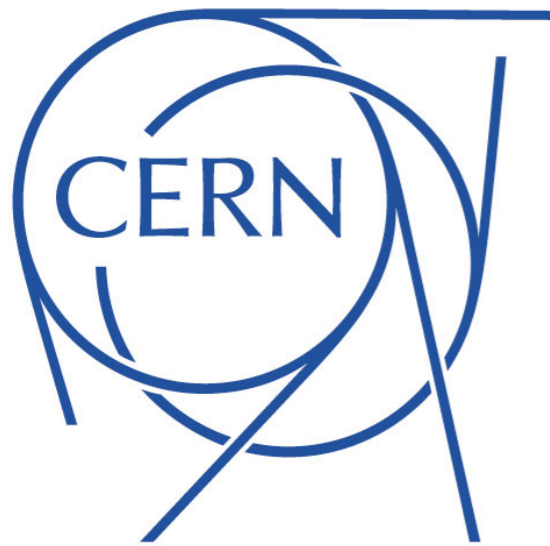




Konrad Jende

Introduction to CERN



COLLABORATION

EDUCATION

FUNDAMENTAL RESEARCH

NEW TECHNOLOGIES

introductory talk about the Laboratory by Konrad Jende

konrad.jende@cern.ch CERN 33-R-010, C09600, CH-1211 Genève 23 +41-76 487 0246



NEW
| NCIS: Los Angeles Tomorrow 9|8c



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1. History & Organization
2. Fundamental Research
3. Latest Results
4. Technology Transfer

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Conseil Européen pour la Recherche Nucléaire

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UNESCO & CERN



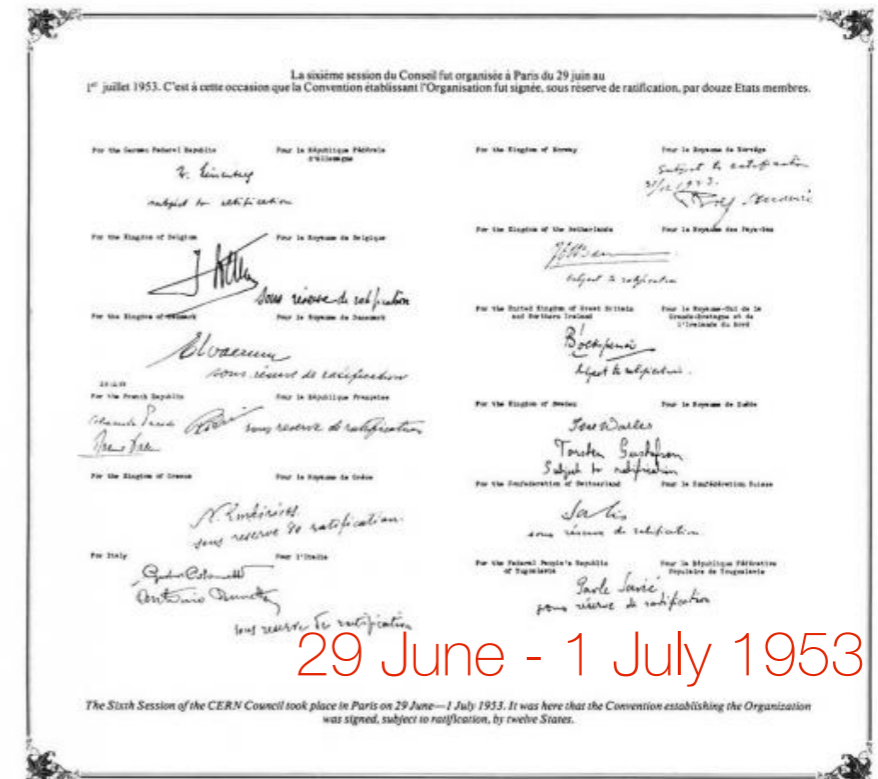
EUROPE in 1949



CERN vs COW



CERN Convention



EUROPE in 1949



CERN vs COW

Sur le terrain du futur institut nucléaire

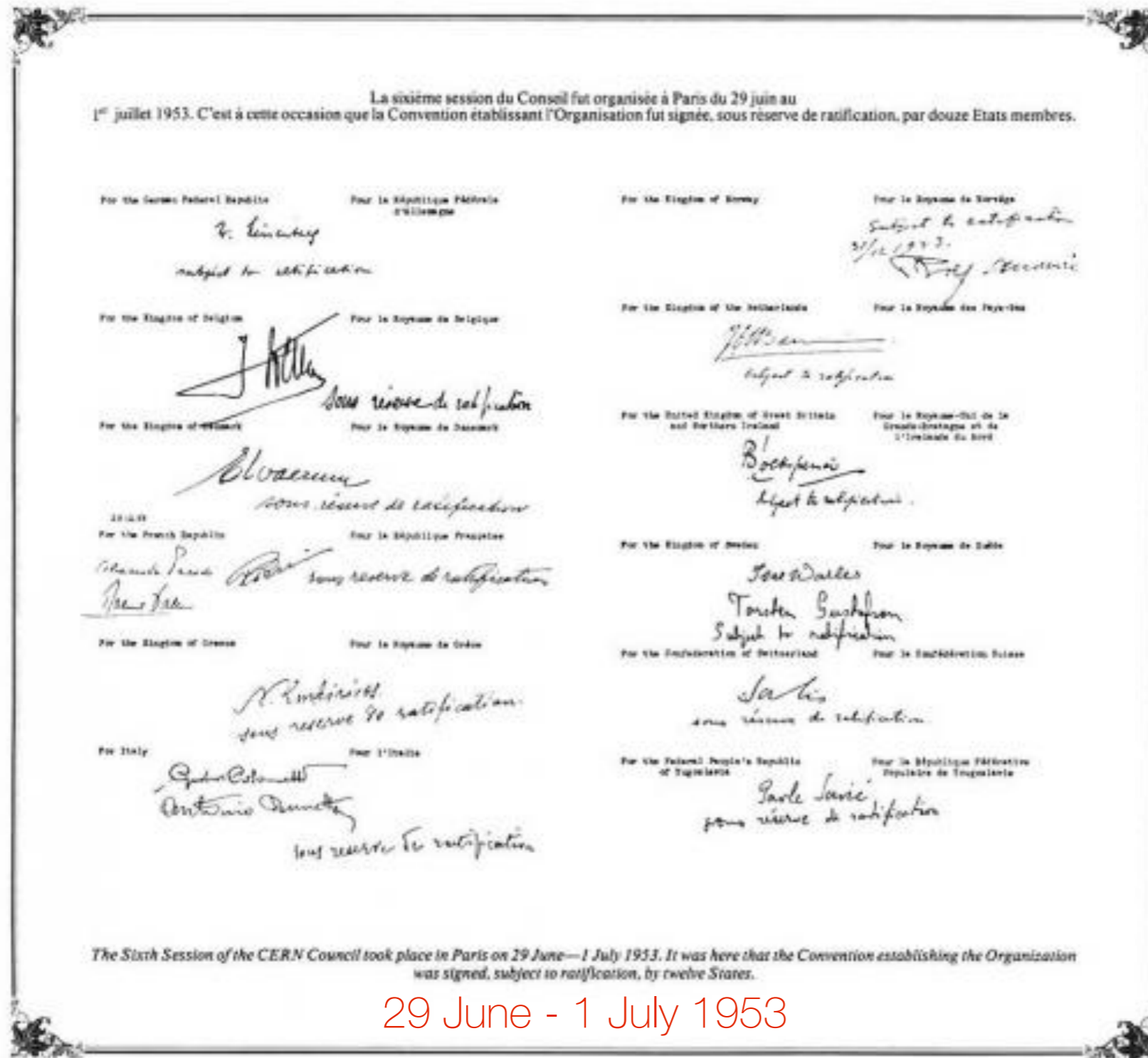


CERN Convention

ARTICLE II: Purposes

The organization shall provide for collaboration among European States in nuclear research of a pure scientific and fundamental character [...]

The organization shall have no concern with work for military requirements and the results of its experimental and theoretical work shall be published or otherwise made generally available.



