

Welcome



Committee for Employment and Learning
Northern Ireland Legislative Assembly
United Kingdom of Great Britain and Northern Ireland

to



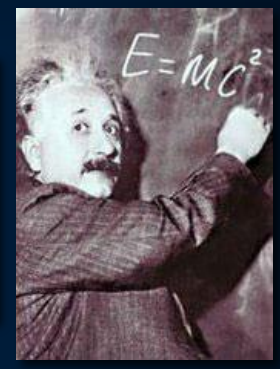
Accelerating Science and Innovation

The Mission of CERN



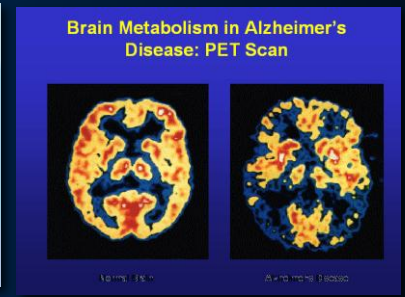
- ❑ **Push forward** the frontiers of knowledge

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

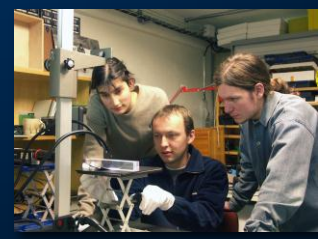


- ❑ **Develop** new technologies, accelerators and detectors

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: 20 Member States

~ 2300 staff

~ 1000 other paid personnel

> 11000 users

Budget (2013) ~1000 MCHF

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

Candidate for Accession: Romania

Associate Members in Pre-Stage to Membership: Israel, Serbia

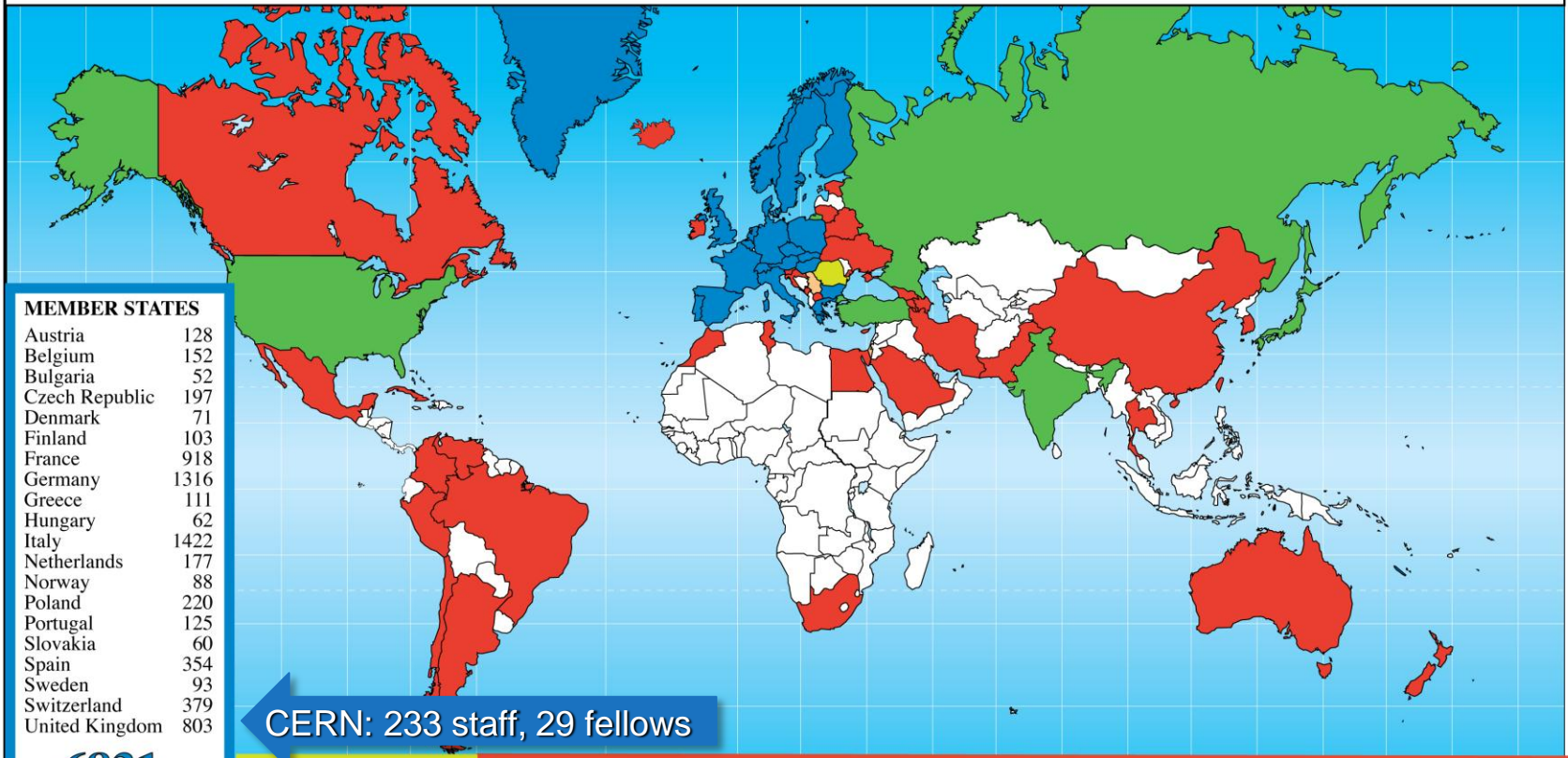
Applicant States for Membership or Associate Membership: Brazil, Cyprus (awaiting ratification), Russia, Slovenia, Turkey, Ukraine

