



Designing Effective Outreach Programmes for Teachers at CERN

Inspiring the next generation of scientists and engineers

Mick Storr

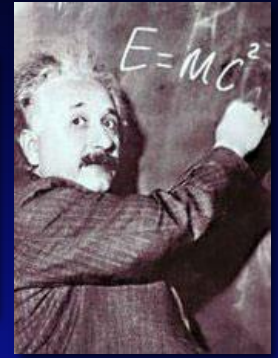
Head CERN Teacher Programmes
and
Visits Service



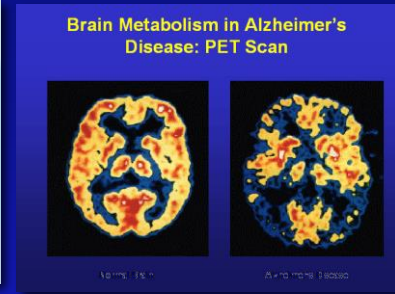
The Mission of CERN

- ❑ **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, IT - the Web and the Cloud, 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

~ 1050 other paid personnel

> 11000 users

Budget (2012) ~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 the Pre-Stage to Membership: Israel, Serbia

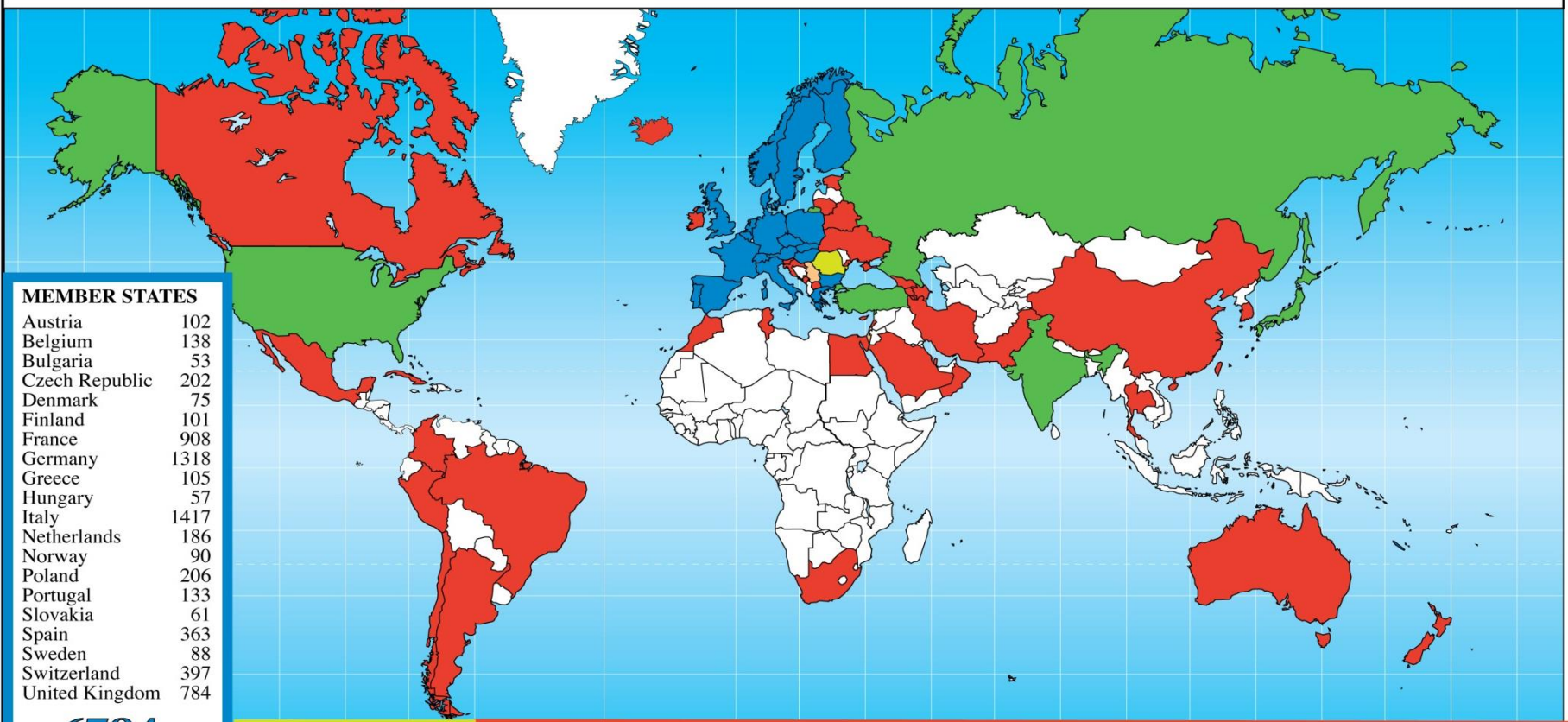
Applicant States: Cyprus, Slovenia, Turkey

