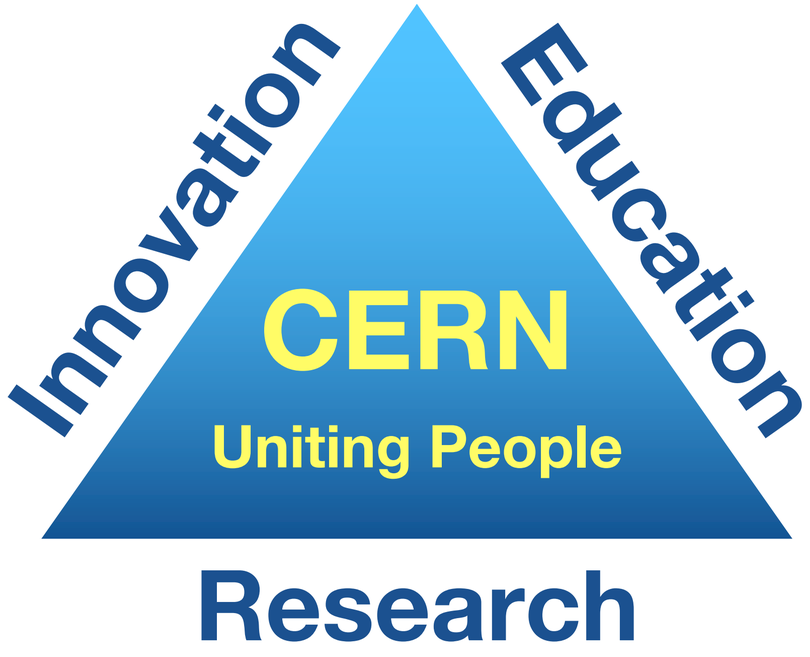

CERN

# CERN

## Science for Peace

Prof. Dr. Christoph Schäfer
CERN International Relations Office
9 April 2019

# The Mission of CERN




- **Explore and push back the frontiers of physics**
  - e.g. the secrets of the Big Bang … what was the matter like within the fist moments of the Universe existence?
- **Develop new technologies for accelerators and detectors**
  - Information technology - the Web and the GRID, Medical applications - diagnosis and therapy.
- **Train scientists and engineers of tomorrow**
- **Unite people from different countries and cultures**

