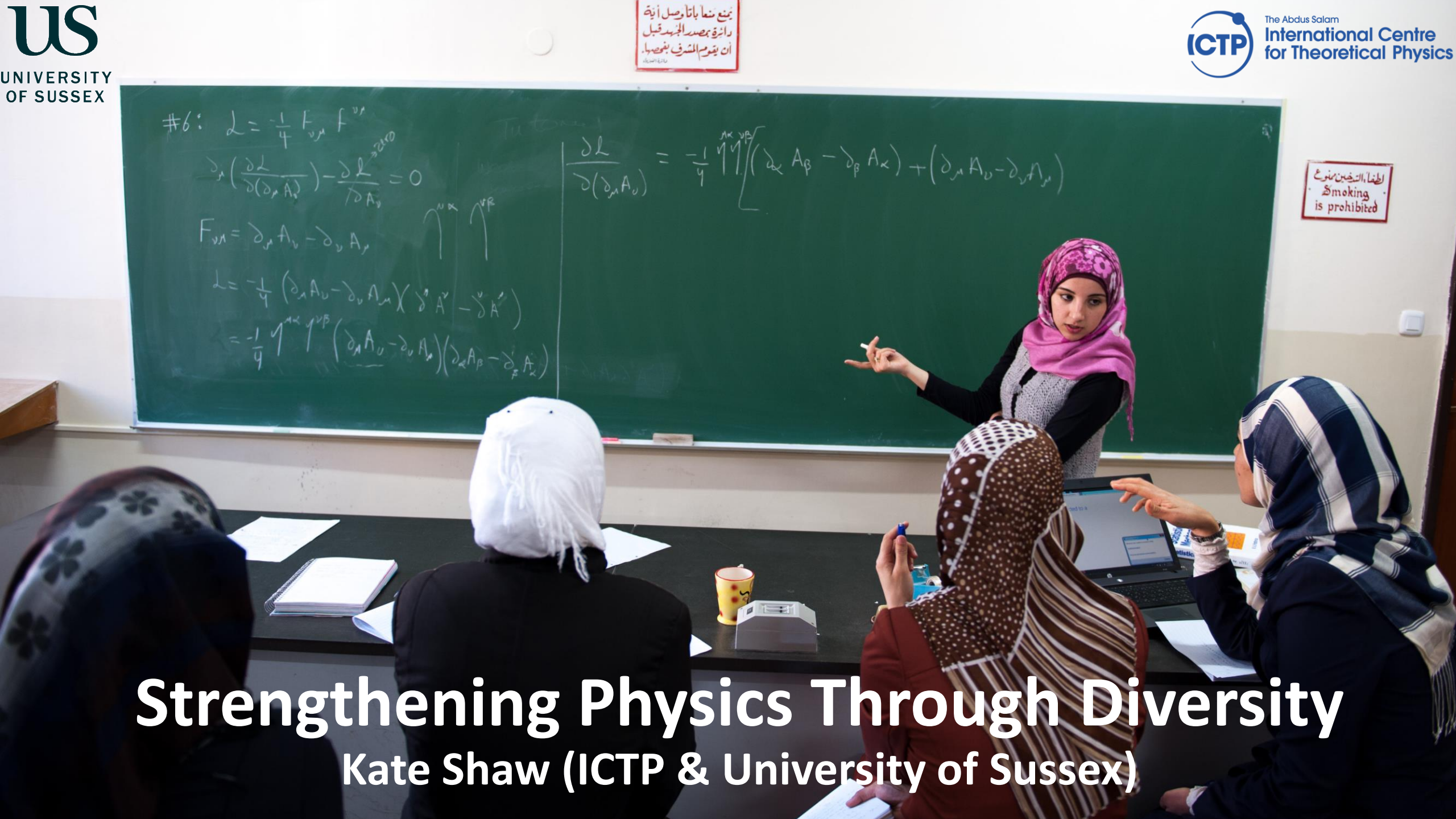
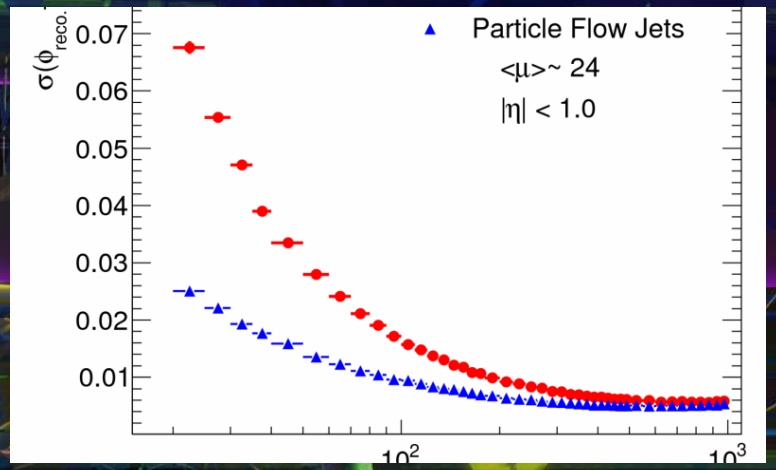