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

Science is getting more and more global

Appendix D

Distribution of All CERN Users by Location of Institute on 14 January 2013



MEMBER STATES

Austria	128
Belgium	152
Bulgaria	52
Czech Republic	197
Denmark	71
Finland	103
France	918
Germany	1316
Greece	111
Hungary	62
Italy	1422
Netherlands	177
Norway	88
Poland	220
Portugal	125
Slovakia	60
Spain	354
Sweden	93
Switzerland	379
United Kingdom	803

6831

OBSERVERS

India	146
Japan	238
Russia	883
Turkey	94
USA	1757

3118

CANDIDATE FOR ACCESSION

Romania	88
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ASSOCIATE MEMBER IN THE PRE-STAGE TO MEMBERSHIP

Israel	63
Serbia	31

OTHERS

Argentina	19	Chile	7	Georgia	10	Morocco	10	Tunisia	1
Armenia	15	China	114	Iceland	4	New Zealand	9	Ukraine	25
Australia	32	China (Taipei)	69	Iran	23	Pakistan	22	Venezuela	1
Azerbaijan	2	Colombia	10	Ireland	8	Peru	2		
Belarus	22	Croatia	24	Korea	96	Saudi Arabia	3		
Brazil	107	Cuba	3	Lithuania	13	Slovenia	30		
Canada	168	Cyprus	7	Malta	1	South Africa	25		
		Egypt	11	Mexico	41	Thailand	5		
		Estonia	17	Montenegro	1	T.F.Y.R.O.M.	2		