# CERN: founded in 1954 by 12 European States



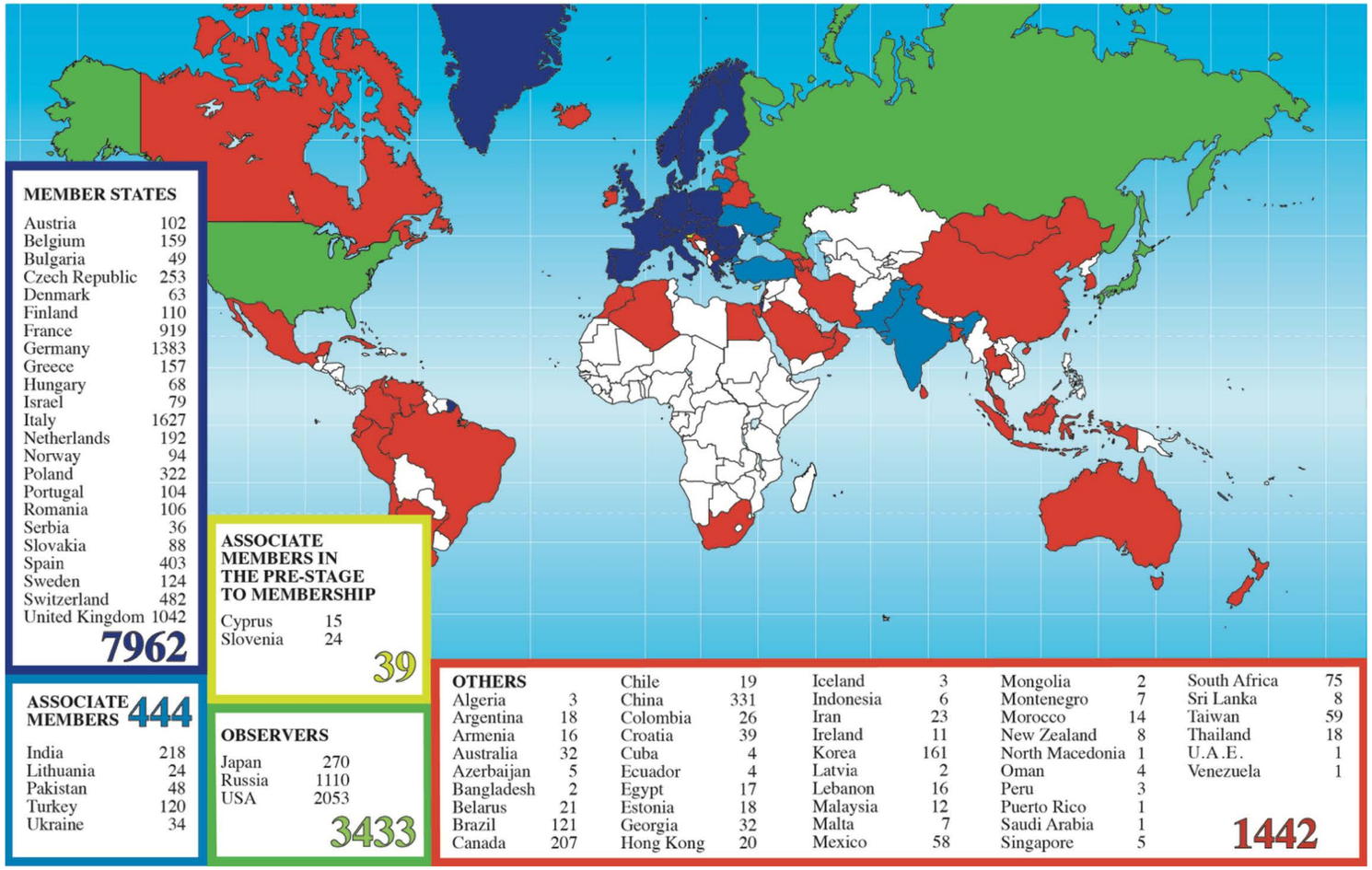

Today: 23 Member States

~ 2500 Staff
~ 1800 other paid personnel
~ 13’000 scientific users
~ 1000 Million Euro Budget