Strengthening Physics Through Diversity

Kate Shaw (ICTP & University of Sussex)

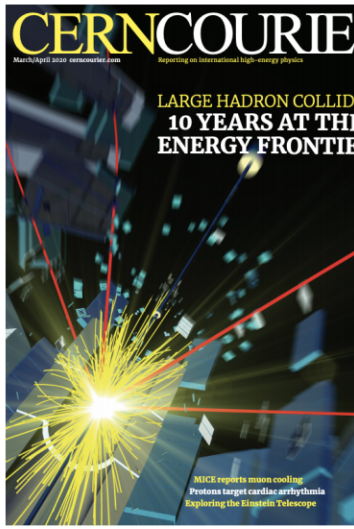


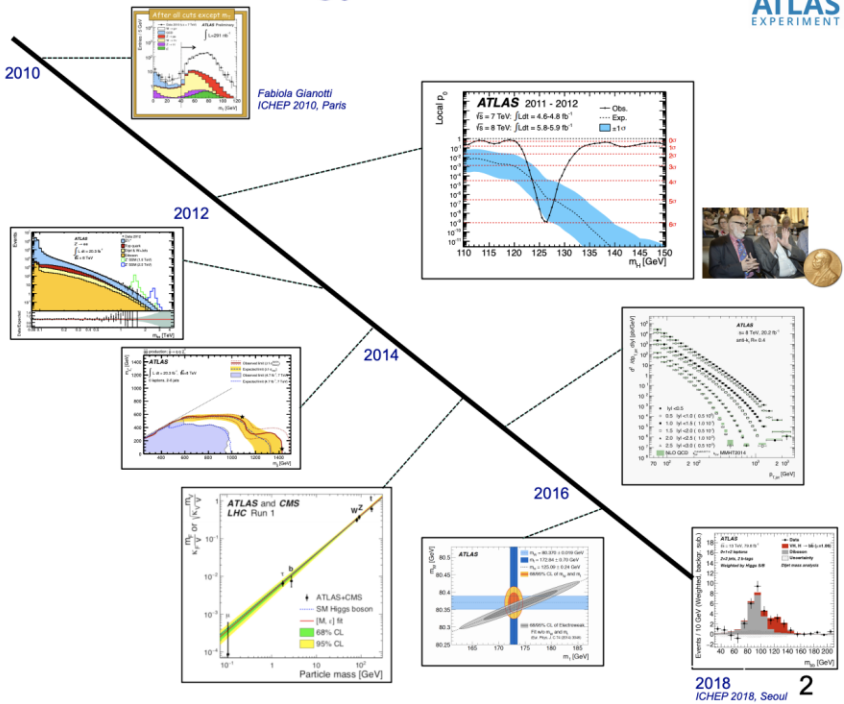
USING SOME OF THE MOST COMPLEX MACHINES IN THE WORLD

Argentina
Armenia
Australia
Austria
Azerbaijan
Belarus
Brazil
Canada
Chile
China
Colomb
Czech R
Denmar
France
Georgia
German
Greece
Israel
Italy
Japan

Morocco
Netherlands
Norway
Poland
Portugal
Romania
Russia
Serbia
Slovakia

10 Years at the Energy Frontier





Diversity is the key to the success of physics!