959

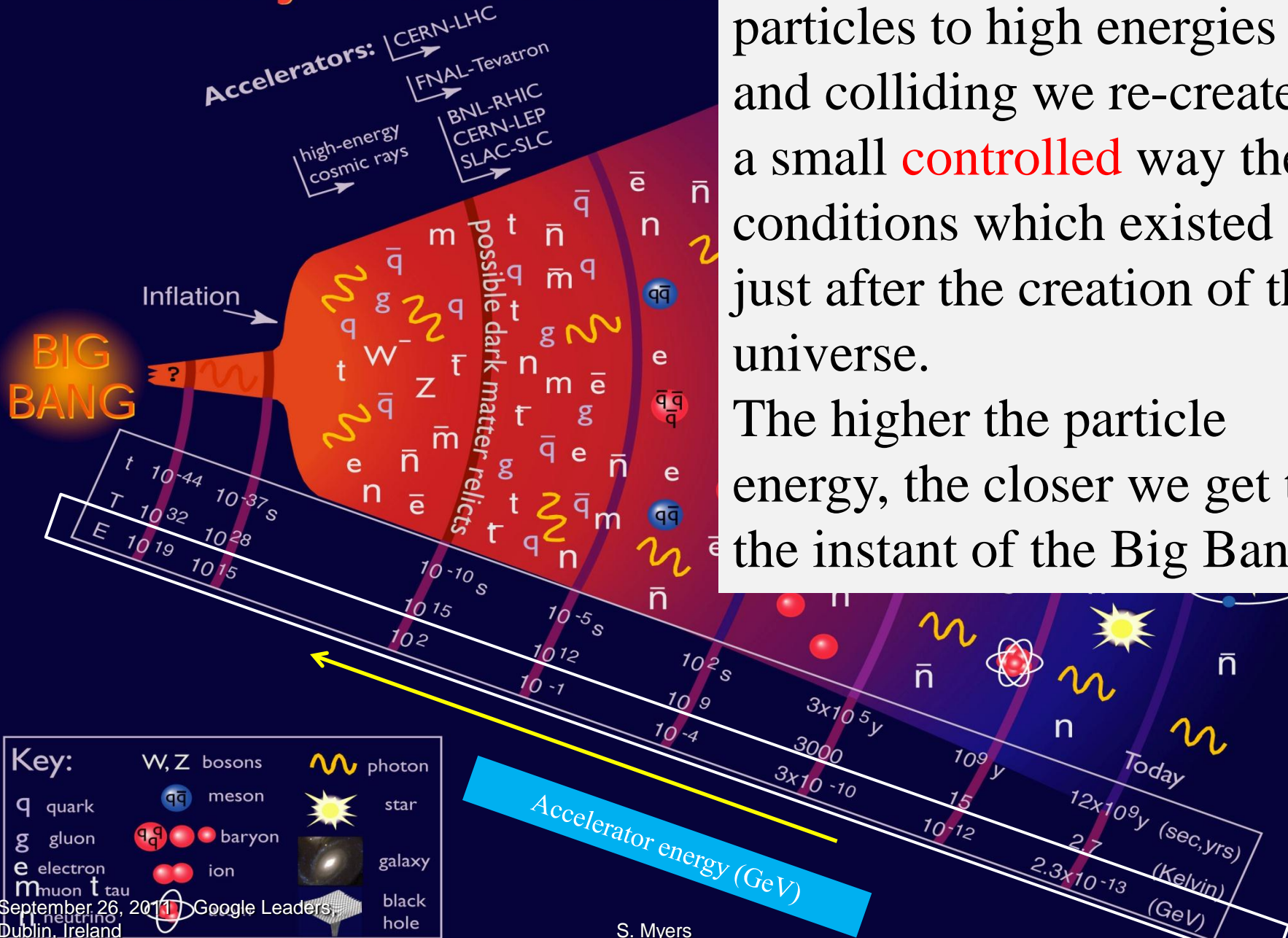


History of the Universe

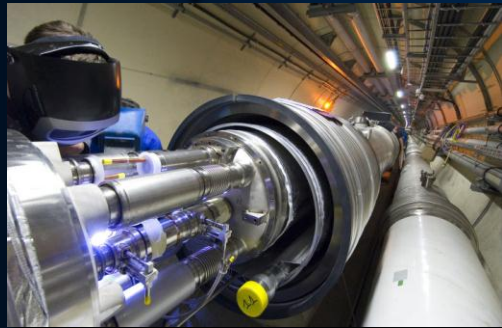
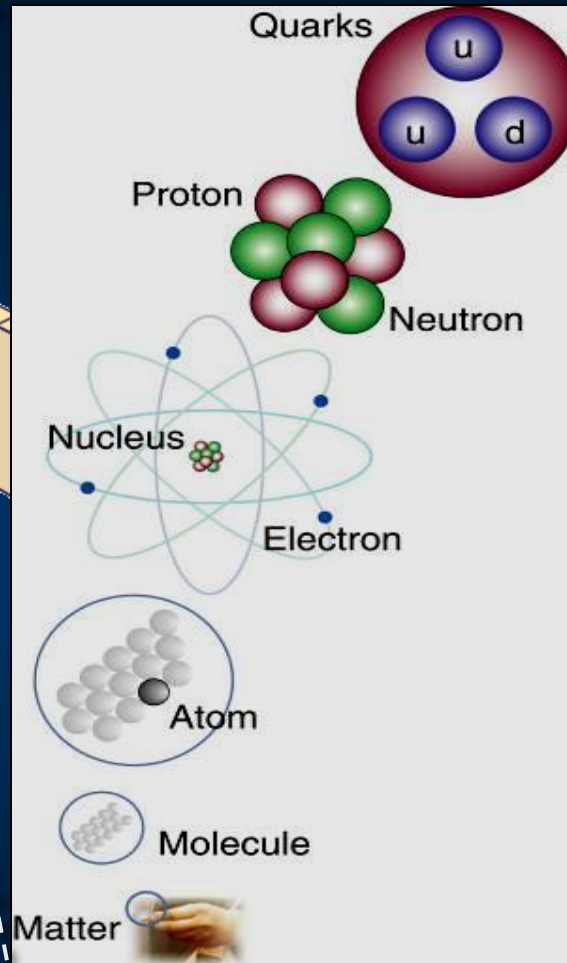
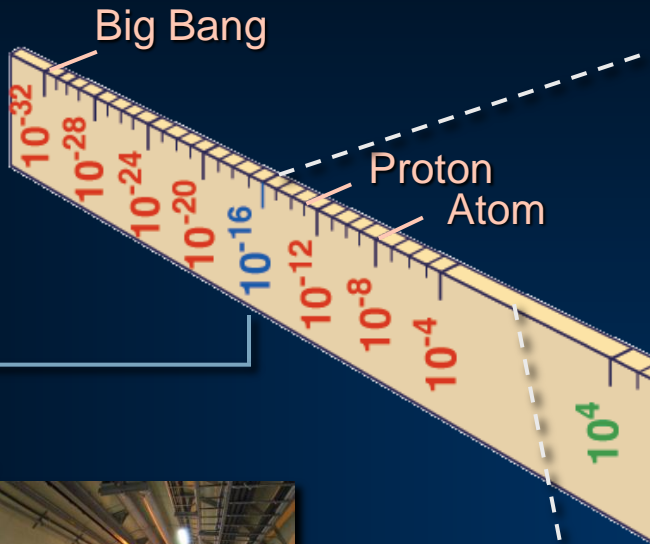
Appendix D