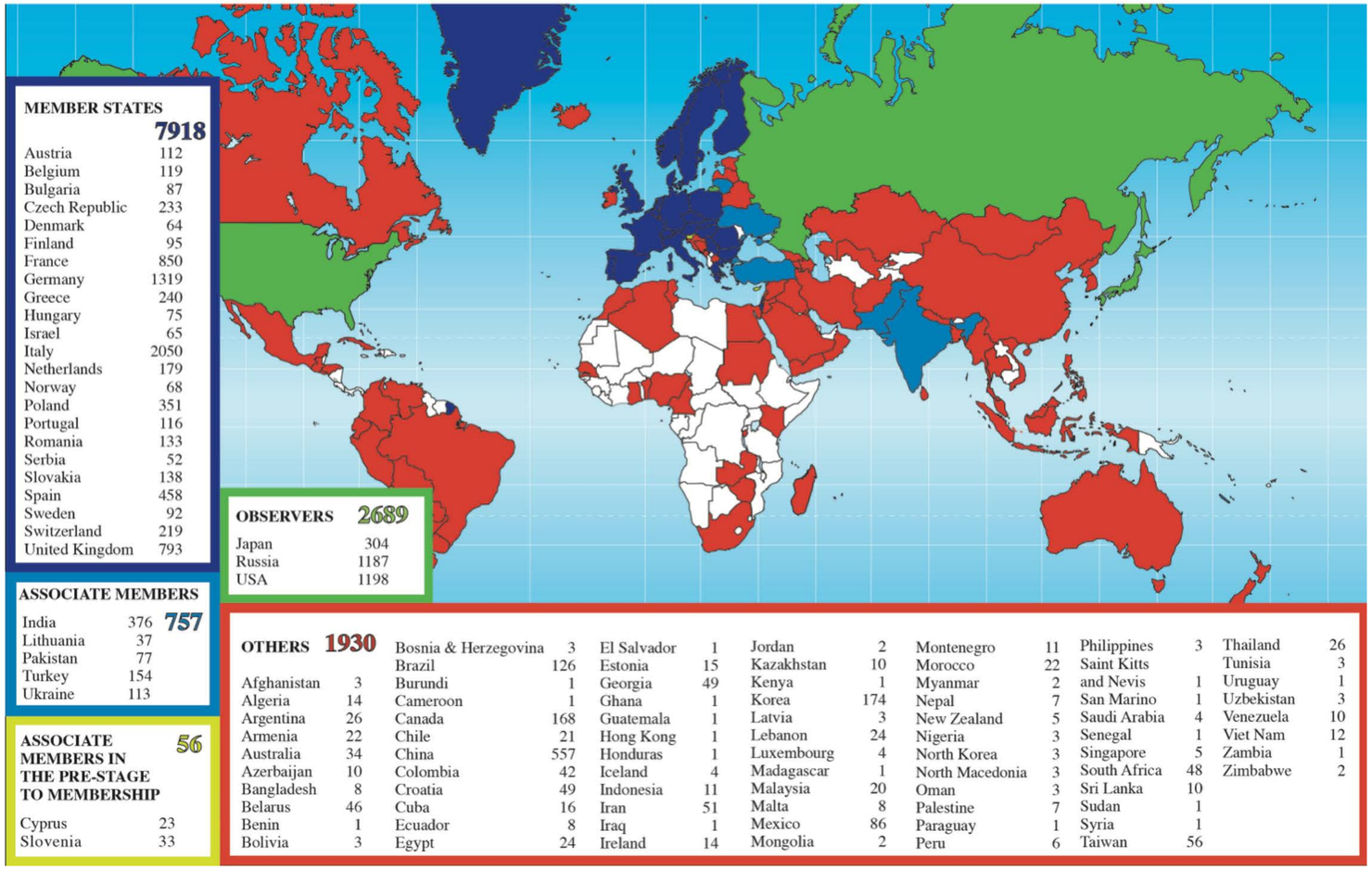
# Science is getting more and more global

**Distribution of All CERN Users by Location of Institute on 28 January 2019**



# Science is getting more and more global

## Distribution of All CERN Users by Nationality on 28 January 2019



**MEMBER STATES** 7918

| | |
|---|---|
| Austria | 112 |
| Belgium | 119 |
| Bulgaria | 87 |
| Czech Republic | 233 |
| Denmark | 64 |
| Finland | 95 |
| France | 850 |
| Germany | 1319 |
| Greece | 240 |
| Hungary | 75 |
| Israel | 65 |
| Italy | 2050 |
| Netherlands | 179 |
| Norway | 68 |
| Poland | 351 |
| Portugal | 116 |
| Romania | 133 |
| Serbia | 52 |
| Slovakia | 138 |
| Spain | 458 |
| Sweden | 92 |
| Switzerland | 219 |
| United Kingdom | 793 |

**OBSERVERS** 2689

| | |
|---|---|
| Japan | 304 |
| Russia | 1187 |
| USA | 1198 |

**ASSOCIATE MEMBERS** 757

| | |
|---|---|
| India | 376 |
| Lithuania | 37 |
| Pakistan | 77 |
| Turkey | 154 |
| Ukraine | 113 |