Albania
Algeria
Argentina
Armenia
Australia
Austria
Azerbaijan
Bangladesh
Belarus
Belgium
Bosnia and Herzegovina
Botswana
Brazil
Bulgaria
Burundi
Canada
Chile
China
Colombia
Costa Rica
Croatia
Cuba
Cyprus
Czech Republic
Denmark
Ecuador
Egypt
Finland
France
Georgia
Germany
Ghana
Greece
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Japan
Jordan
Kazakhstan
Kenya
Kyrgyzstan
Latvia
Lebanon
Lithuania
Luxembourg
Madagascar
Malaysia
Malta
Mauritius
Mexico
Mongolia
Montenegro
Morocco
Nepal
Netherlands
New Zealand
Niger
Nigeria
Norway
Pakistan
Palestine
Peru
Philippines
Poland
Portugal
Romania
Russia
Saudi Arabia
Senegal
Serbia
Slovakia
Slovenia
South Africa
South Korea
Spain
Sri Lanka
Sudan
Swaziland
Sweden
Switzerland
Syria
Taiwan
Thailand
Tunisia
Turkey
Ukraine
UAE
UK
USA
Uruguay
Uzbekistan
Venezuela
Vietnam
Zambia
Zimbabwe

ATLAS Collaboration member nationalities

Over 5500 members of 103 nationalities

Our diversity is our strength!

ATLAS EXPERIMENT

Diversity is the key to the success of physics!

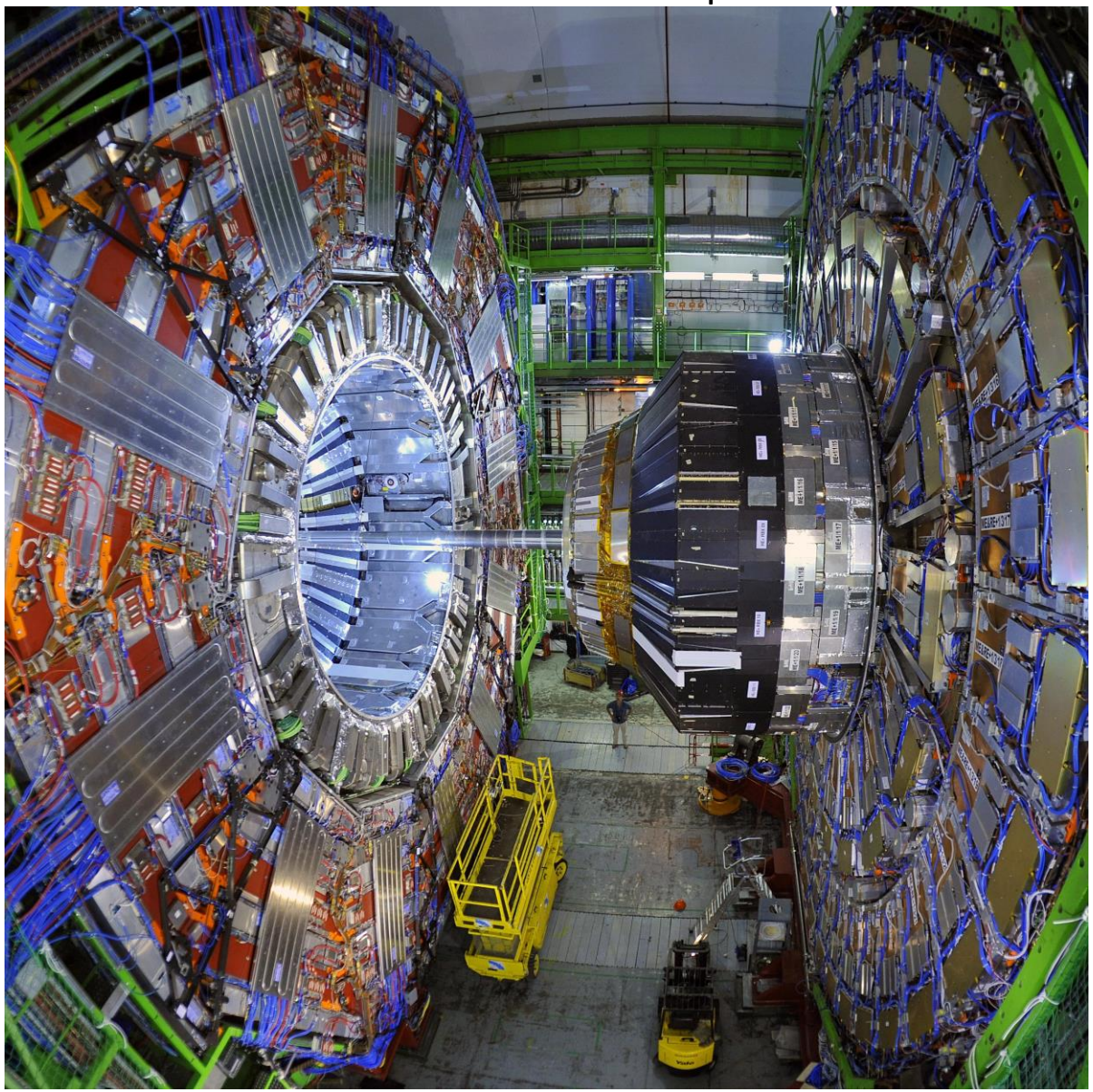
Monoculture can create mono approaches – everyone may use same approach, they have the same culture, background, and experiences