By accelerating these particles to high energies and colliding we re-create in a small **controlled** way the conditions which existed just after the creation of the universe.

The higher the particle energy, the closer we get to the instant of the Big Bang



September 26, 2011 Google Leaders, Dublin, Ireland



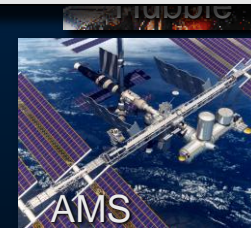
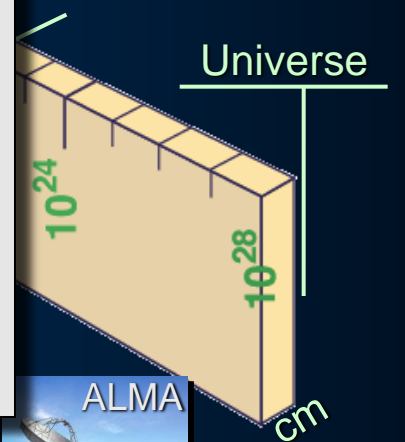
LHC

Super-Microscope



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

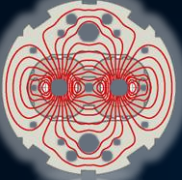
Radius of Galaxies



Enter a New Era in Fundamental Science

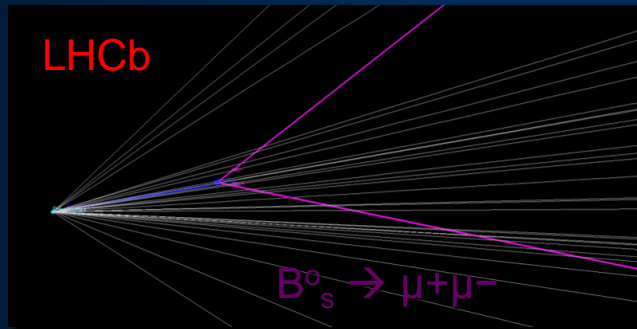
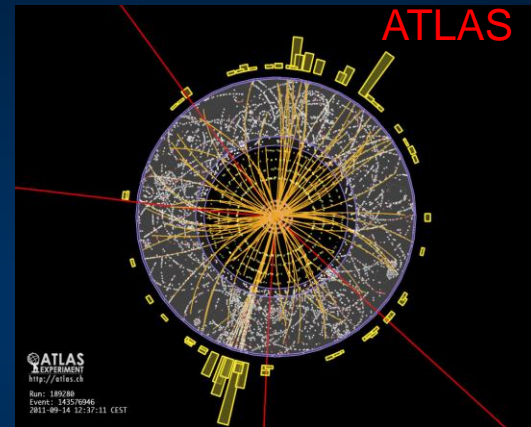
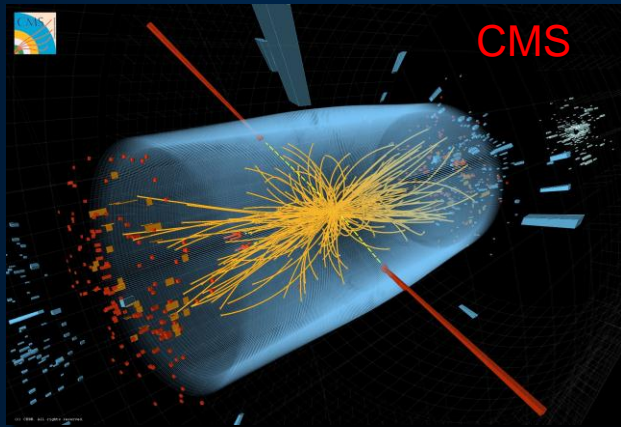
Appendix 1