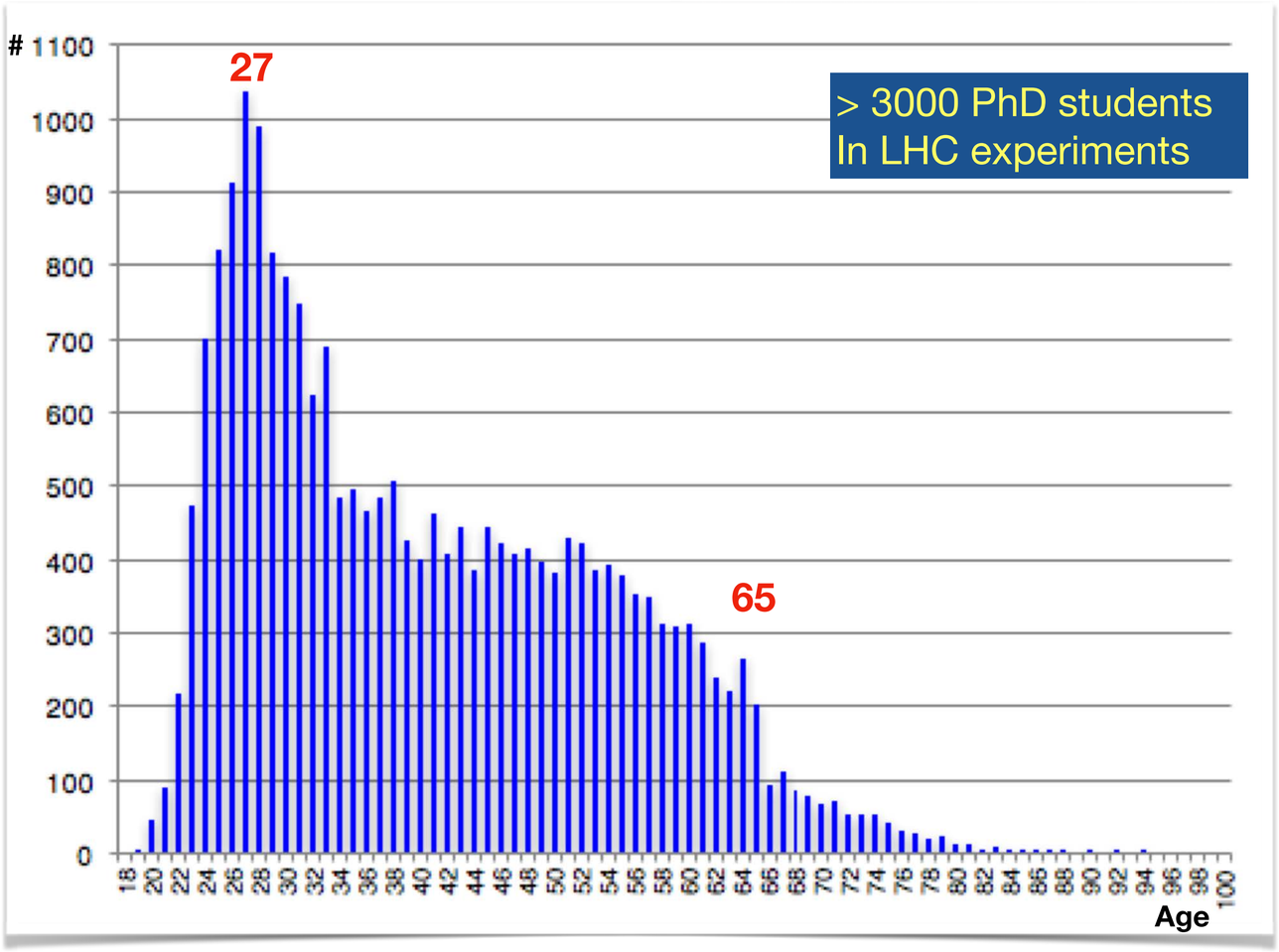
**ASSOCIATE MEMBERS IN THE PRE-STAGE TO MEMBERSHIP** 