29 June - 1 July 1953

CERN milestones

1954 (29 Sep) DOB of CERN

1957 TH Group & first accelerator *Synchrocyclotron (SC)*

1958 *Weak interaction* studies

1968 Invention of the *Multi-wire proportional chamber* by
G. Charpak (NP 1992)

1973 Discovery of *Weak Neutral Currents*

1983 Confirming the existence of the *W* and *Z bosons*

1989 Start-up of the Large Electron Positron Collider (LEP)

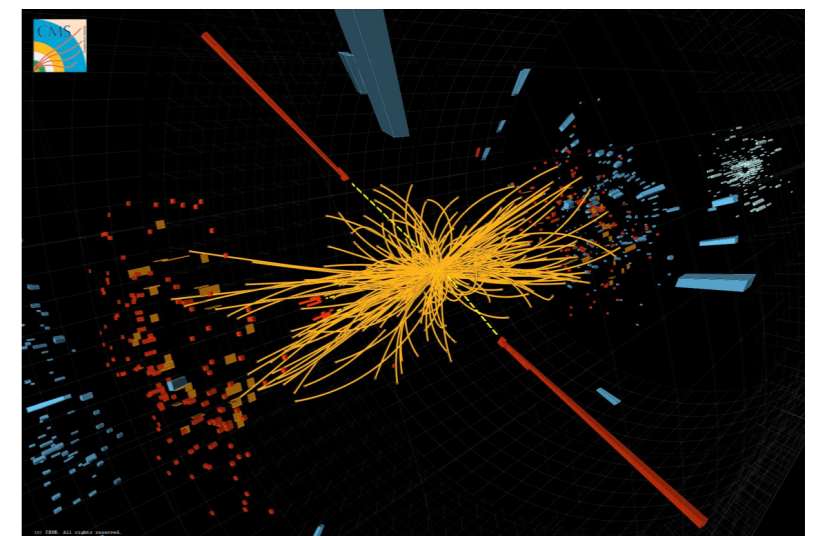
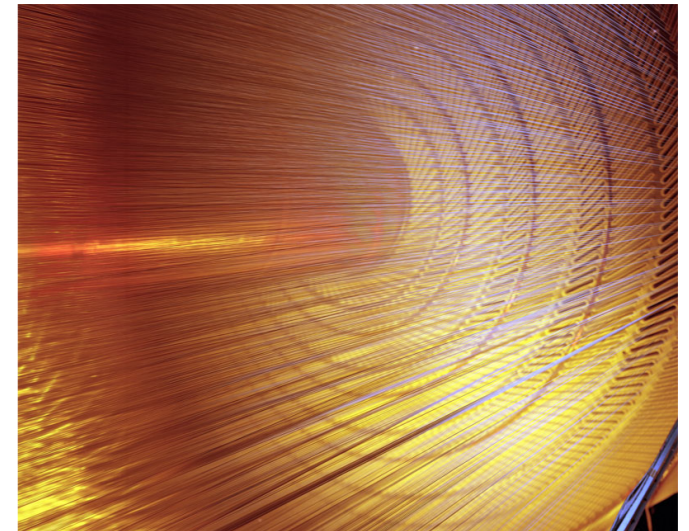
1990 Establishing of the WWW

1995 First production of antimatter atoms

2008 Start-up of the Large Hadron Collider

2012 Confirming the existence of the *Higgs boson*

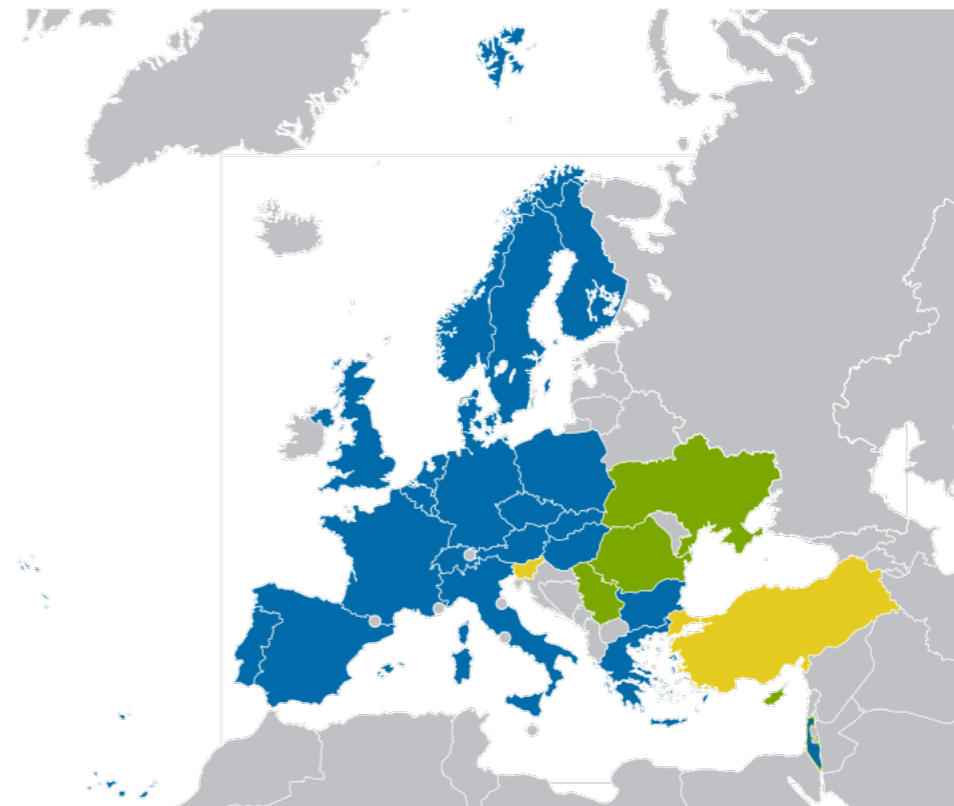
2013 Nobel prize to F. Englert and P. Higgs



Flags - then and now

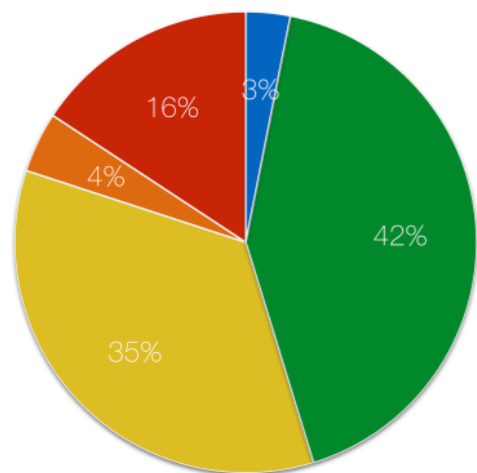


CERN Member States



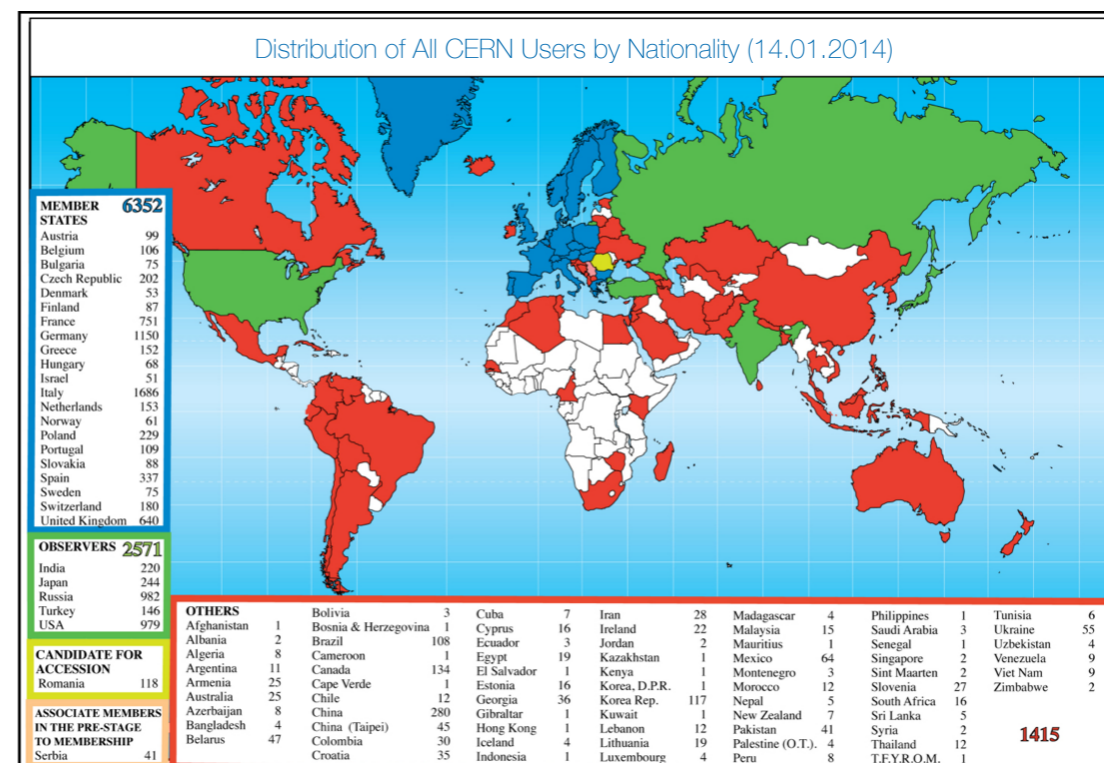
Professions

Staff Members



- Research Physicists
- Scientific and Engineering Work
- Technical Work
- Manual Work, Crafts and Trades
- Office and Administrative Work

