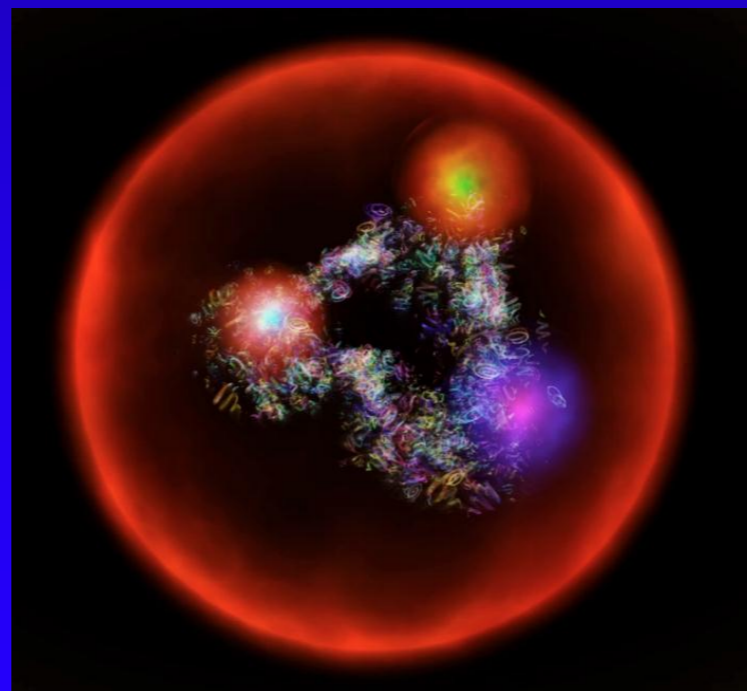


CERN Education Programmes

Rolf Landua

Head of Education and Public Outreach

CERN



CERN Education

1. CERN teacher programmes

Raise interest of young people in

modern science - physics - particle physics/astrophysics/fusion/...

How?

Introduce modern science topics they find interesting

Once their interest is raised, they will **ask questions** ...

... and are (more) willing to learn 'basic' concepts

Why teachers?

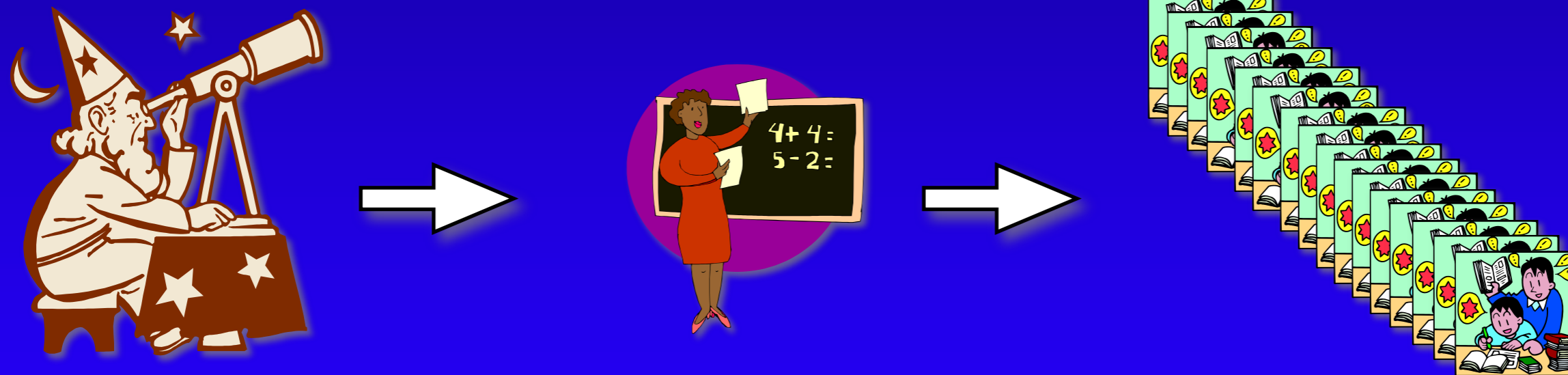
Teachers are

role models

multipliers

crucial link for bringing modern science into school classes

x 1000



CERN 'themes' are attractive for young people:

ANTIMATTER

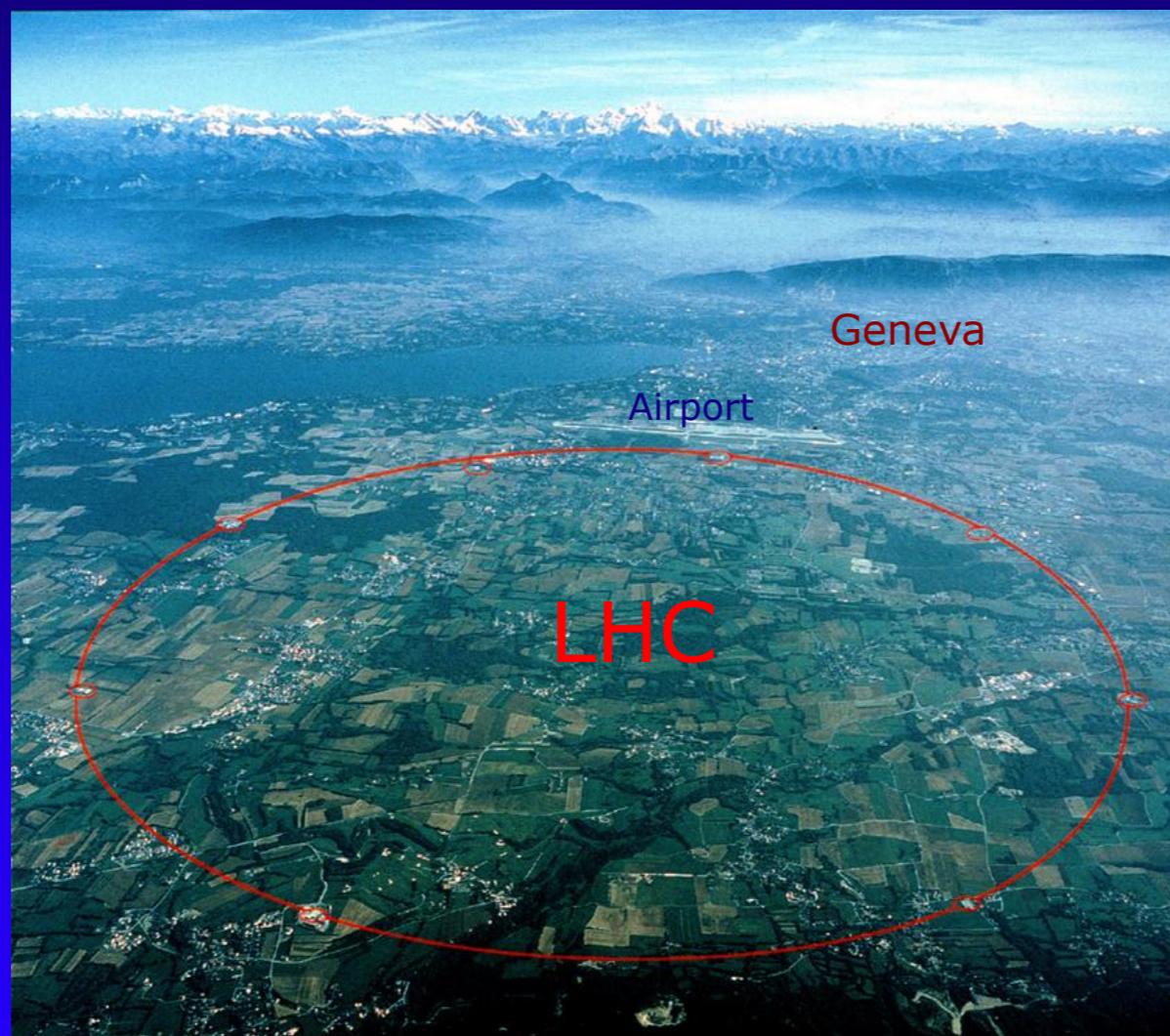
BLACK HOLES

DARK MATTER

THEORY OF
EVERYTHING

WWW

PET SCAN



THE 'GOD' PARTICLE

DARK ENERGY

BIG BANG

EXTRA DIMENSIONS

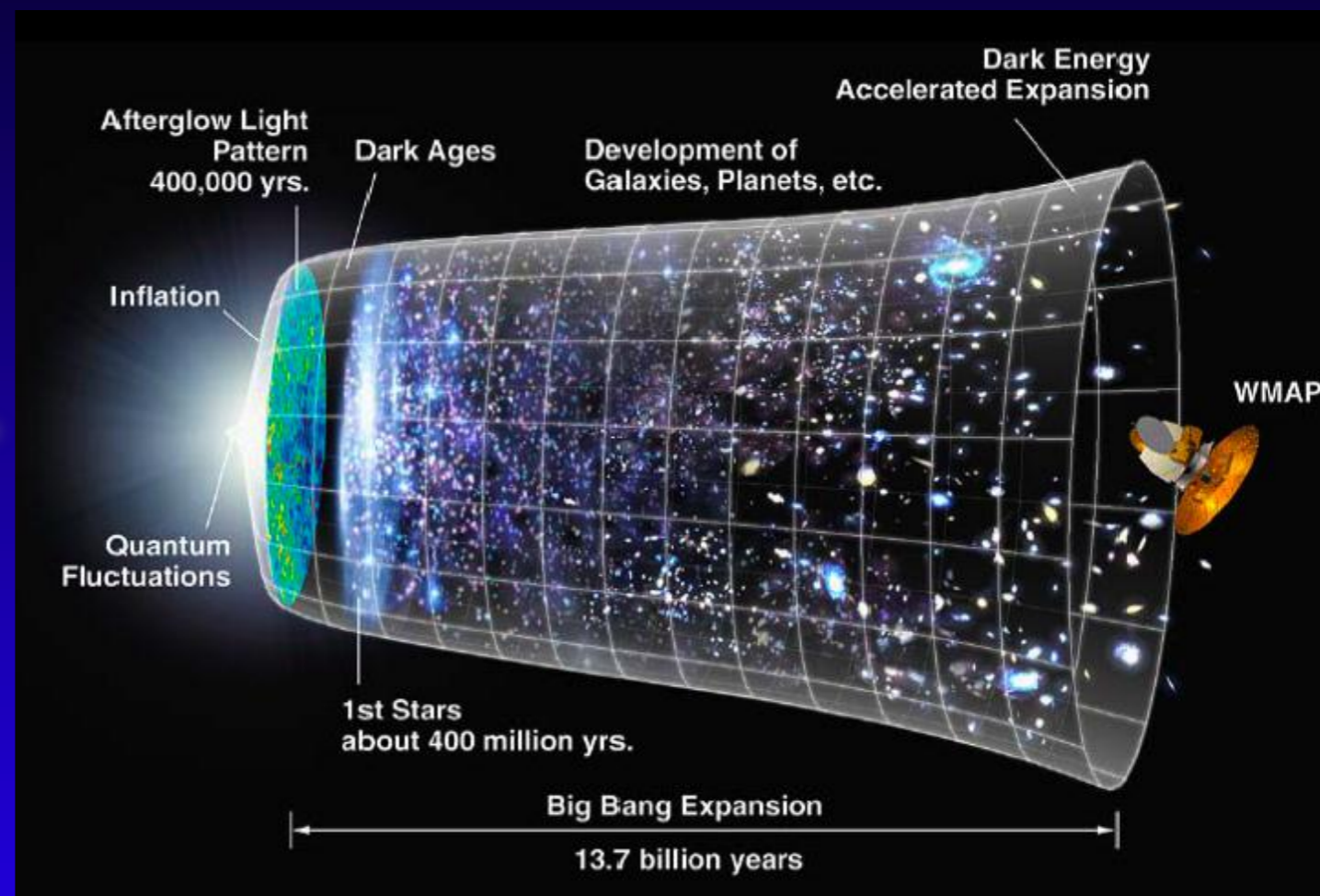
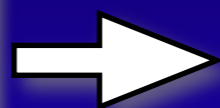
GRID

HADROTHERAPY

CERN means 'science in action'

Theories

- origin of mass
- Dark matter
- extra-dimensions



...are **tested experimentally** by reproducing conditions $\sim 10^{-12}$ sec after the Big Bang

Physics is alive ... !!