A group of people with different experiences and perspectives brings **innovation** and **creativity**

If certain groups are under-represented, our **talent pool** is smaller

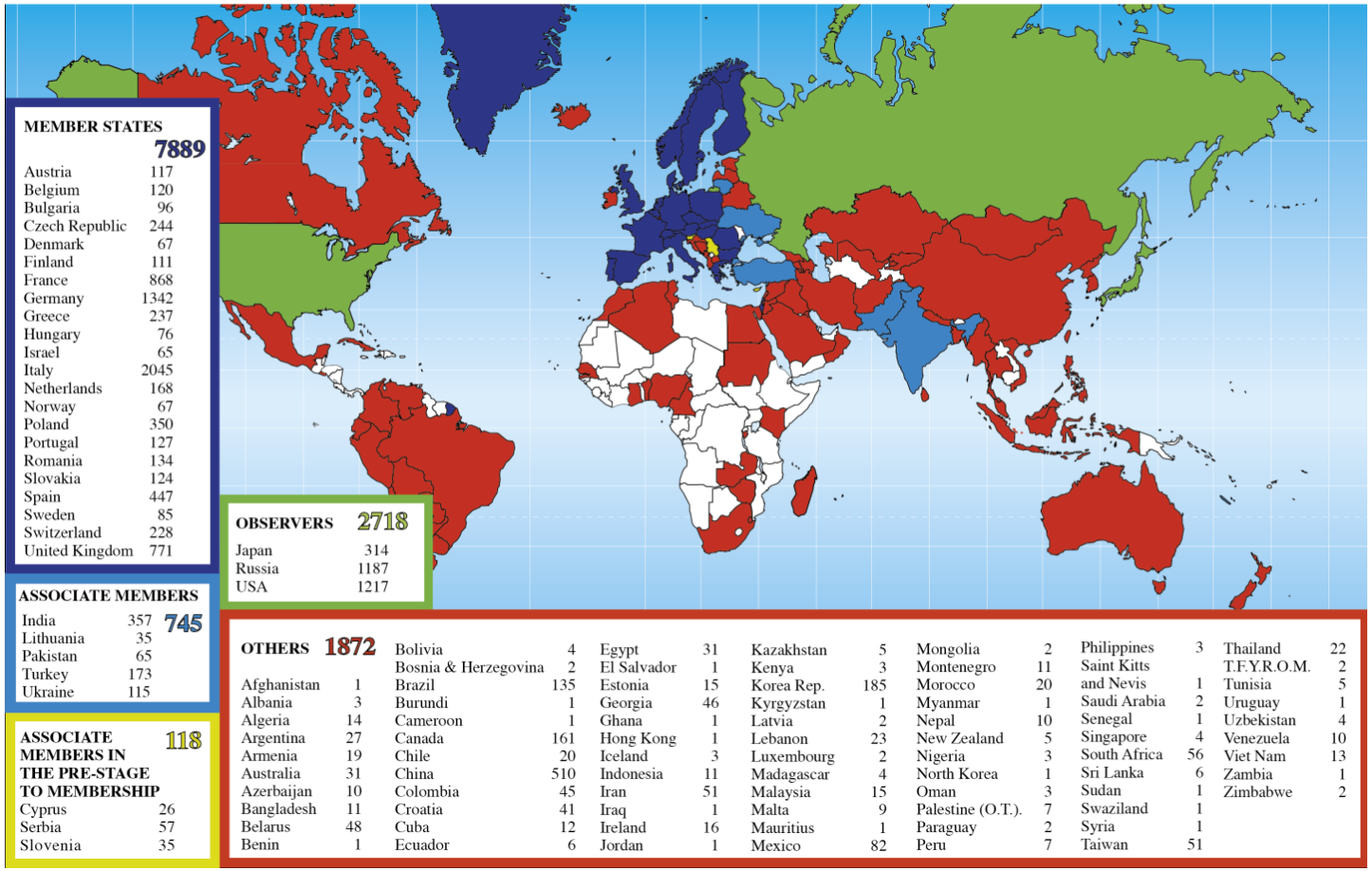
Collaboration is key

ATLAS and CMS work in competition with each other, then combine results and share new techniques



International cooperation enables these ambitious projects

Distribution of All CERN Users by Nationality on 24 January 2018



MEMBER STATES 7889

Austria	117
Belgium	120
Bulgaria	96
Czech Republic	244
Denmark	67
Finland	111
France	868
Germany	1342
Greece	237
Hungary	76
Israel	65
Italy	2045
Netherlands	168
Norway	67
Poland	350
Portugal	127
Romania	134
Slovakia	124
Spain	447
Sweden	85
Switzerland	228
United Kingdom	771

ASSOCIATE MEMBERS 745

India	357
Lithuania	35
Pakistan	65
Turkey	173
Ukraine	115

ASSOCIATE MEMBERS IN THE PRE-STAGE TO MEMBERSHIP 118

Cyprus	26
Serbia	57
Slovenia	35

OBSERVERS 2718