LHC + Experiments: spectacular start-up on 30 March 2010

→ Brilliant performances of LHC, experiments and GRID computing during 2010, 2011 and 2012 data taking periods



→ 2012 run:

energy increase (7 TeV → 8 TeV), factor 3 more data expected from LHC



The highlight of a remarkable year 2012

ArXiv:1207.3114v2

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). It includes data points (black circles), a total fit (red line), and a Higgs fit component (green shaded area). A magnifying glass highlights the region around 125 GeV. The bottom plot is an ATLAS plot showing the Local p_0 versus m_H [GeV] for the 2011-12 data at $\sqrt{s} = 7-8$ TeV. It displays the observed data (black line) and the expected signal (blue shaded area) with various confidence levels (2 σ to 6 σ) indicated by horizontal dashed lines.

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

The Economist

JULY 7TH - 13TH 2012 Economist.com

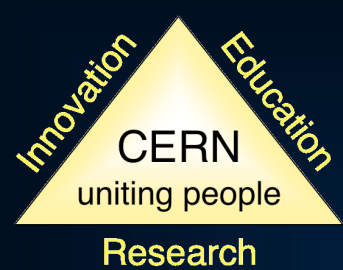
In praise of charter schools
Britain's banking scandal spreads
Volkswagen overtakes the rest
A power struggle at the Vatican
When Lonesome George met Nora

A giant leap for science

The cover features a central image of a man in a dark suit jumping over a vibrant, multi-colored, abstract landscape that resembles a nebula or a complex data visualization. The man is in mid-air, with his arms outstretched, as if celebrating a discovery.

Finding the Higgs boson





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)