Two types of CERN teacher programmes

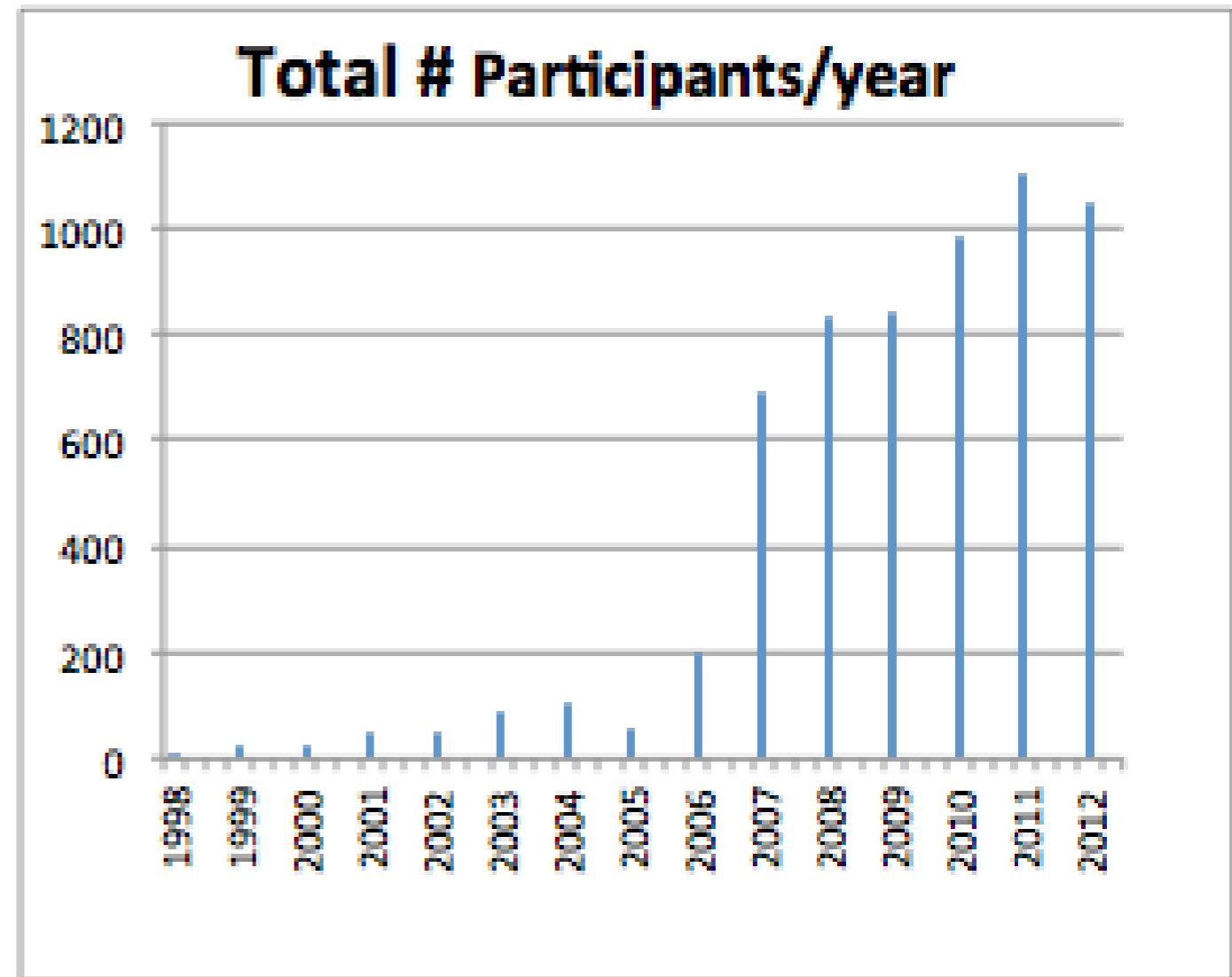
International “High School Teacher” school (3 weeks)