Observers to Council: India, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and UNESCO



Science is becoming more and more global

Distribution of All CERN Users by Nation of Institute on 4 April 2012



MEMBER STATES

Austria	102
Belgium	138
Bulgaria	53
Czech Republic	202
Denmark	75
Finland	101
France	908
Germany	1318
Greece	105
Hungary	57
Italy	1417
Netherlands	186
Norway	90
Poland	206
Portugal	133
Slovakia	61
Spain	363
Sweden	88
Switzerland	397
United Kingdom	784

6784

OBSERVERS

India	134
Japan	225
Russia	859
Turkey	83
USA	1749

3050

CANDIDATE FOR ACCESSION

Romania	78
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ASSOCIATE MEMBER IN THE PRE-STAGE TO MEMBERSHIP

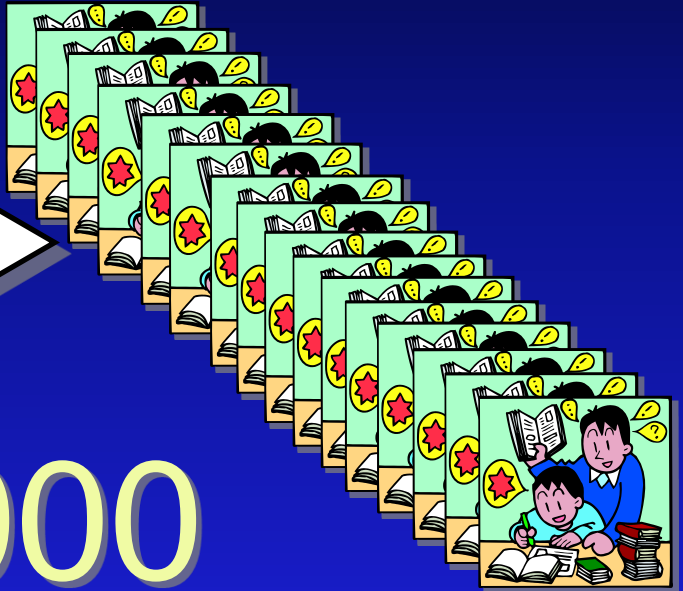
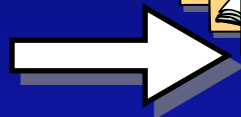
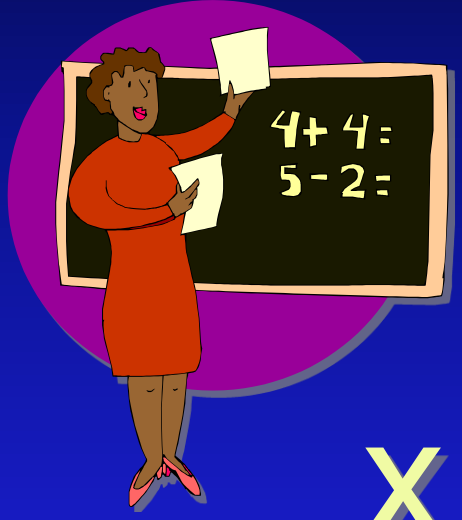
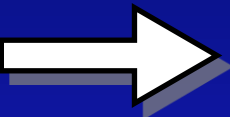
Israel	67
Serbia	26

OTHERS

China	115	Iran	16	Oman	1	Ukraine	21
China (Taipei)	70	Ireland	10	Pakistan	22	Uzbekistan	1
Colombia	10	Korea	91	Peru	2		
Croatia	21	Lebanon	1	Qatar	1		
Australia	28	Cuba	4	Saudi Arabia	3		
Azerbaijan	1	Cyprus	9	Slovenia	38		
Belarus	22	Egypt	7	South Africa	21		
Brazil	102	Malta	1	Thailand	5		
Canada	170	Mexico	43	T.F.Y.R.O.M.	2		
Chile	4	Montenegro	1	Tunisia	1		
		Georgia	10				
		Iceland	3				
		New Zealand	11				