Nationalities






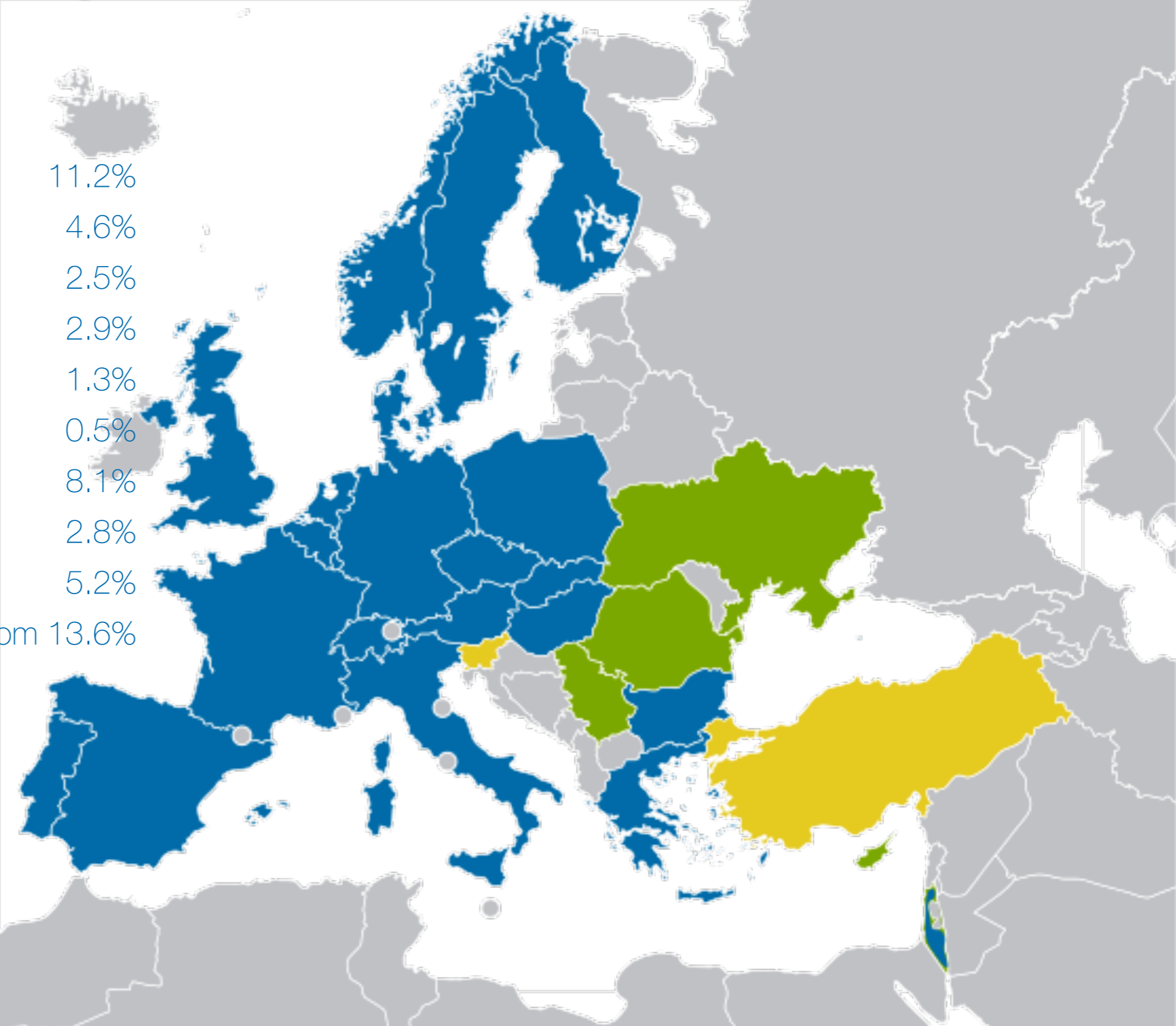
Flags - then and now



CERN member states

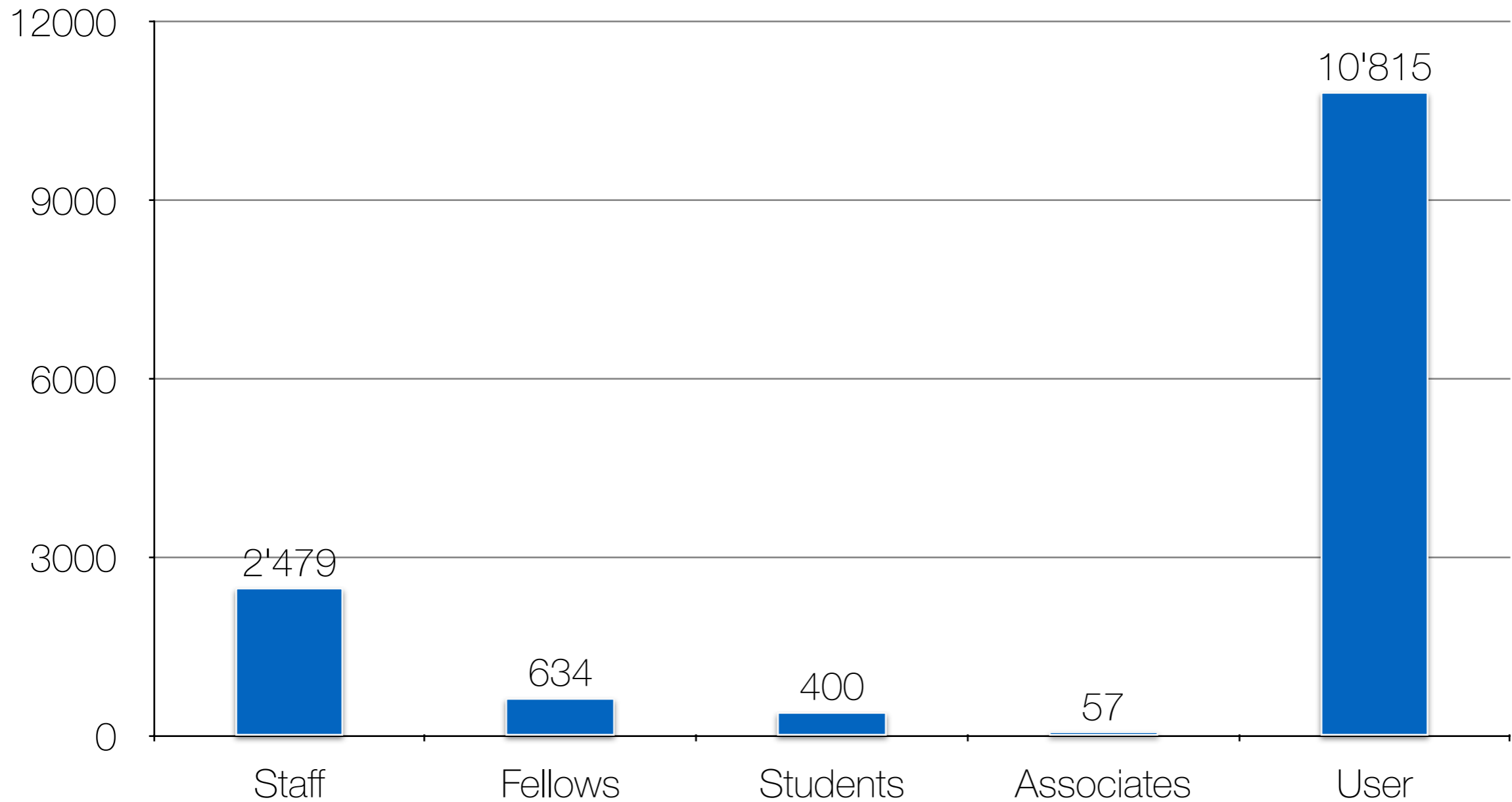
Austria	2.2%	Italy	11.2%
Belgium	2.9%	Netherlands	4.6%
Bulgaria	0.3%	Norway	2.5%
Czech Rep	1.0%	Poland	2.9%
Denmark	1.8%	Portugal	1.3%
Finland	1.4%	Slovak Rep	0.5%
France	15.5%	Spain	8.1%
Germany	20.3%	Sweden	2.8%
Greece	1.6%	Switzerland	5.2%
Hungary	0.6%	United Kingdom	13.6%
Israel	0.3%		