Japan	314
Russia	1187
USA	1217

OTHERS 1872

Afghanistan	1
Albania	3
Algeria	14
Argentina	27
Armenia	19
Australia	31
Azerbaijan	10
Bangladesh	11
Belarus	48
Benin	1
Bolivia	4
Bosnia & Herzegovina	2
Brazil	135
Burundi	1
Cameroon	1
Canada	161
Chile	20
China	510
Colombia	45
Croatia	41
Cuba	12
Ecuador	6
Egypt	31
El Salvador	1
Estonia	15
Georgia	46
Ghana	1
Hong Kong	1
Iceland	3
Indonesia	11
Iran	51
Iraq	1
Ireland	16
Jordan	1
Kazakhstan	5
Kenya	3
Korea Rep.	185
Kyrgyzstan	1
Latvia	2
Lebanon	23
Luxembourg	2
Madagascar	4
Malaysia	15
Malta	9
Mauritius	1
Mexico	82
Mongolia	2
Montenegro	11
Morocco	20
Myanmar	1
Nepal	10
New Zealand	5
Nigeria	3
North Korea	1
Oman	3
Palestine (O.T.).	7
Paraguay	2
Peru	7
Philippines	3
Saint Kitts and Nevis	1
Saudi Arabia	2
Senegal	1
Singapore	4
South Africa	56
Sri Lanka	6
Sudan	1
Swaziland	1
Syria	1
Taiwan	51
Thailand	22
T.F.Y.R.O.M.	2
Tunisia	5
Uruguay	1
Uzbekistan	4
Venezuela	10
Viet Nam	13
Zambia	1
Zimbabwe	2