Fully funded by CERN for MS (programme, travel, accommodation)
Participants from US, Asia, South America , Africa funded externally
In English - 40-45 participants

National schools (1 week) - 25-30 courses per year

In their mother tongue (lectures by scientists from this country)
External funding of travel, accommodation
Teaching resources in national language
Build networks between teachers and with scientists inside country

1000+ teachers in CERN courses per year

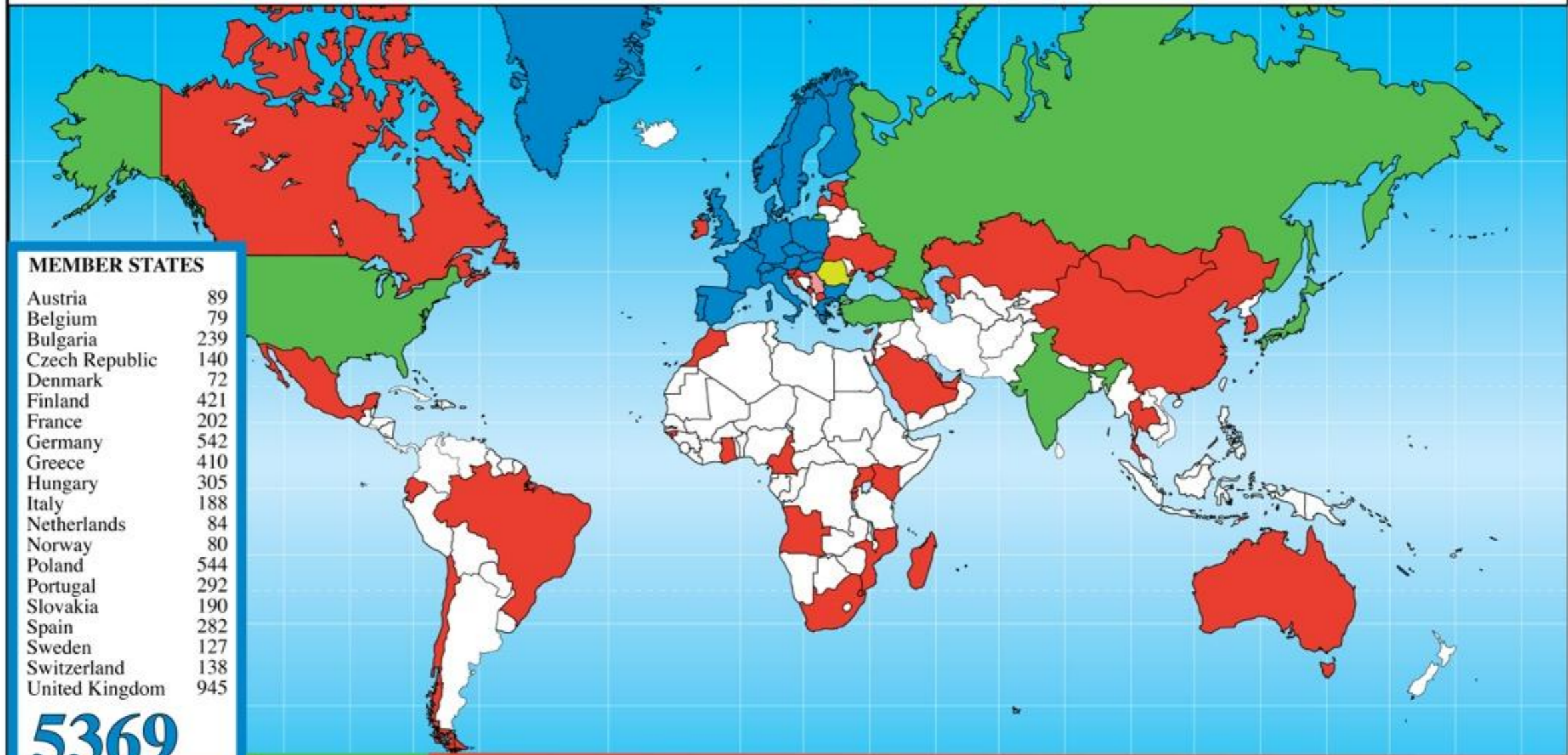


25-30 one-week courses for teachers (secondary level) in mother tongue

HST: 3-week course in English; 25-30 nationalities

6101 teachers from 72 countries

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

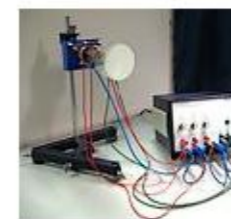
Thailand	6
T.F.Y.R.O.M.	11
Timor-Leste	4
Uganda	1
Ukraine	57
U.A.E.	1

472

Content of teacher programmes

- Lectures
 - Introductions to CERN
 - Particle Physics
 - Cosmology
 - LHC Experiments
 - Particle Accelerators
 - Medical Applications of Particle Physics
 - GRID
- Visits to experimental facilities
- Meet physicists in a variety of informal settings

● TEACHER'S LAB



Cathode ray tube

- documentation: [pdf](#) | [doc](#)
- quick reference guide: [pdf](#) | [doc](#)