-  member state
-  candidate
-  intendant candidate



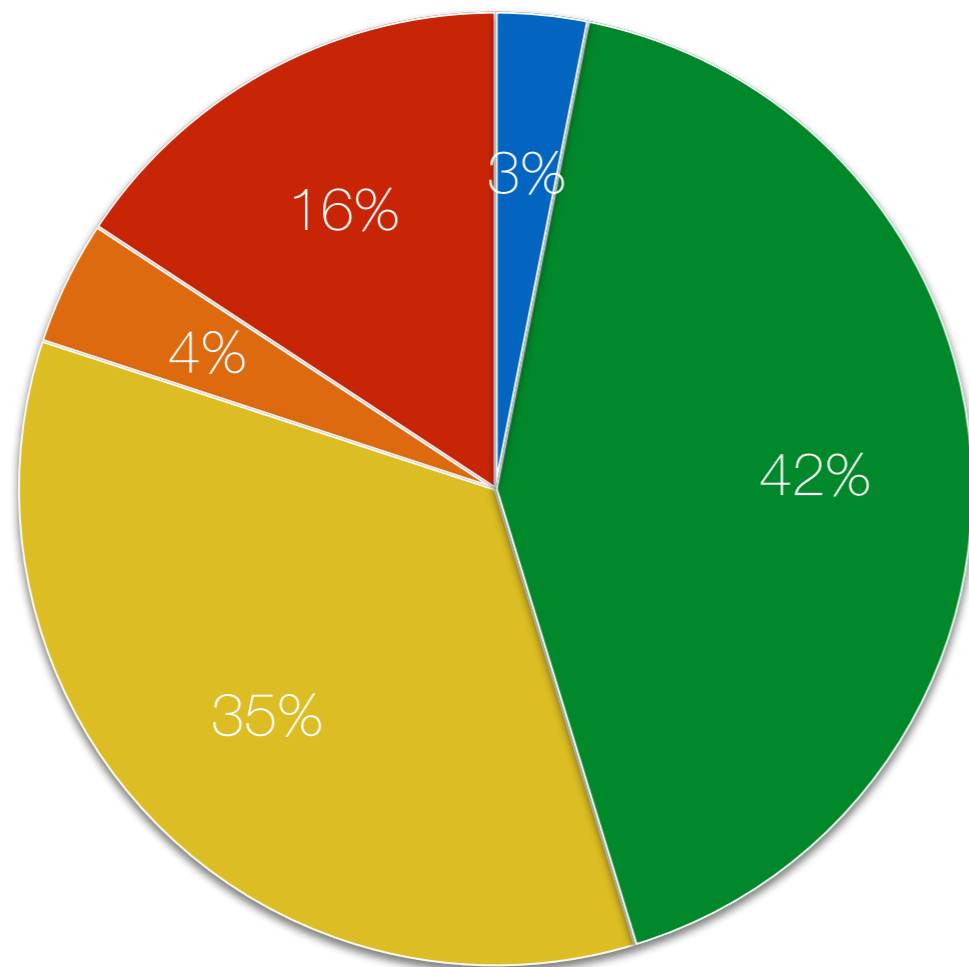
Professions 1

Members of the Personnel



Professions 2

Staff Members



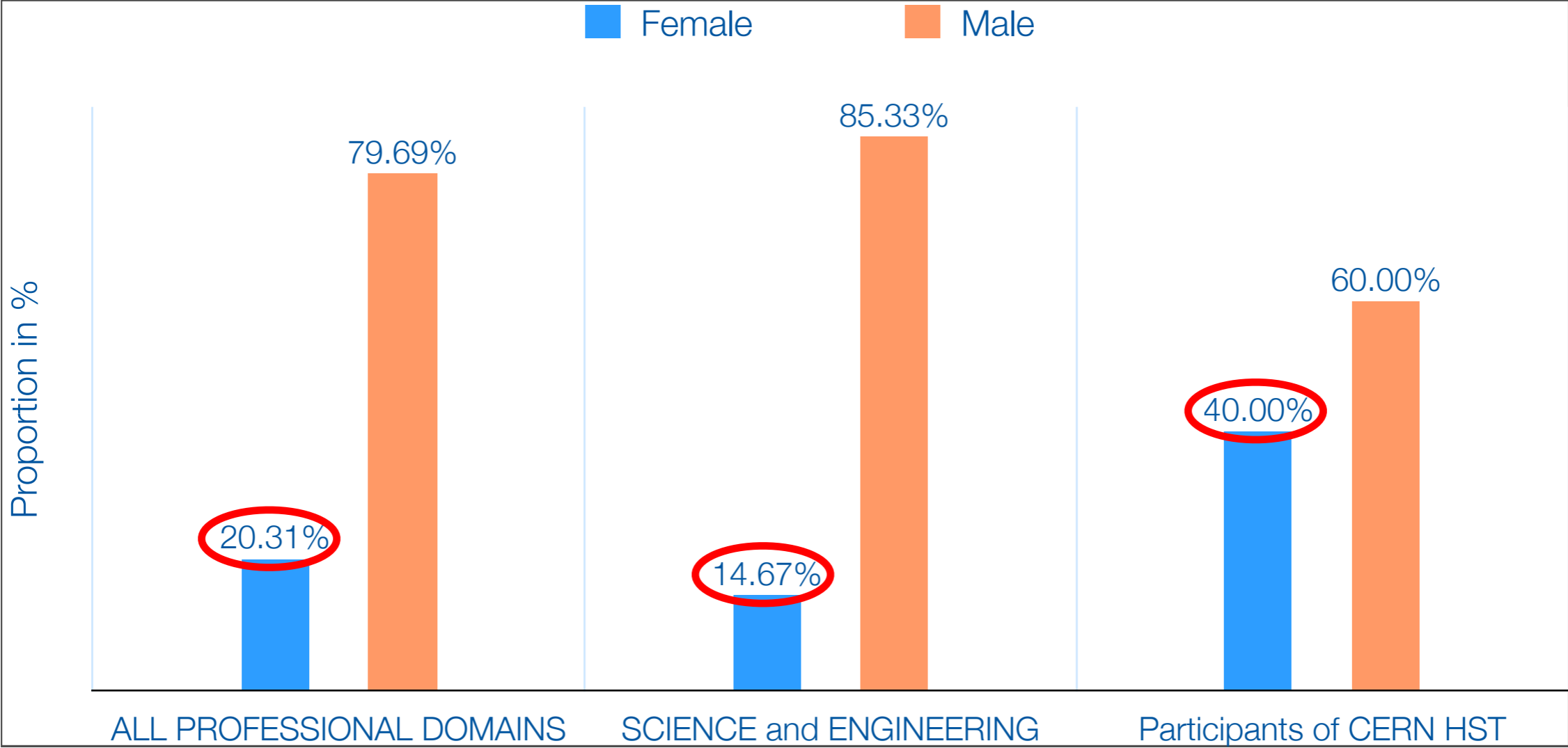
- Research Physicists
- Scientific and Engineering Work
- Technical Work
- Manual Work, Crafts and Trades
- Office and Administrative Work

Professions 3

Various Professions

- Vacuum Technician
- Information Officer
- Electronics Engineer
- Administrative Assistant
- Lawyer
- Technical Engineer
- Radiation Protection Engineers
- Translator
- Computing Engineer
- Machine Operator
- Firefighter
- Physicist