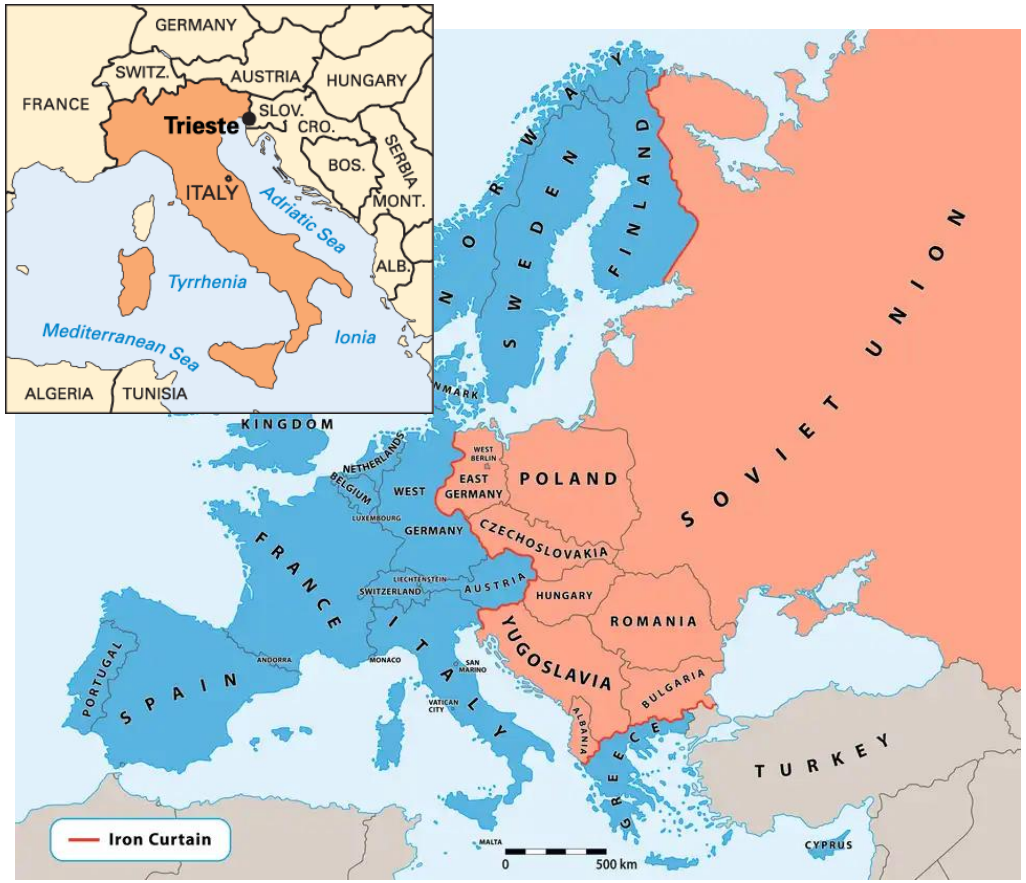
At the end of the Second World War, European science was no longer world-class

1954 CERN was born as a international cooperation between **13** European states

Today CERN has **23** member states, and many countries participate

Working for **Science for Peace!**

International cooperation builds bridges across nations



The international Centre for Theoretical Physics (ICTP), Trieste, Italy.

During the Cold War era in the heart of Europe, a continent separated by the iron curtain, ICTP provided a rare line of communication between scientists from the East and West, and those from developing nations.

Is Physics Diverse?

Not as much as we would like

Internationally, richer countries fare better

- many countries **lack resources** and their universities lack investment

- many scientists do not have the same access to **funding** and **governmental support** as others

- many students and young people **lack exposure, access** and **opportunity**

- **This costs us valuable scientists!**

Dr Wafaa Khater, Birzeit University, Palestinian Territories.