934

Teachers are multiplicative factors



x 1000

School Teacher

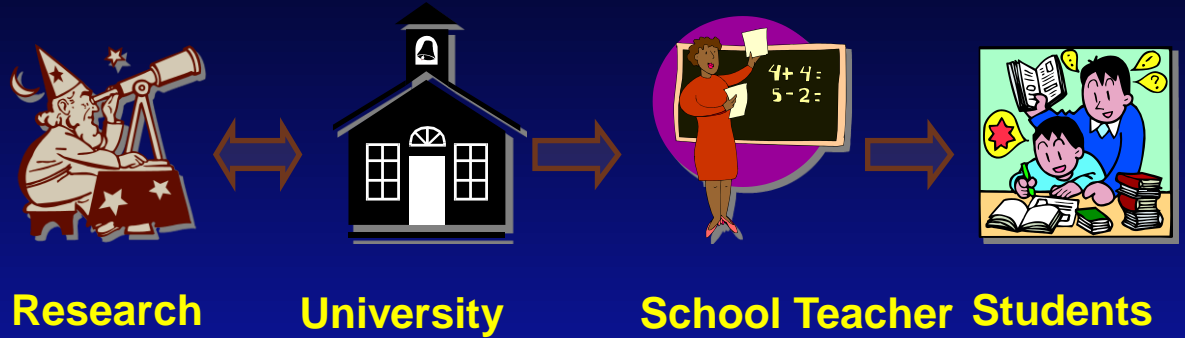
School Students



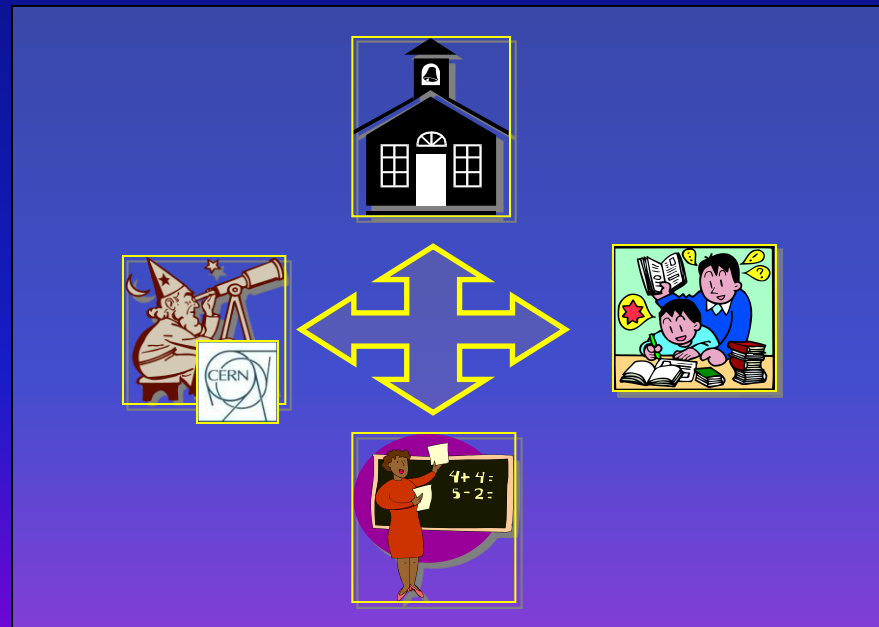
Objective of Teacher Programmes

To bring modern research closer to schools

OLD



NEW





Objectives of CERN Teacher Programmes

- Pass the message
 - Teachers are our partners and colleagues
- Recognise
 - Teachers hold the future in their hands
- Empower teachers
 - To update, expand and pass on their knowledge
- Facilitate
 - Learning
 - Networking
- Inspire and encourage
- Open and honest
- NOT TO tell teachers how to teach
- Learn from teachers

THANK



What are we trying to achieve with the help of physics teachers ?

1: RAISE AND MAINTAIN THE INTEREST OF STUDENTS IN MODERN SCIENCE

Motivate them to continue scientific education at school
Help them to better understand the physical world