Professions 4 - Women in SET and at CERN

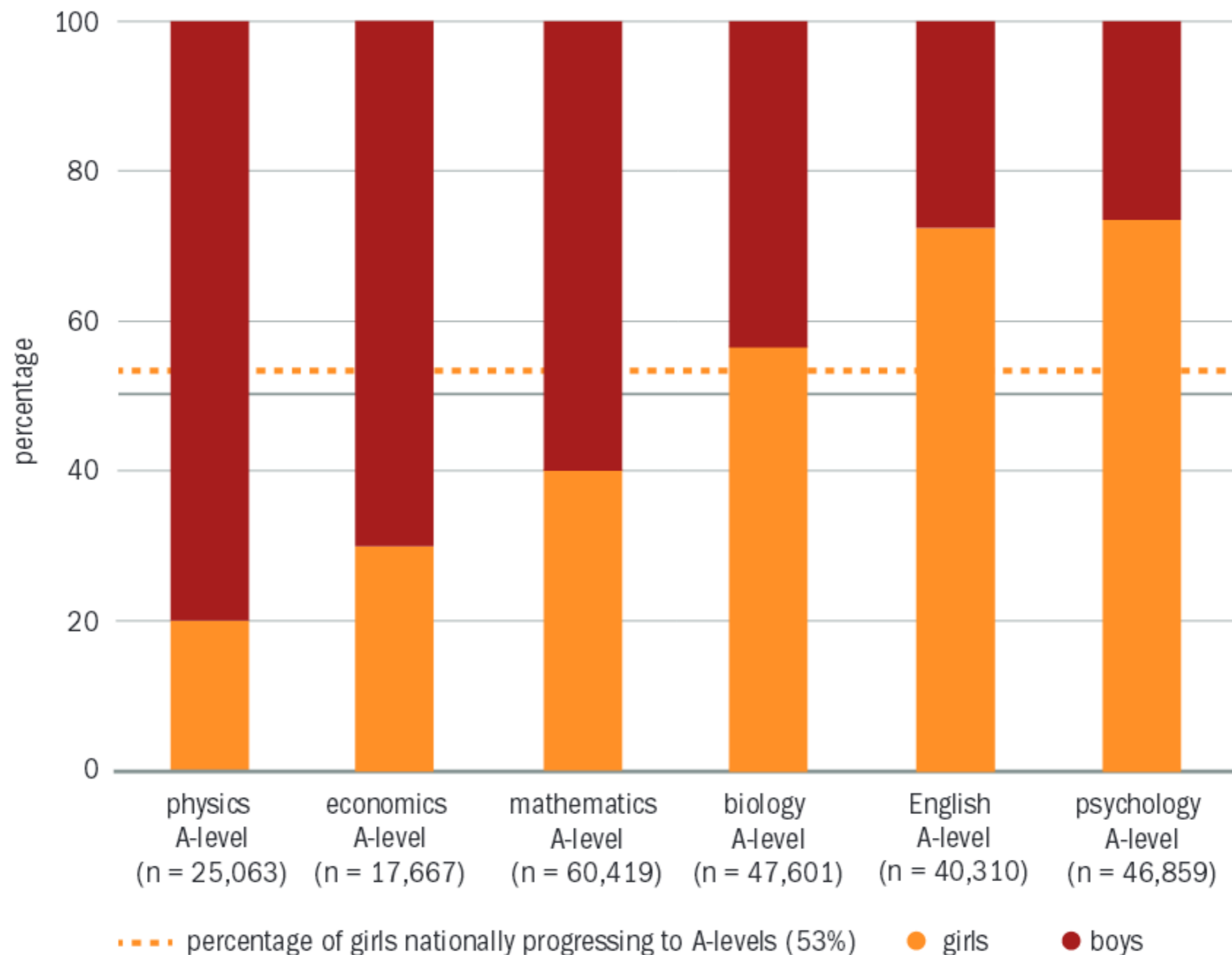


Source: 2014 CERN Personnel Statistics



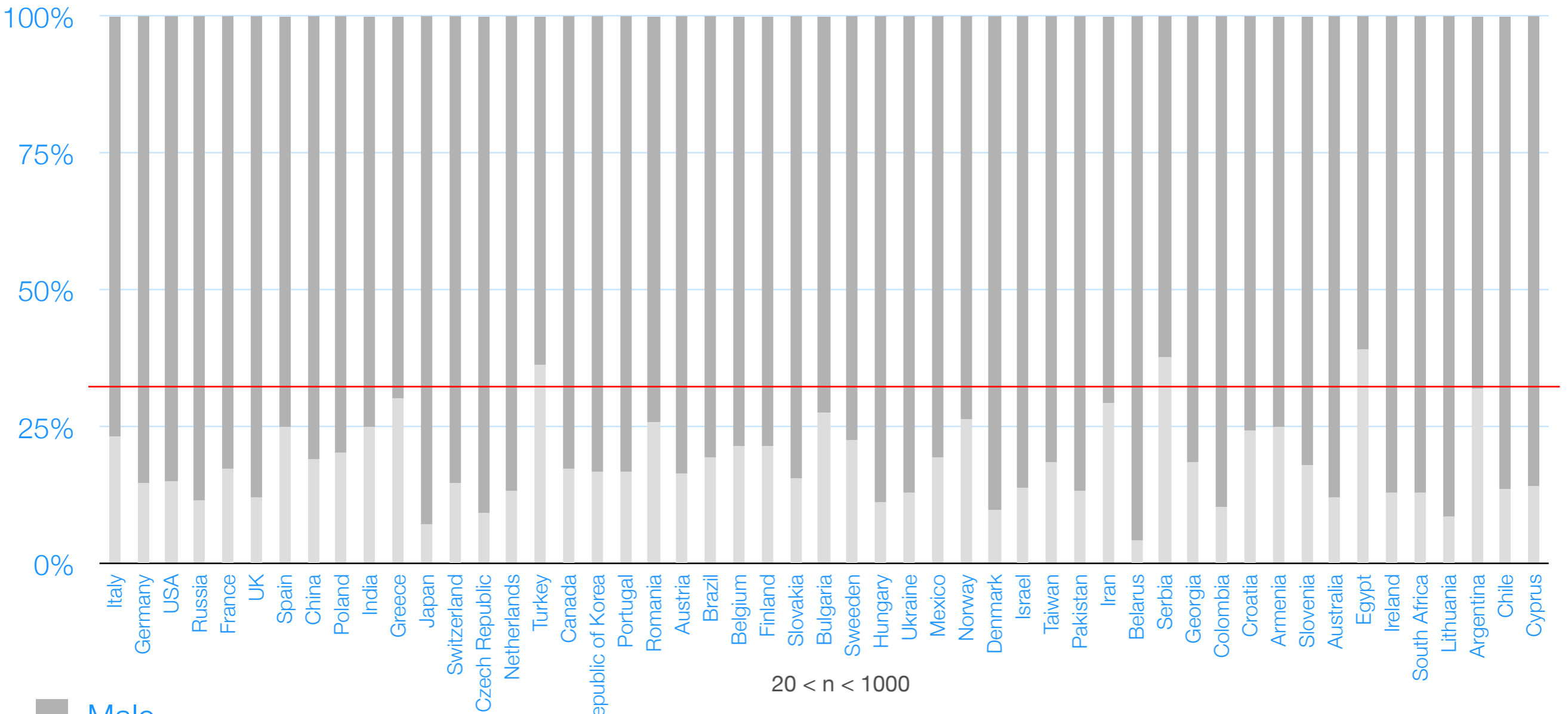
Professions 5 - Women in SET and at CERN

National ratios of male and female entries to the six selected A-level subjects averaged over the years 2010 to 2012 in England



Professions 6 - Women in SET and at CERN

Gender ratio of CERN User population by nationality



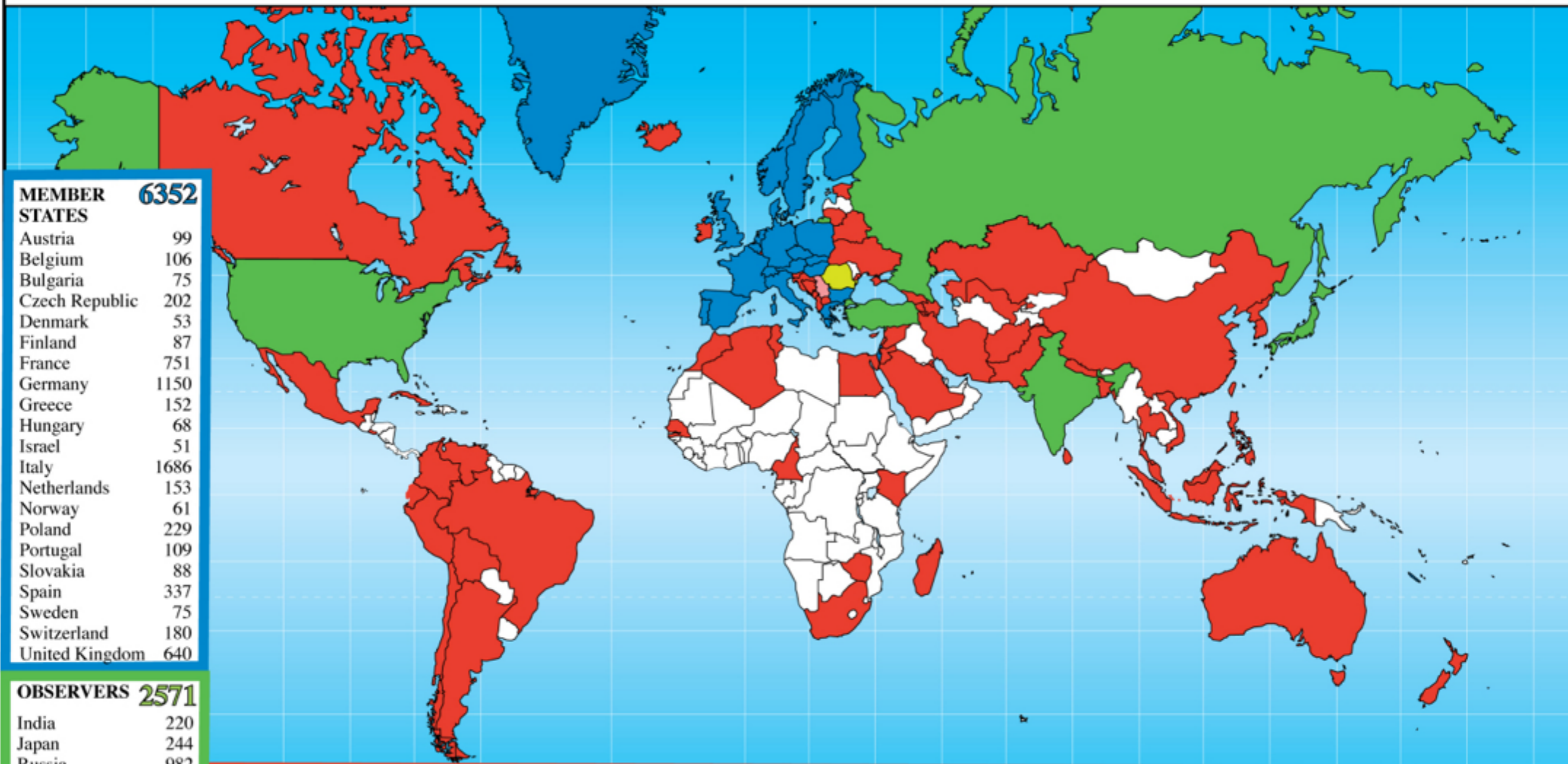
20 < n < 1000

Source: CERN HRT

Male
Female



Distribution of All CERN Users by Nationality (14.01.2014)



MEMBER STATES	6352
Austria	99
Belgium	106
Bulgaria	75
Czech Republic	202
Denmark	53
Finland	87
France	751
Germany	1150
Greece	152
Hungary	68
Israel	51
Italy	1686
Netherlands	153
Norway	61
Poland	229
Portugal	109
Slovakia	88
Spain	337
Sweden	75
Switzerland	180
United Kingdom	640

OBSERVERS	2571
India	220
Japan	244
Russia	982
Turkey	146
USA	979

CANDIDATE FOR ACCESSION	
Romania	118

ASSOCIATE MEMBERS IN THE PRE-STAGE TO MEMBERSHIP	
Serbia	41

OTHERS															
Afghanistan	1	Bolivia	3	Cuba	7	Iran	28	Madagascar	4	Philippines	1	Tunisia	6		
Albania	2	Bosnia & Herzegovina	1	Cyprus	16	Ireland	22	Malaysia	15	Saudi Arabia	3	Ukraine	55	Uzbekistan	4
Algeria	8	Brazil	108	Ecuador	3	Jordan	2	Mauritius	1	Senegal	1	Venezuela	9	Viet Nam	9
Argentina	11	Cameroon	1	Egypt	19	Kazakhstan	1	Mexico	64	Singapore	2	Sint Maarten	2	Zimbabwe	2
Australia	25	Canada	134	El Salvador	1	Kenya	1	Montenegro	3	Slovenia	27	South Africa	16		
Azerbaijan	8	Cape Verde	1	Estonia	16	Korea, D.P.R.	1	Morocco	12	Sri Lanka	5				
Bangladesh	4	Chile	12	Georgia	36	Korea Rep.	117	Nepal	5	Syria	2				
Belarus	47	China	280	Gibraltar	1	Kuwait	1	New Zealand	7	Thailand	12				
		China (Taipei)	45	Hong Kong	1	Lebanon	12	Pakistan	41	T.F.Y.R.O.M.	1				
		Colombia	30	Iceland	4	Lithuania	19	Palestine (O.T.)	4						
		Croatia	35	Indonesia	1	Luxembourg	4	Peru	8						

1415

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Fundamental questions of mankind

Where do we come from?