Electron diffraction tube

- documentation: [pdf](#) | [doc](#)
- quick reference guide: [pdf](#) | [doc](#)



Fine beam tube

- documentation: [pdf](#) | [doc](#)
- quick reference guide: [pdf](#) | [doc](#)



Photoelectric effect

- documentation: [pdf](#) | [doc](#)
- quick reference guide: [pdf](#) | [doc](#)



Electron spin resonance

- documentation: [pdf](#) | [doc](#)
- quick reference guide: [pdf](#) | [doc](#)

2 Educational resources for schools

Lesson Plans on ANTIMATTER, COSMIC RAYS

Living
In the
ANTI-Material
World

e^-	ν_e	u	d
Knowing Anti-Me, Knowing Anti-You			
e^+	$\bar{\nu}_e$	\bar{u}	\bar{d}

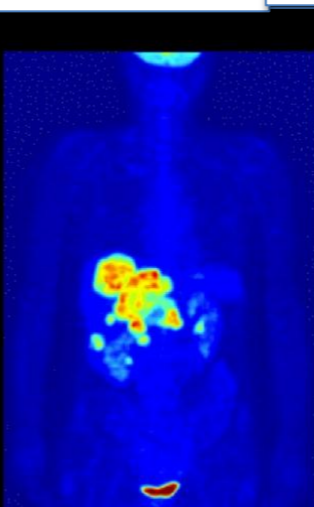
**Operation:
Annihilate!**

APPLE → KABOOM!!! ← ANTI-APPLE

? *The*
Mother
Of All
Conundrums
?

Dammit Jim,
I'm a DOCTOR,
not a PARTICLE
PHYSICIST!!

MEDICINE
THE NEXT GENERATION



**ENERGY'S
SPAWN**

**IT
CAME FROM
OUTER SPACE**

Boys With Toys

Guided CERN tours



A huge demand

1/2 d visits, by volunteer guides

- Introduction talk (30')
- 2 visit points (CCC, SM18, PS,...)
- Transport by CERN or own bus

Many school classes (~ 30-40 %)

Waiting list: 4-12 months

Estimated demand: 200,000 +

LS 1 - 2013/14

Even more demand

Transport, guides: limitations reached
LHC underground visits vs safety!