56

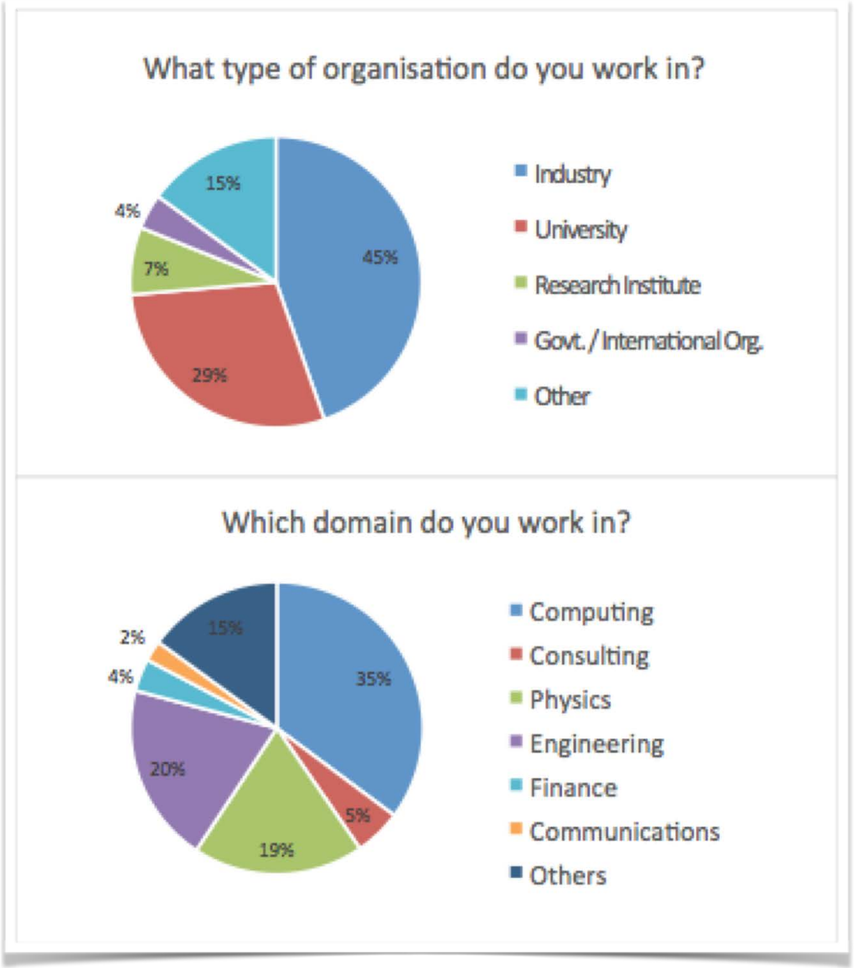
| | |
|---|---|
| Cyprus | 23 |
| Slovenia | 33 |