CERN Education Activities

Appendix D

Scientists at CERN
Academic Training Programme



Young Researchers

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



Physics Students
Summer Students
Programme

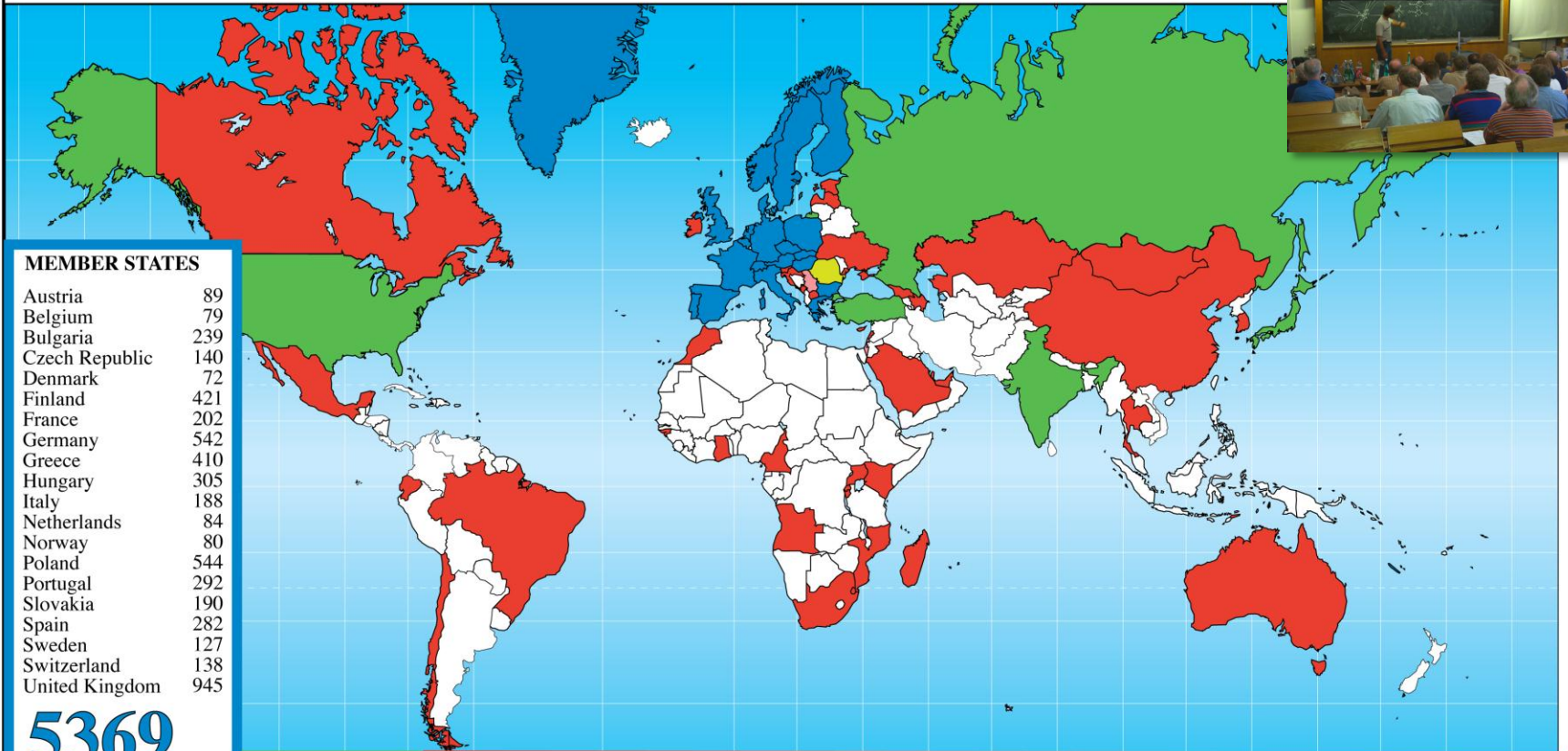


CERN Teacher Schools
International and National
Programmes

CERN Teacher Programme

Appendix D

Teacher Programme Participants 1998 - 2012



MEMBER STATES

Austria	89
Belgium	79
Bulgaria	239
Czech Republic	140
Denmark	72
Finland	421
France	202
Germany	542
Greece	410
Hungary	305
Italy	188
Netherlands	84
Norway	80
Poland	544
Portugal	292
Slovakia	190
Spain	282
Sweden	127
Switzerland	138
United Kingdom	945

5369

CANDIDATE FOR ACCESSION

Romania	11
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ASSOCIATE MEMBER IN THE PRE-STAGE TO MEMBERSHIP

Israel	4
Serbia	12

OBSERVER STATES

India	2
Japan	4
Russia	163
Turkey	3
USA	61

233

OTHERS

Angola	4
Australia	3
Azerbaijan	1
Brazil	83
Burundi	1
Cameroon	3
Canada	2
Cape Verde	3

Chile	3
China	1
Croatia	1
Cyprus	8
Ecuador	2
Estonia	35
Georgia	55
Ghana	6
Guinea Bissau	1
Ireland	3

Kazakhstan	3
Kenya	2
Latvia	1
Lebanon	1
Madagascar	2
Malta	36
Mexico	5
Mongolia	1
Montenegro	13
Morocco	2

Mozambique	17
Qatar	1
Rwanda	15
Sao Tome	3
Saudi Arabia	1
Singapore	2
Slovenia	21
South Africa	6
South Korea	44
Swaziland	1