Extended School Visits

Part of present Microcosm exhibition space will be transformed

Installation of ~ 10 experiment stations

Possibility for up to 30 school students to carry out experiments

2-3 technical supervisors + teacher

Electron diffraction

Photoelectric effect

Cloud chambers

Rutherford experiment

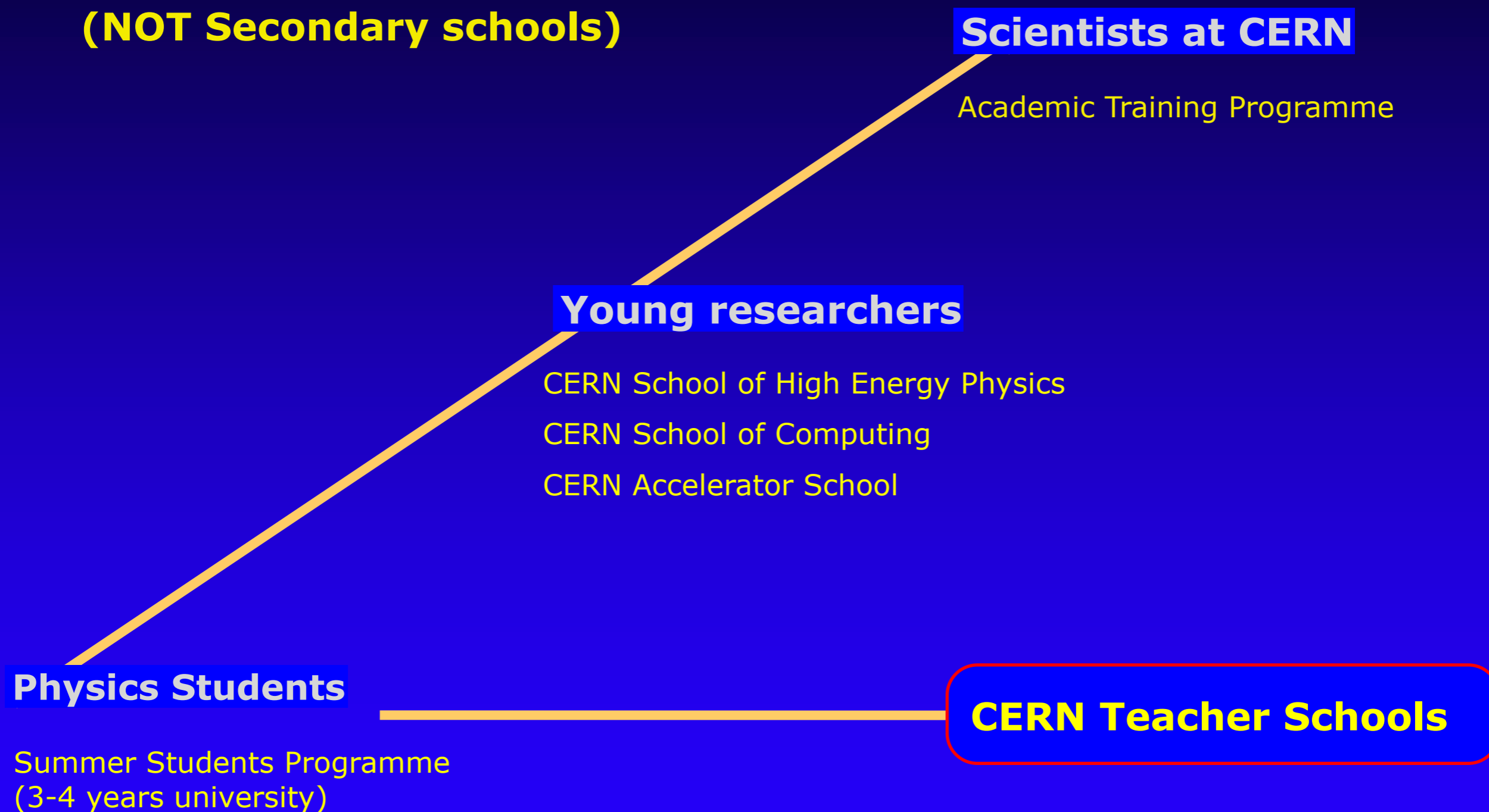
Radioactivity - Geiger counters

High Tc magnets

Pixel detectors

Cosmic ray detectors

Other CERN Education Activities (NOT Secondary schools)



Video-Conferences between CERN and schools/teachers

with Europe, US, Asia, and Africa

high speed Internet (plus Polycom/Tandberg), also EVO/Skype/Google+

Thank you for your attention.