Improve scientific literacy

2: INSTIL A FEELING OF MYSTERY AND DISCOVERY POTENTIAL

Motivate students to take up science/engineering at universities

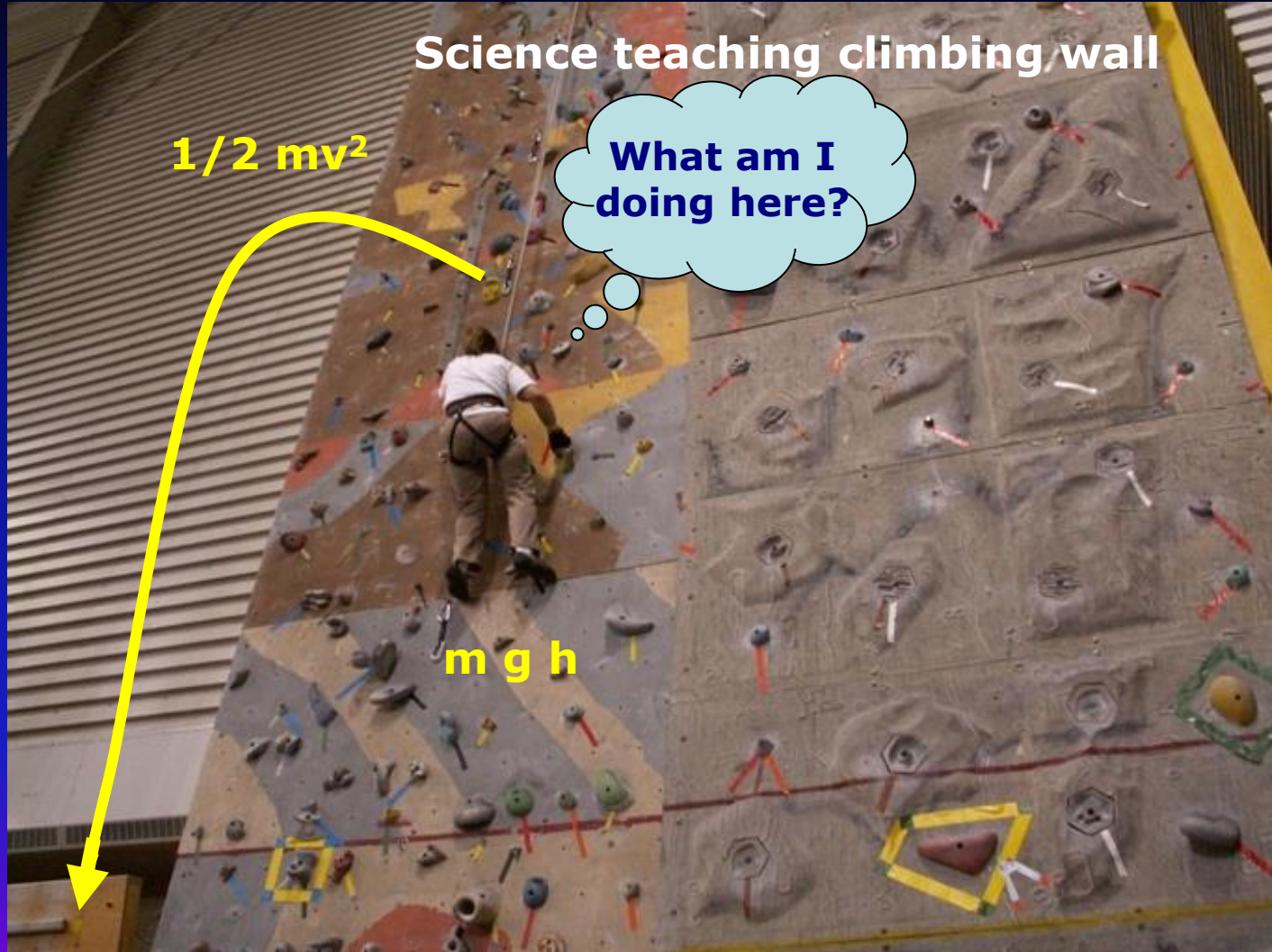
Prepare the future generation of scientists/engineers

SCIENCE IS ALIVE !