Thailand	6
T.F.Y.R.O.M.	11
Timor-Leste	4
Uganda	1
Ukraine	57
U.A.E.	1

472

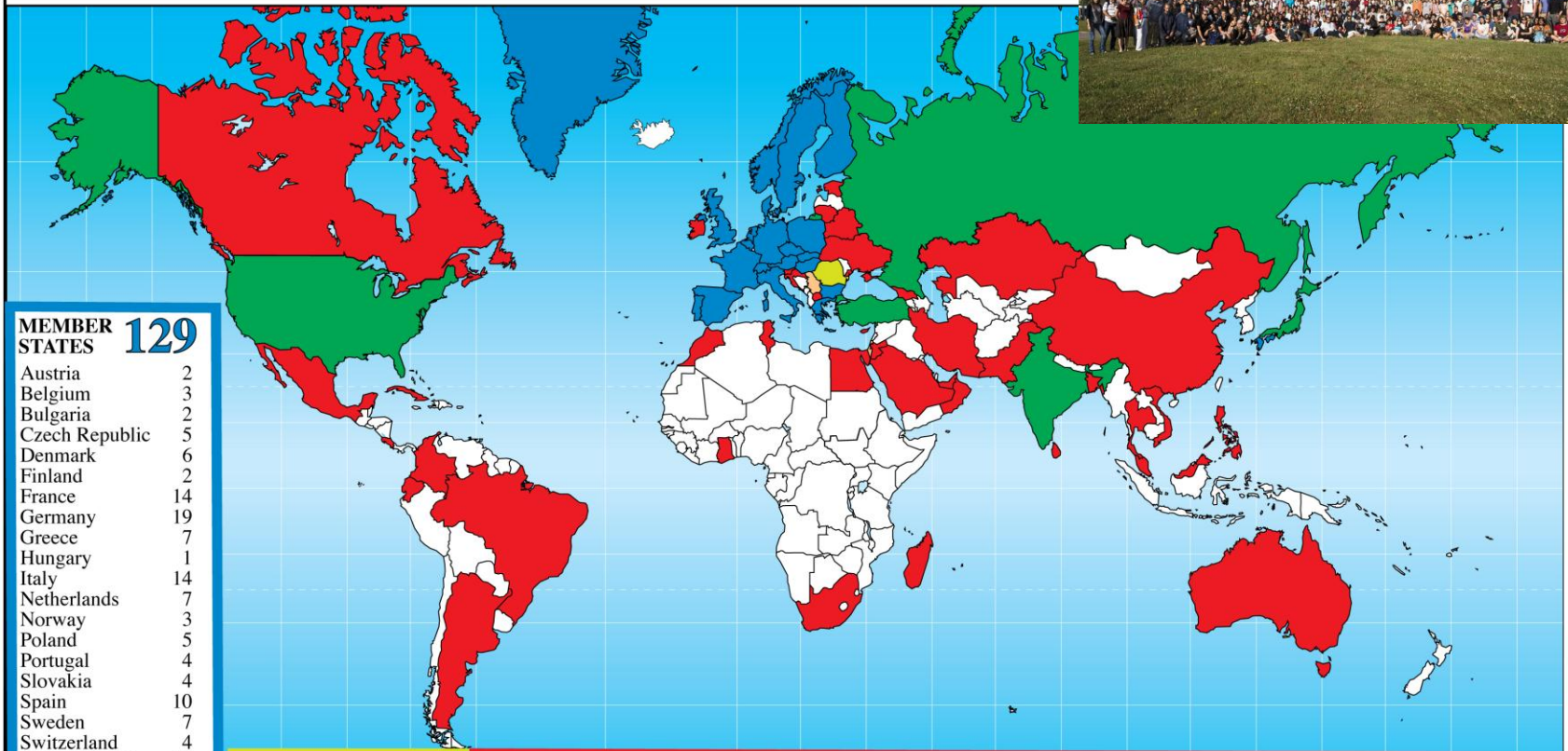


Summer Students 2012

Appendix D



Summer Students 2012



MEMBER STATES 129

Austria	2
Belgium	3
Bulgaria	2
Czech Republic	5
Denmark	6
Finland	2
France	14
Germany	19
Greece	7
Hungary	1
Italy	14
Netherlands	7
Norway	3
Poland	5
Portugal	4
Slovakia	4
Spain	10
Sweden	7
Switzerland	4
United Kingdom	10

OBSERVERS 41

India	5
Japan	5
Russia	11
Turkey	6
USA	14

CANDIDATE FOR ACCESSION

Romania	6
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ASSOCIATE MEMBER IN THE PRE-STAGE TO MEMBERSHIP

Israel	2
Serbia	2

OTHERS

Argentina	1	Croatia	6	Iran	4	Morocco	2	Sri Lanka	1
Australia	2	Cuba	2	Ireland	1	Oman	1	Thailand	2
Bangladesh	1	Cyprus	3	Jordan	1	Pakistan	5	T.F.Y.R.O.M.	3
Belarus	1	Ecuador	2	Kazakhstan	1	Palestine	1	Tunisia	1
Brazil	1	Egypt	3	Lithuania	1	Philippines	1	Ukraine	1
Canada	5	Estonia	5	Madagascar	1	Saudi Arabia	1	U.A.E.	2
China	8	Georgia	1	Malaysia	3	Singapore	2	Vietnam	1
Colombia	1	Ghana	1	Malta	3	Slovenia	1		
Costa Rica	1	Hong Kong	2	Mexico	1	South Africa	2		

89





The United Kingdom and CERN

Appendix D



- ❑ **Founding member of CERN (1954)**
- ❑ **Top level management:**
 - Director for Accelerators and Technology: Steve Myers(NI)
 - Beams Department Head (Paul Collier)
 - WLCG (Ian Bird)
- ❑ **Leading theoretical role** in setting experimental agenda (Peter Higgs)
- ❑ **Leading role in IT@CERN**
 - WWW (Tim Berners-Lee)
 - Grid (e-science)
- ❑ Participates in **all four LHC** experiments with major management responsibilities
- ❑ **Leading role in public outreach**