= Big Bang Theory

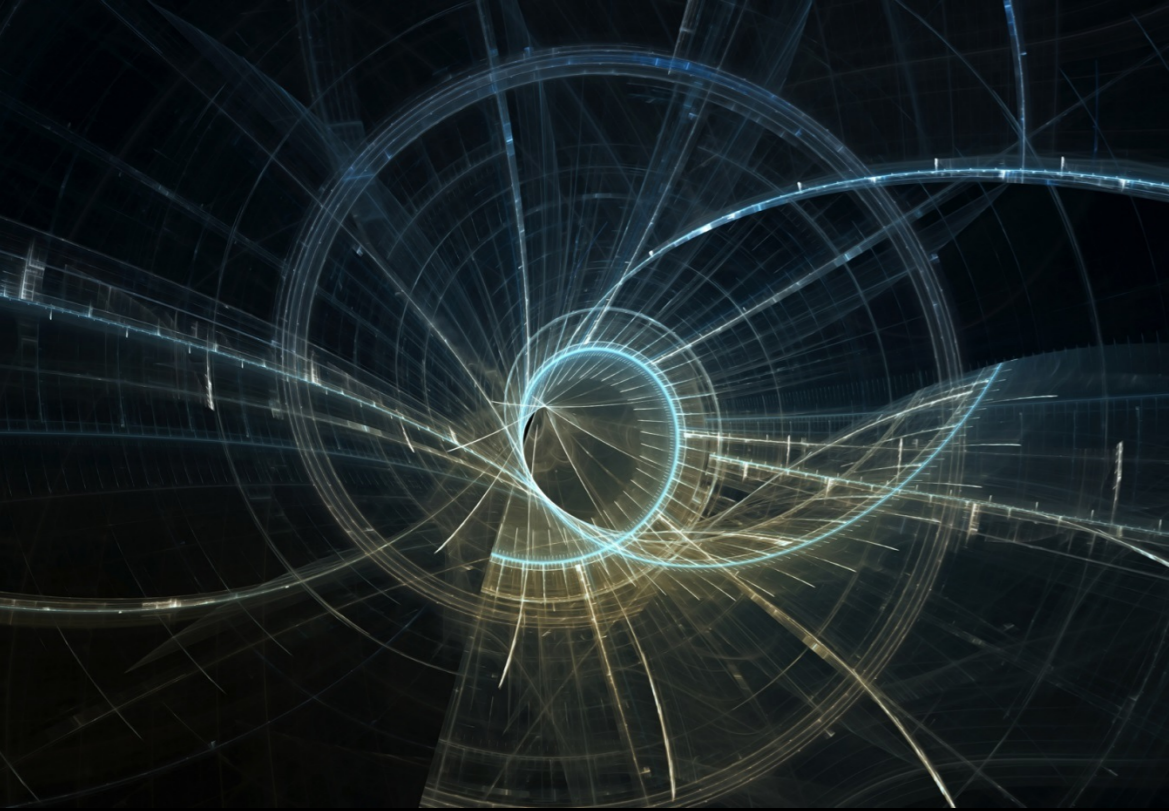
What are we made of?

= Particle Physics Research

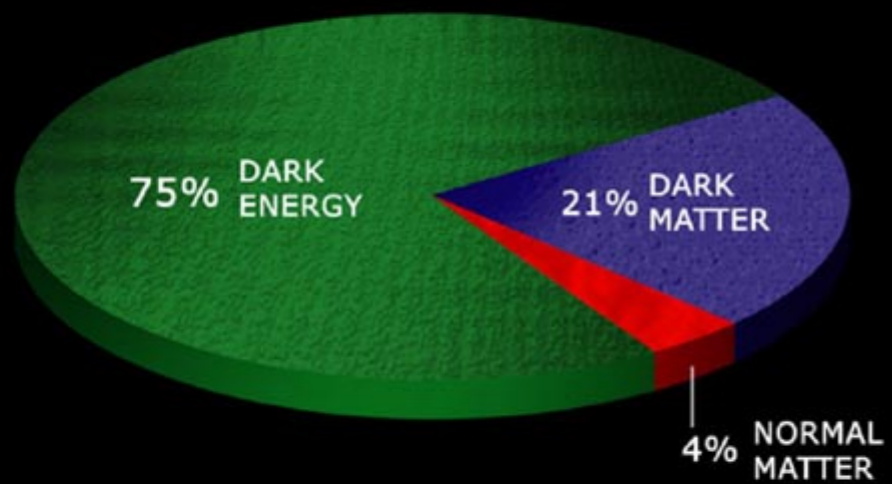
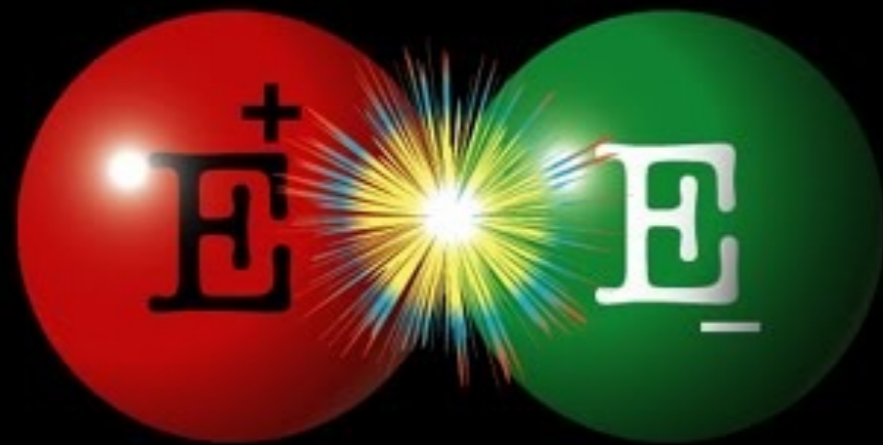
Where are we going?