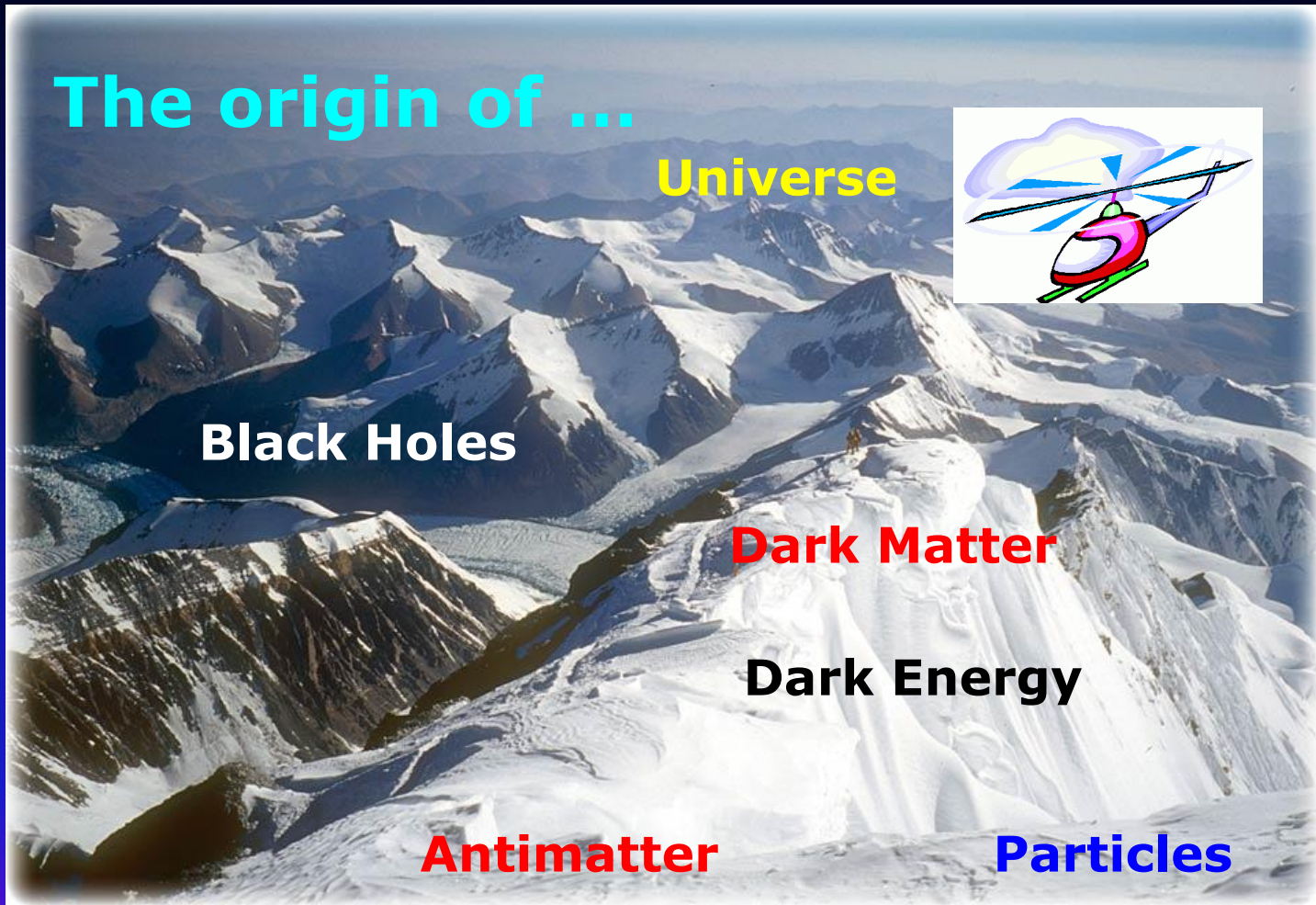
How researchers view science



How school students can view science



Take students on a sight-seeing tour ...



Link modern physics to school curriculum



Residential Teacher Programmes

Basic content

- Lectures
 - Introductions to CERN, Particle Physics, Cosmology, the LHC Experiments, Particle Accelerators, Medical Applications of Particle Physics, and the GRID
- Visits to experimental facilities
- Hands-on activities
- Working group activities
- Opportunities to meet working research physicists in a variety of informal settings
- Team building and social programme

All lectures are web archived and made publicly available => a rich multi-lingual treasure trove