- Lacks time for research
- No access to research grants
- No funding to travel to conferences to present results and meet new collaborators

Is Physics Diverse?

Physics students at Kabul University, Afghanistan, during an ICTP Physics Without Frontiers School

- There is no physics masters programme in Afghanistan

- Top students must look for master’s degree abroad, but funded master’s are very rare!

Is Physics Diverse?

The mission of the **ICTP** includes to foster physics in developing nations, and support scientists.

CERN programmes work to support students and scientists from non-member states.

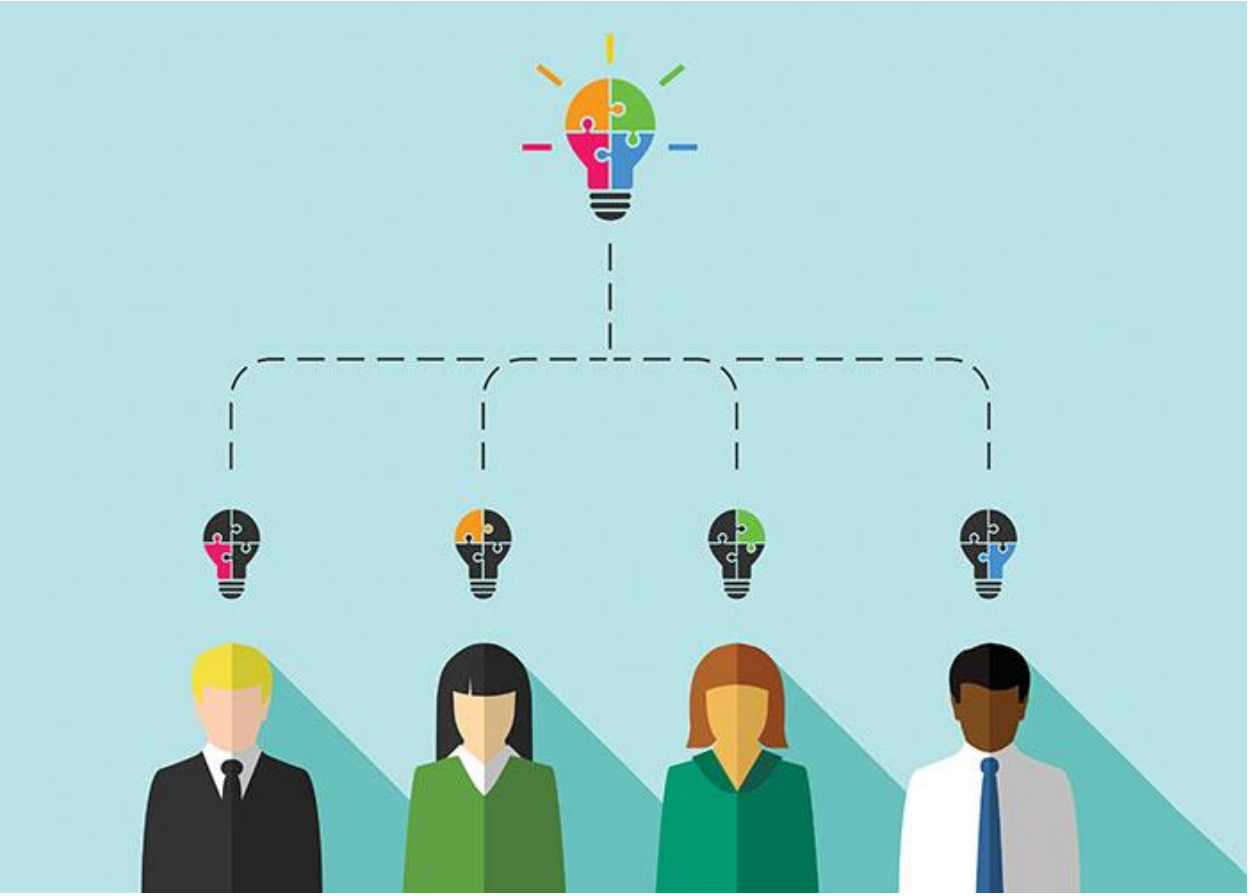
Is Physics Diverse?