**OTHERS** 1930

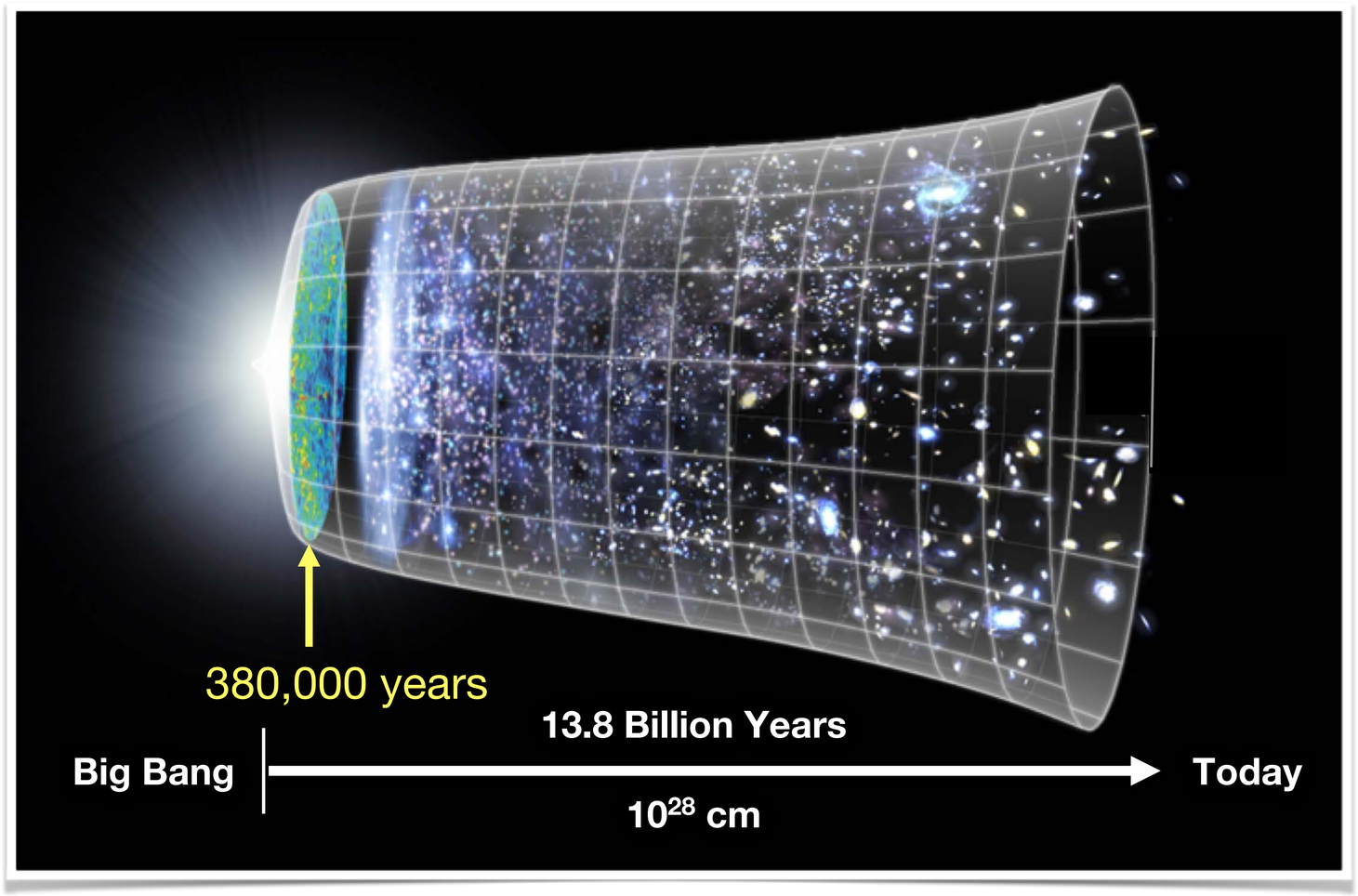
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Afghanistan | 3 | Bosnia & Herzegovina | 3 | El Salvador | 1 | Jordan | 2 | Montenegro | 11 | Philippines | 3 | Thailand | 26 |
| Algeria | 14 | Brazil | 126 | Estonia | 15 | Kazakhstan | 10 | Morocco | 22 | Saint Kitts and Nevis | 1 | Tunisia | 3 |
| Argentina | 26 | Burundi | 1 | Georgia | 49 | Kenya | 1 | Myanmar | 2 | San Marino | 1 | Uruguay | 1 |
| Armenia | 22 | Cameroon | 1 | Ghana | 1 | Korea | 174 | Nepal | 7 | Saudi Arabia | 4 | Uzbekistan | 3 |
| Australia | 34 | Canada | 168 | Guatemala | 1 | Latvia | 3 | New Zealand | 5 | Senegal | 1 | Venezuela | 10 |
| Azerbaijan | 10 | Chile | 21 | Hong Kong | 1 | Lebanon | 24 | Nigeria | 3 | Singapore | 5 | Viet Nam | 12 |
| Bangladesh | 8 | China | 557 | Honduras | 1 | Luxembourg | 4 | North Korea | 3 | South Africa | 48 | Zambia | 1 |
| Belarus | 46 | Colombia | 42 | Iceland | 4 | Madagascar | 1 | North Macedonia | 3 | Sri Lanka | 10 | Zimbabwe | 2 |
| Benin | 1 | Croatia | 49 | Indonesia | 11 | Malaysia | 20 | Oman | 3 | Sudan | 1 | | |
| Bolivia | 3 | Cuba | 16 | Iran | 51 | Malta | 8 | Palestine | 7 | Syria | 1 | | |
| | | Ecuador | 8 | Iraq | 1 | Mexico | 86 | Paraguay | 1 | Taiwan | 56 | | |
| | | Egypt | 24 | Ireland | 14 | Mongolia | 2 | Peru | 6 | | | | |