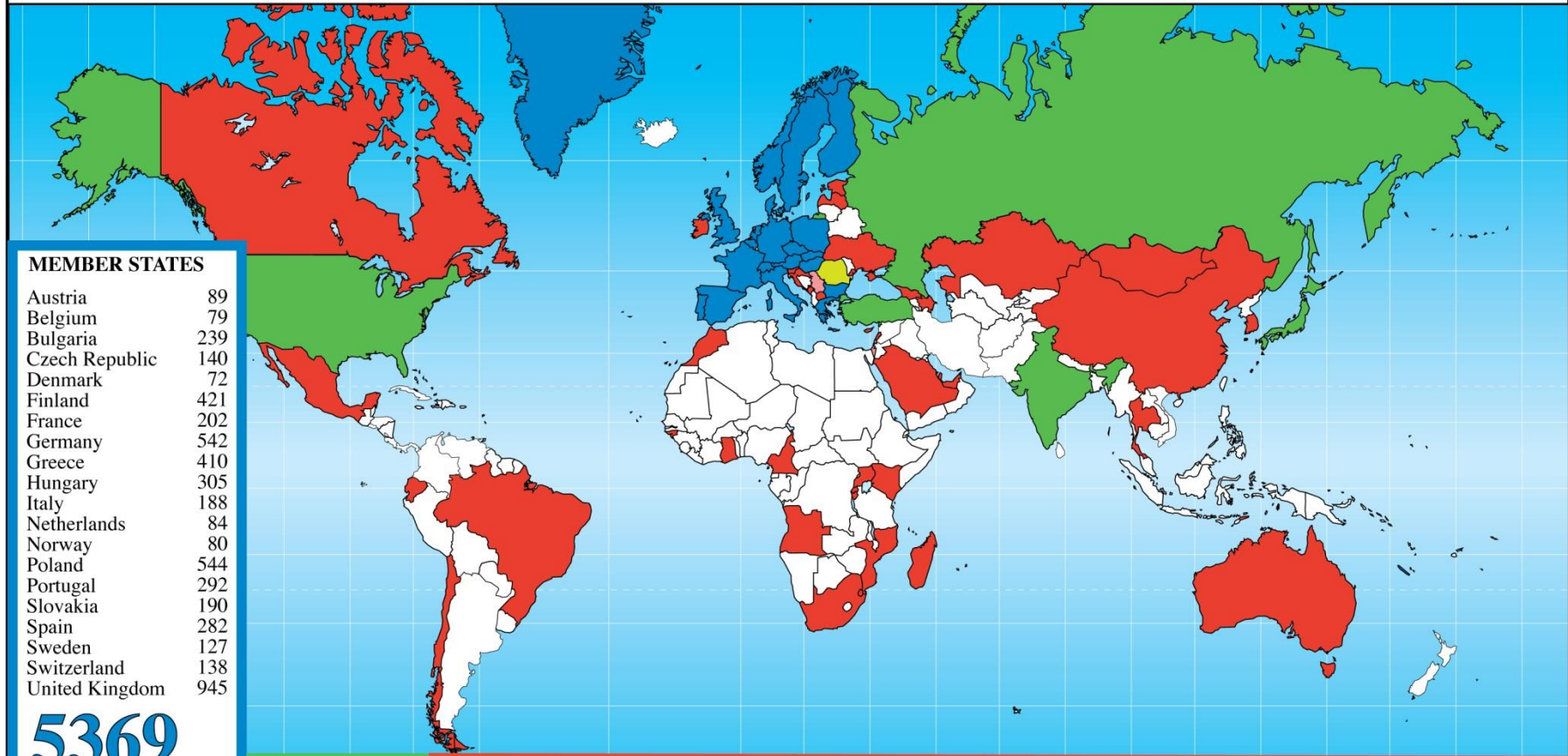


Outcome

- Newly inspired, motivated and confident teachers
- Inspire and motivate students
- Communicate with their colleagues
- Communicate with the general public
- Act as ambassadors for science/engineering, physics, particle physics, CERN
- Organise follow up activities
 - Visits, exhibitions, video conferences, projects
- Promote teacher programmes
- Help us to expand beyond the borders of CERN

**Excellent examples among
the many teachers who
have attended our
programmes**

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	Chile	3	Kazakhstan	3	Mozambique	17	Thailand	6
Australia	3	China	1	Kenya	2	Qatar	1	T.F.Y.R.O.M.	11
Azerbaijan	1	Croatia	1	Latvia	1	Rwanda	15	Timor-Leste	4
Brazil	83	Cyprus	8	Lebanon	1	Sao Tome	3	Uganda	1
Burundi	1	Ecuador	2	Madagascar	2	Saudi Arabia	1	Ukraine	57
Cameroon	3	Estonia	35	Malta	36	Singapore	2	U.A.E.	1
Canada	2	Georgia	55	Mexico	5	Slovenia	21		
Cape Verde	3	Ghana	6	Mongolia	1	South Africa	6		
		Guinea Bissau	1	Montenegro	13	South Korea	44		
		Ireland	3	Morocco	2	Swaziland	1		

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Arthur C. Clarke

Author of 2001 : A Space Odyssey

- “When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong.” •
- “The only way of discovering the limits of the possible is to venture a little way past them into the impossible.”
- “Any sufficiently advanced technology is indistinguishable from magic.”

Our goal, with the help of teachers, is to bring a little of the magic of CERN into the classroom