Not as much as we would like

Nationally there is often issues with diversity in physics

- Many groups are under-represented in physics (aspects such as gender, sexuality, ethnicity, social-economic background)

- We are working to address this and recognize the barriers, organise outreach initiatives and support role models and new initiatives



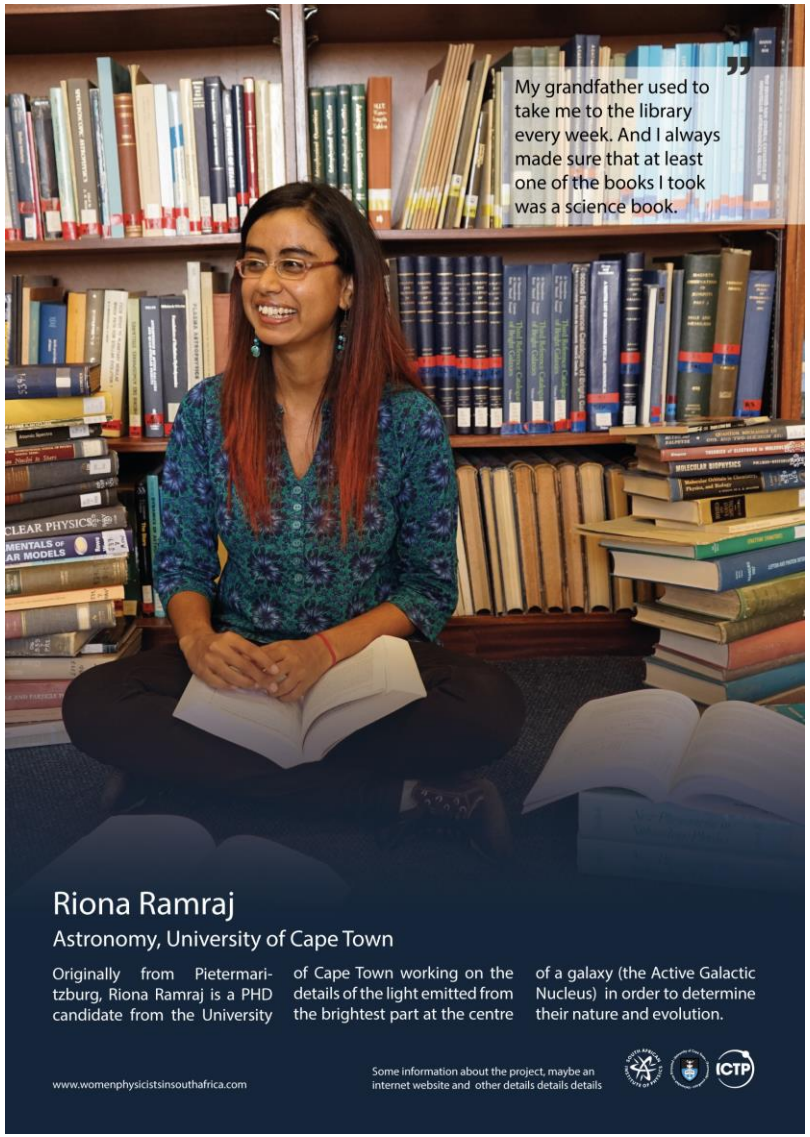
Is Physics Diverse?

Working with Sahal Yacoob, Organisation of Women in Physics in South Africa, University of Cape Town, and the ICTP

Project to support women in physics in South Africa

- Posters of women in Physics, with inspiration quotes
- Displayed in high schools and science events throughout South Africa
- **Role models** and **imagery** are vital

Is Physics Diverse?



Project to support women in physics in South Africa

- Posters of women in Physics, with inspiration quotes
- Displayed in high schools and science events throughout South Africa
- **Role models** and **imagery** are vital

Summary

A diverse community makes us all stronger!

We are proud of our **international** and **diverse** community!