= Technology Transfer

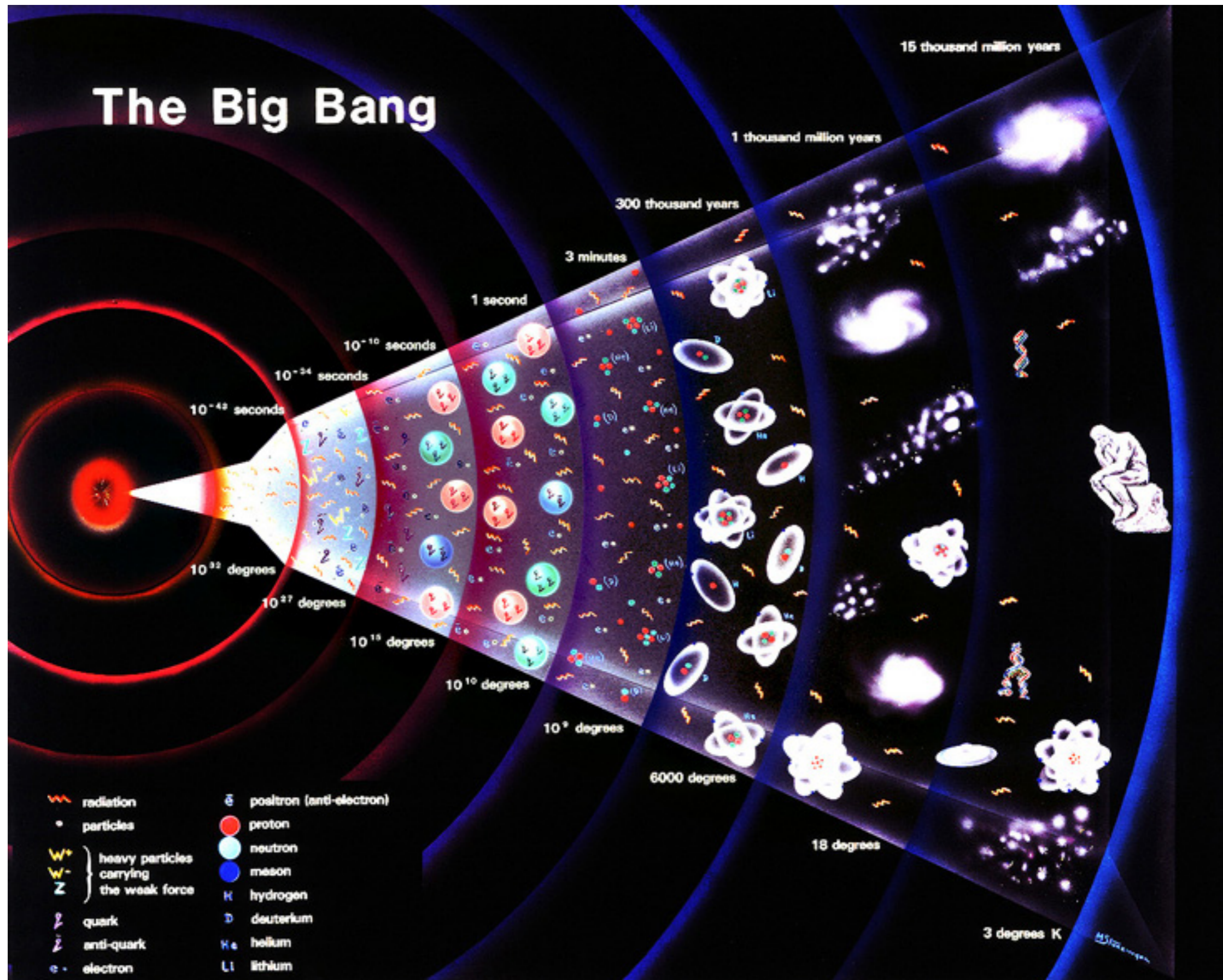




Fundamental questions of mankind



Big Bang Theory



CERN



CERN

LHCb

ATLAS

CERN-Meyrin
4.26 km

CERN-DSM
1.5 km

SPS 7 km

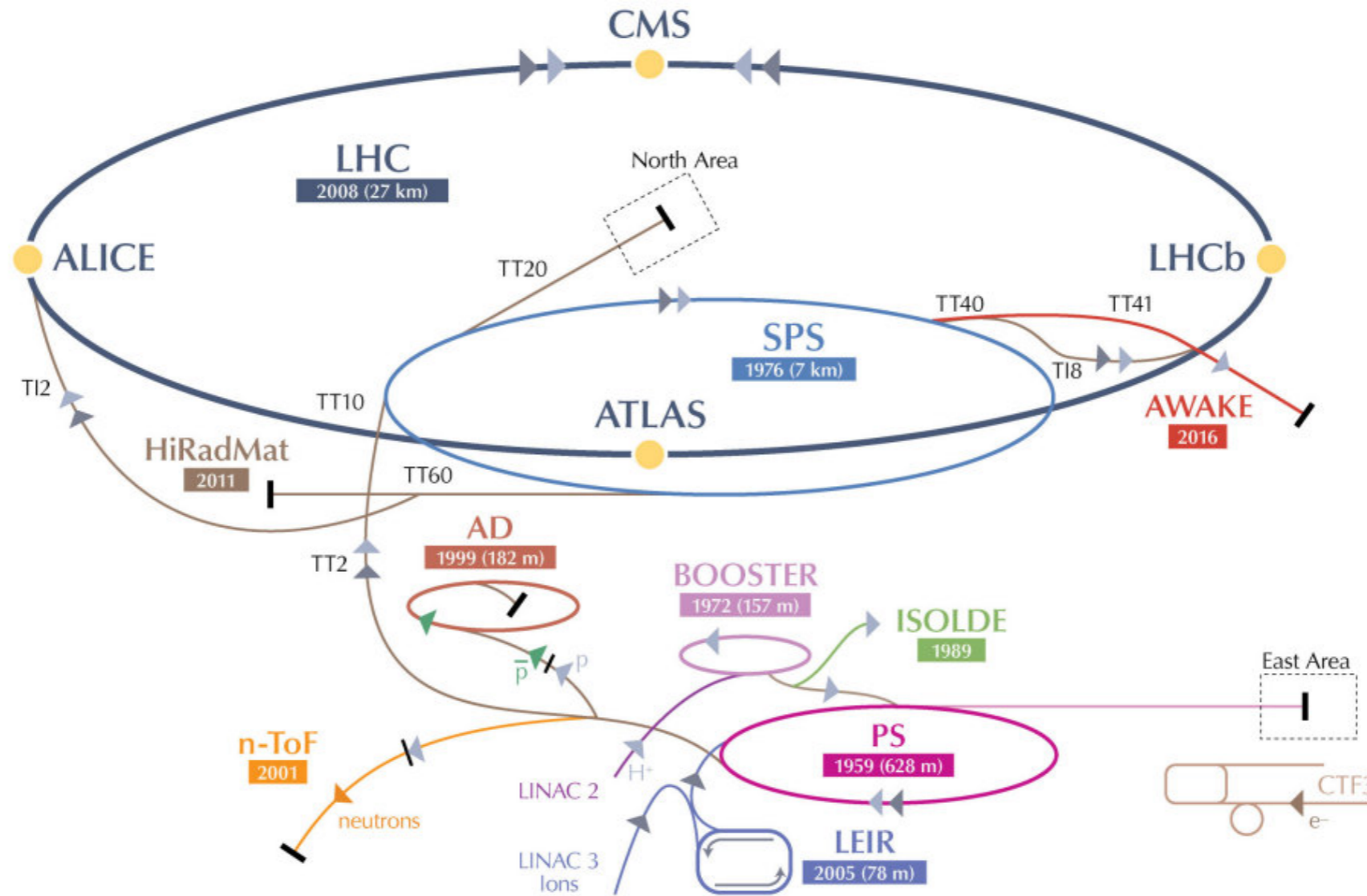
SUISSE
FRANCE

CMS

ALICE

LHC 27 km

CERN's Accelerator Complex



▶ p (proton)
 ▶ ion
 ▶ neutrons
 ▶ \bar{p} (antiproton)
 ▶ electron
 ↔ proton/antiproton conversion

LHC Large Hadron Collider SPS Super Proton Synchrotron PS Proton Synchrotron

AD Antiproton Decelerator CTF3 Clic Test Facility AWAKE Advanced WAKEfield Experiment ISOLDE Isotope Separator OnLine DEvice

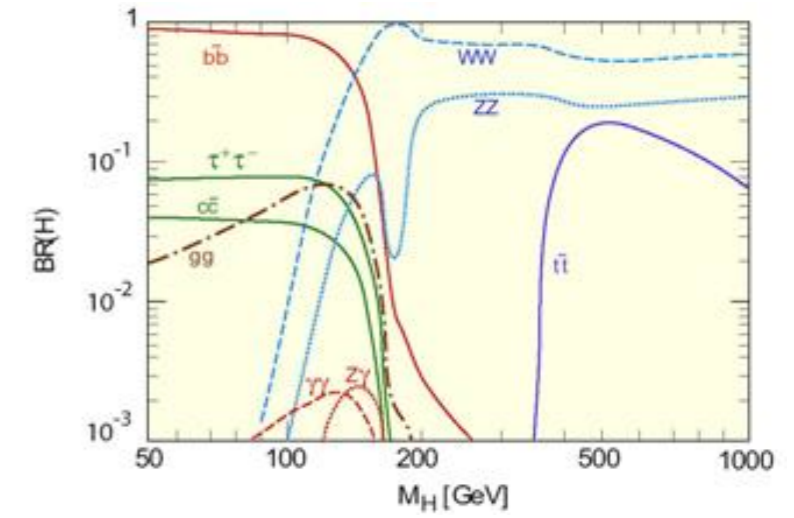
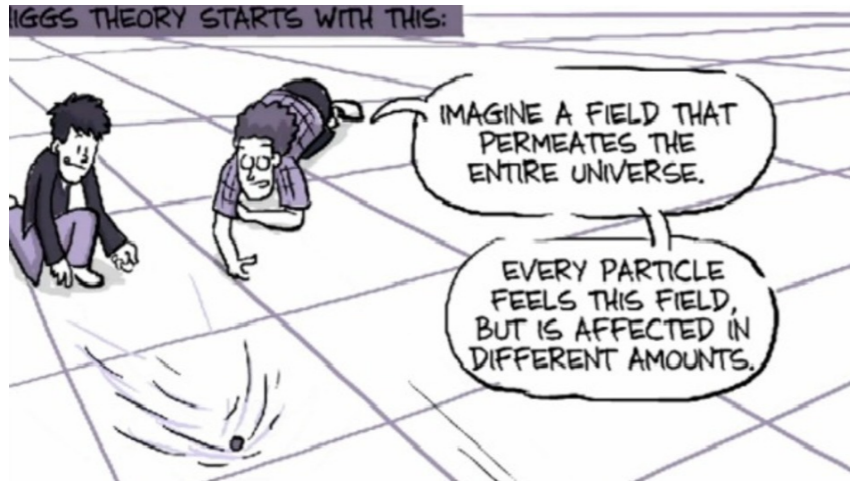
LEIR Low Energy Ion Ring LINAC LINear ACcelerator n-ToF Neutrons Time Of Flight HiRadMat High-Radiation to Materials



CERN

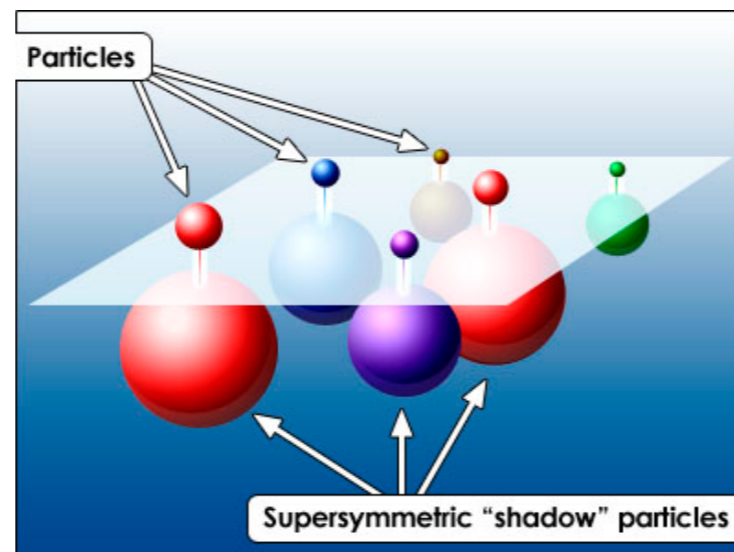
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current results

- 2012 (Jul) Confirmation of existence of the Higgs boson
- 2013 (Jul) Top quark properties refined (e.g. mass)
- 2013 (Nov) Evidence of the Higgs boson decaying into fermions
- now studies on supersymmetric models and particles



