, South	2	New Zealand	1	Tunisia	1
Argentina	1	Colombia	1	Georgia	1	Lebanon	1	Pakistan	4	Ukraine	2
Australia	1	Comoros	1	Ghana	1	Lithuania	2	Palestine	1	U.A.E.	2
Bangladesh	1	Costa Rica	1	Hong Kong	4	Madagascar	1	Philippines	1	Venezuela	1
Belarus	1	Croatia	3	Iceland	1	Malaysia	3	Saudi Arabia	1	Zambia	1
Benin	1	Cuba	1	Indonesia	3	Malta	3	Slovenia	1		
Brazil	1	Cyprus	2	Iran	2	Mexico	2	South Africa	2		
Canada	5	Ecuador	3	Ireland	1	Morocco	2	Thailand	2		
Chile	1	Egypt	4	Kazakhstan	1	Nepal	1	T.F.Y.R.O.M.	2		





Italy and CERN

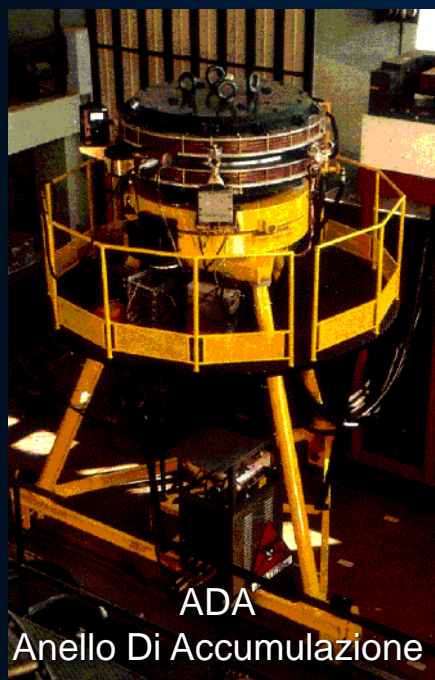


Italy is a founding member of CERN with a strong tradition in particle physics

Eduardo Amaldi: one of the founding fathers of CERN and interim Secretary General

Two Directors General from Italy:

Carlo Rubbia and Luciano Maiani



ADA: the common ancestor of all particle colliders
first storage ring for an electron and a positron beam rotating
in opposite directions operated at Frascati in 1961

Nobel Prizes in Physics:

related to advance of Particle Physics:



1938: E. Fermi

1984: C. Rubbia





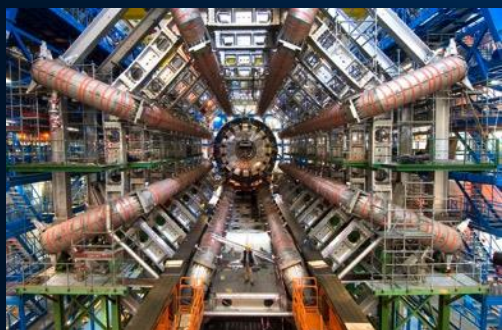
Italy and CERN



INFN brings together some 5000 researchers
Approximately **600 Italian physicists** have collaborated
on the **realisation of the LHC** and on the **research** conducted with the LHC many hold

key positions
in the collaborations

Examples:
Atlas and CMS



Italian industries have
constructed some extremely
important components for the
LHC project, using very
advanced technology

Examples:





Grazie!

Accelerating Science and Innovation



SUISSE
FRANCE

CMS

LHCb

CERN Prévessin

ATLAS

CERN Meyrin

SPS 7 km

LHC 27 km

ALICE

Safety Information for Visitors

Safety is our highest priority

We are confident that you have read the Safety Information provided prior to the visit and ask that you take the time to read the document placed in front of you once more before embarking on the site visit.

By taking part in the site visit you are deemed to have understood and accepted the Safety Information provided to you.

Please always follow the instructions given by your guide and do not hesitate to ask if you have any questions.