# Age Distribution of Scientists



# Our Scientific Challenge




Understanding the very first moments of our Universe after the Big Bang

# 2010: A new Era in Fundamental Science




**Exploration of a new energy frontier**
**In p-p and Pb-Pb collisions**



**The Large Hadron Collider**
**LHC**

# 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".*

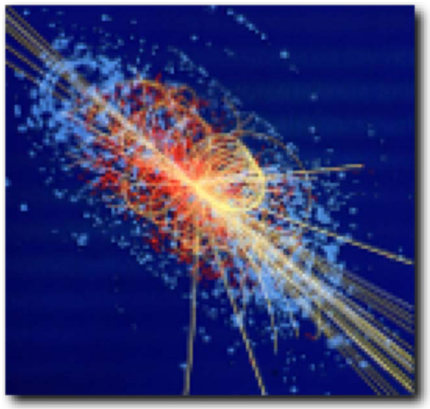
# CERN: Particle Physics and Innovation

Interfacing between fundamental science and
key technological developments

## Our Core Competences



Accelerating particle beams

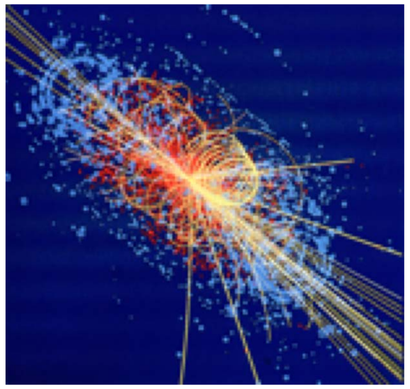


Detecting Particles

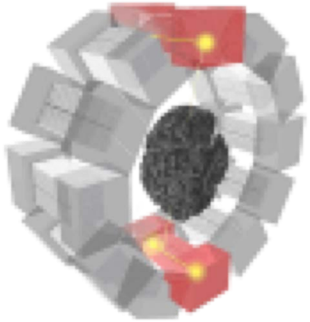


Large-scale computing (GRID)

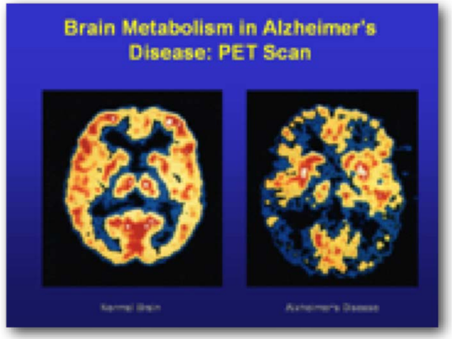
# Medical Applications as an Example for Particle Spin-off



Imaging

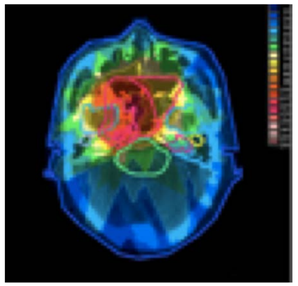


PET Scanner

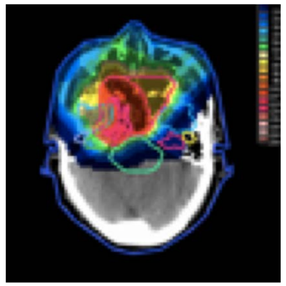





Hadron Therapy



X-Ray



Protons

# CERN Education Activities



**Summer Student Program**





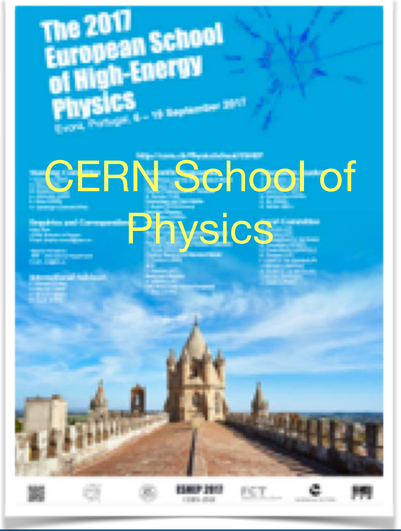




**Young Researchers**

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

**CERN Teacher School**




LHCb
ATLAS
CERN Meyrin
CERN Prévessin
SPS, 7 km
SUISSE
FRANCE
CMS
ALICE
LHC, 27 km
CERN
Accelerating Science and Innovation

# Thank You!