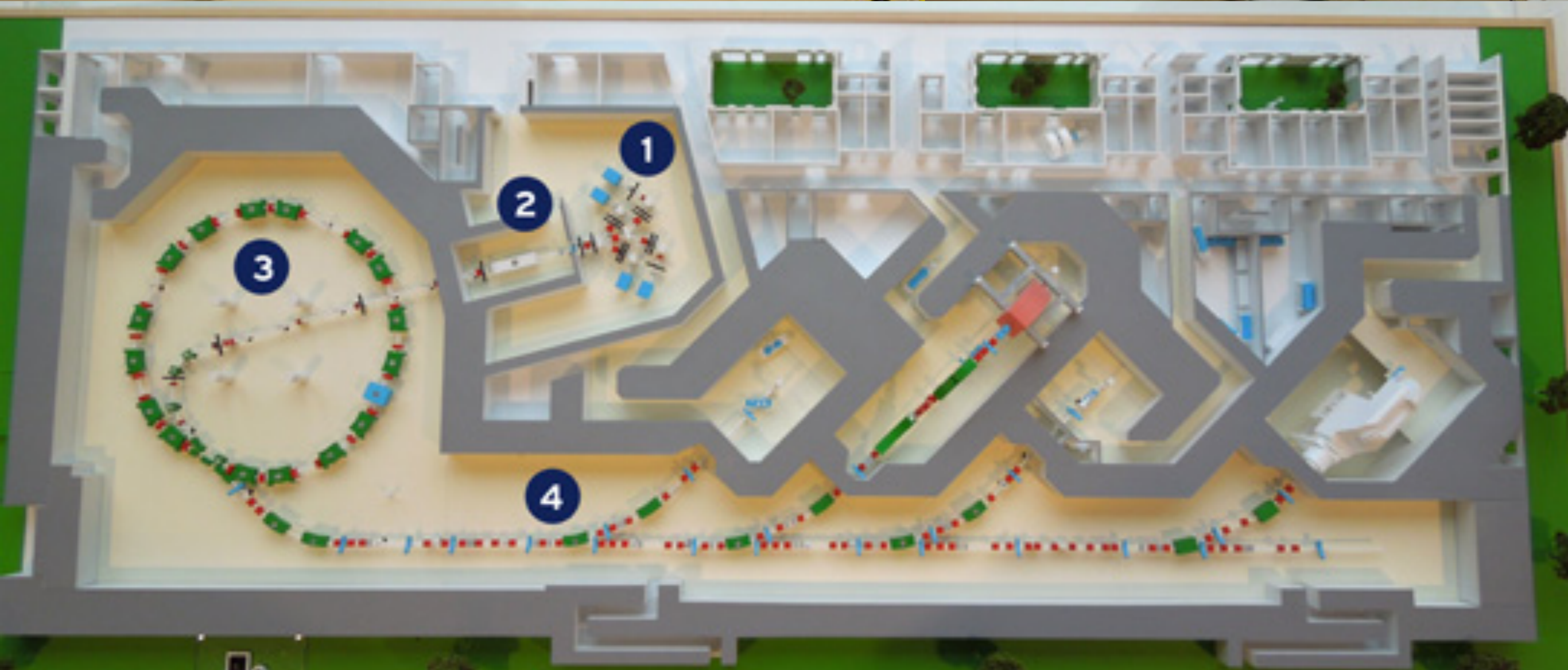
CERN

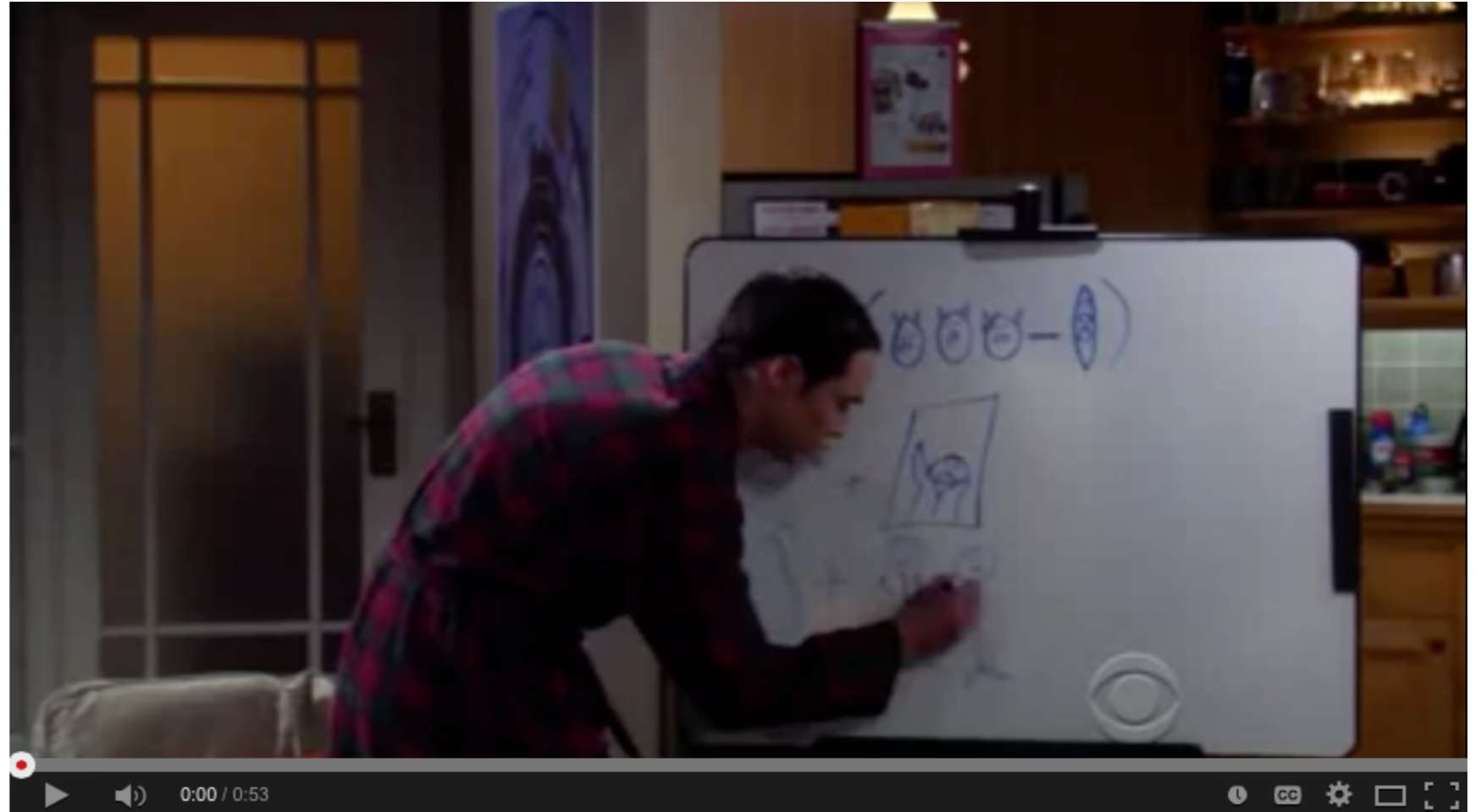
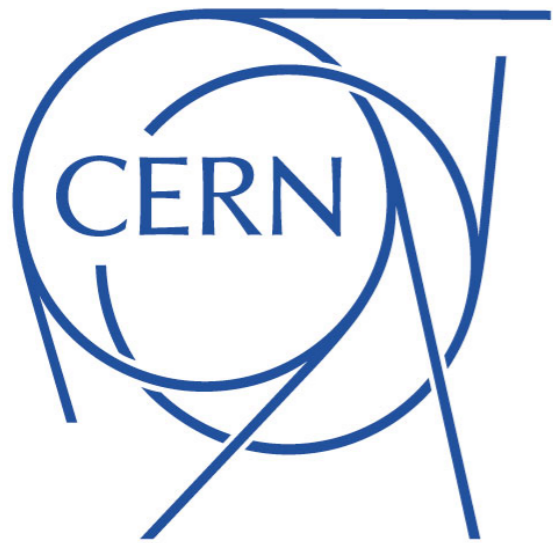
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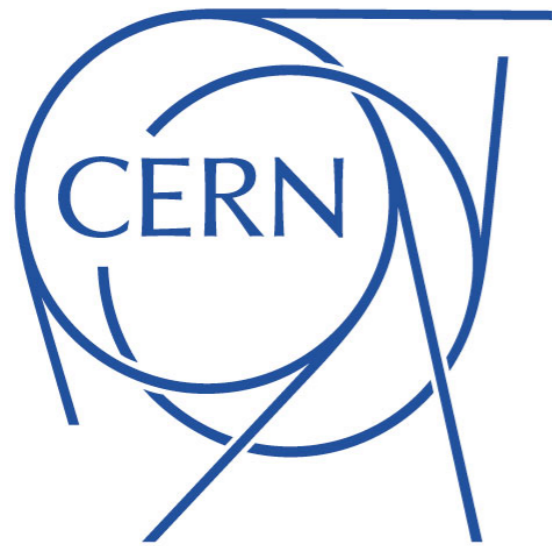








Thank you!



COLLABORATION

EDUCATION

FUNDAMENTAL RESEARCH

NEW TECHNOLOGIES

Thank you!