The United Kingdom and CERN



Strong involvement in the LHC experimental programme
ATLAS, CMS, LHCb and ALICE

ALICE:
3 Institutes



CMS:
5 Institutes



ATLAS:
15 institutes

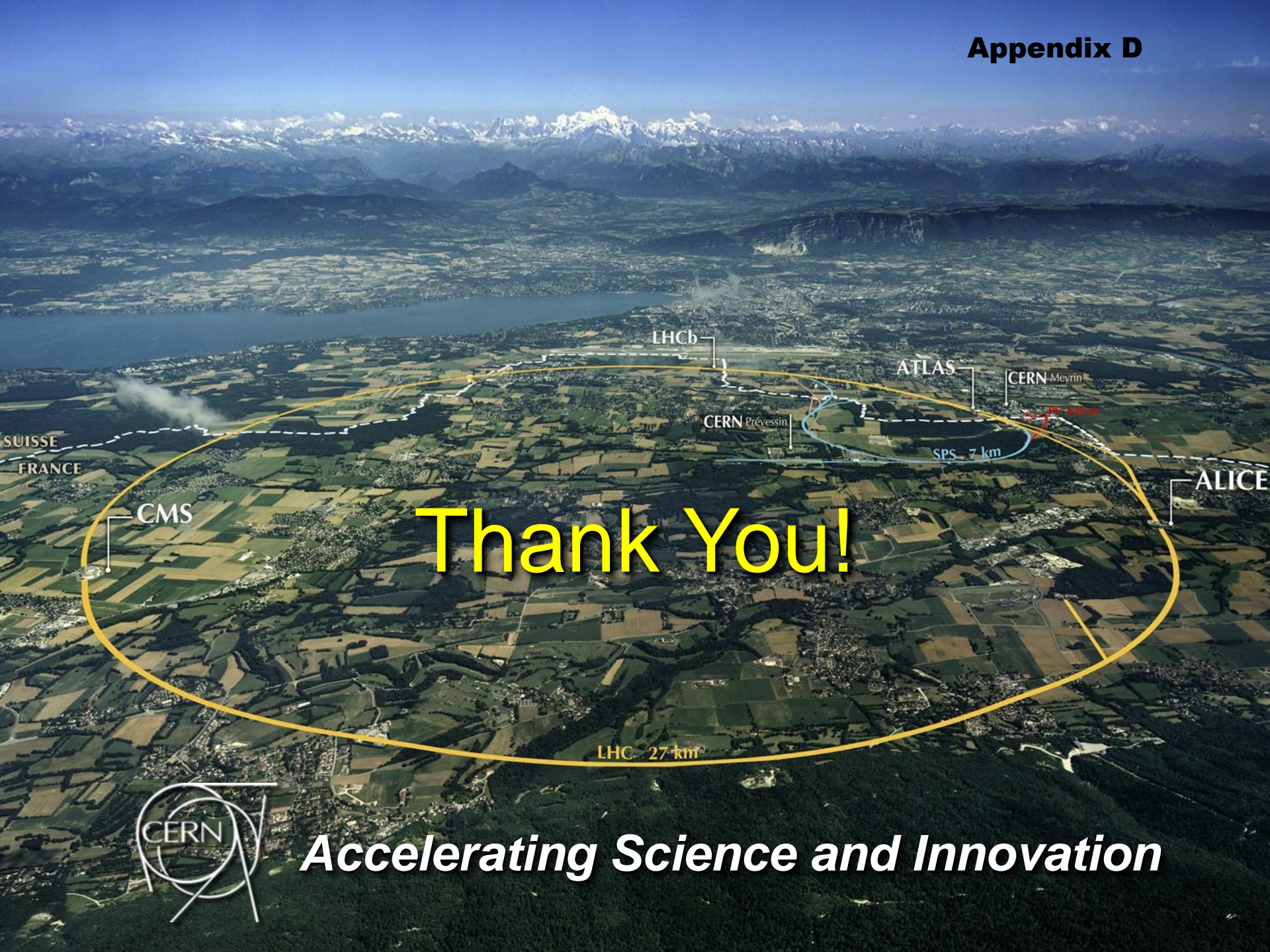


LHCb:
11 Institutes



Accelerator R&D
Innovative technologies developed





Thank You!



Accelerating Science and Innovation

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.

