







CMS

LHC

CERN
Preessin

ALICE >>

LHC

ATLAS

CERN
Meyrin

LHCb

1 km

A laboratory for people around the world

Distribution of all CERN Users by the country of their home institutes as of 31 December 2022



Geographical & cultural diversity
Users of 110 nationalities
19.4% women

Member States 7147

Austria 85 – Belgium 129 – Bulgaria 43 – Czech Republic 244
Denmark 49 – Finland 90 – France 844 – Germany 1225
Greece 119 – Hungary 73 – Israel 64 – Italy 1527
Netherlands 169 – Norway 79 – Poland 305 – Portugal 100
Romania 109 – Serbia 33 – Slovakia 70 – Spain 383
Sweden 103 – Switzerland 406 – United Kingdom 898

Associate Member States in the pre-stage to membership 69
Cyprus 15 – Estonia 30 – Slovenia 24

Associate Member States 382

Croatia 38 – India 132 – Latvia 16 – Lithuania 14 – Pakistan
35 – Türkiye 122 – Ukraine 25

Observers 2991

Japan 216 – Russia (suspended) 873 – United States of
America 1902



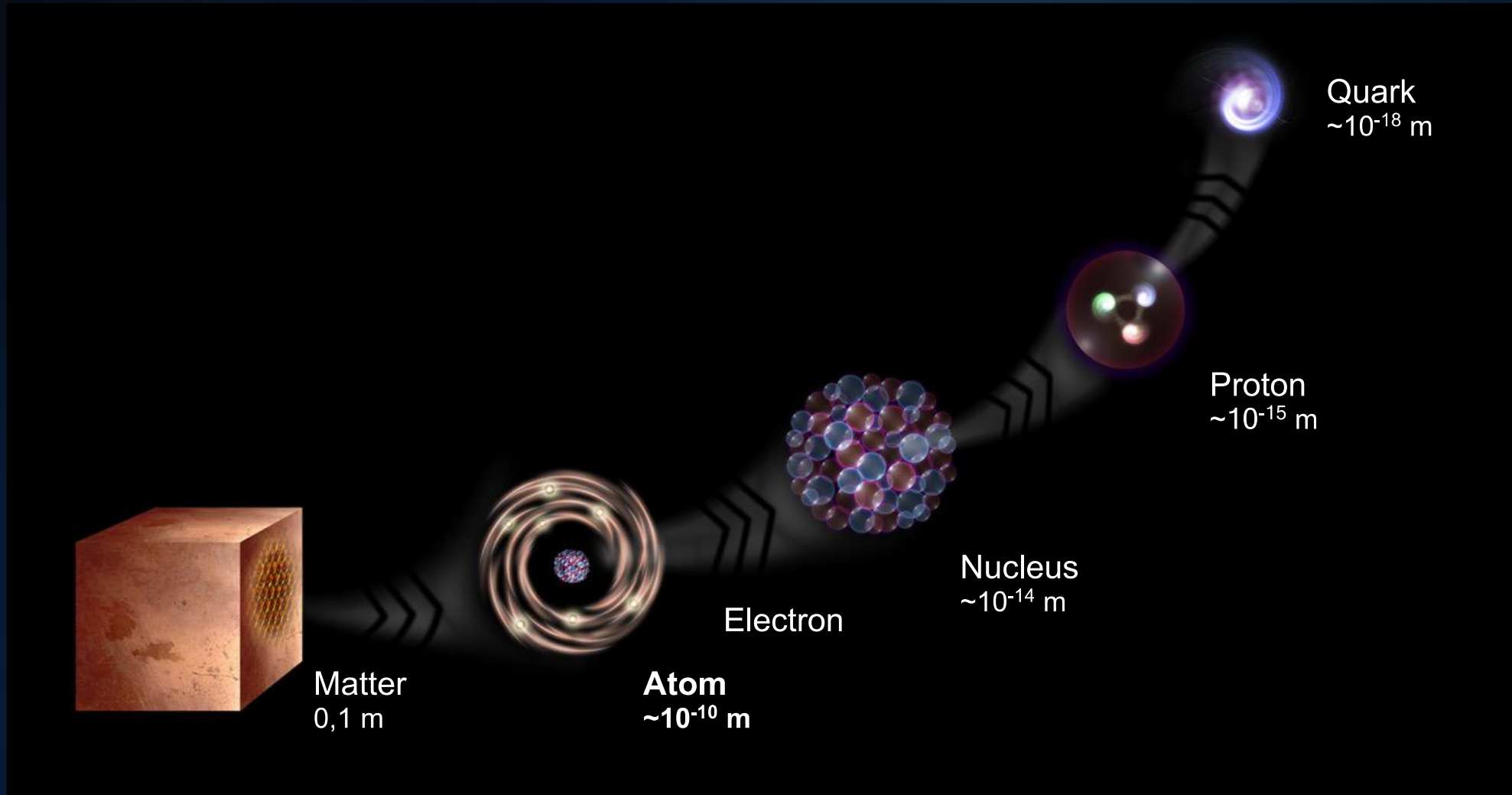
Non-Member States and Territories 271

Algeria 2 – Argentina 12 – Armenia 8 – Australia 21 – Azerbaijan 2 – Bahrain 4 – Belarus 15 – Brazil 122
Canada 199 – Chile 34 – Colombia 21 – Costa Rica 2 – Cuba 3 – Ecuador 4 – Egypt 20 – Georgia 32
Hong Kong 15 – Iceland 3 – Indonesia 5 – Iran 11 – Ireland 5 – Jordan 5 – Kuwait 4 – Lebanon 13 – Madagascar 1
Malaysia 4 – Malta 1 – Mexico 49 – Montenegro 4 – Morocco 19 – New Zealand 5 – Nigeria 1 – Oman 1
Palestine 1 – People's Republic of China 333 – Peru 2 – Philippines 1 – Republic of Korea 147 – Singapore 2
South Africa 52 – Sri Lanka 10 – Taiwan 45 – Thailand 17 – Tunisia 2 – United Arab Emirates 7 – Viet Nam 1



Elementary Particles

Subatomic particles that are not composed by other particles

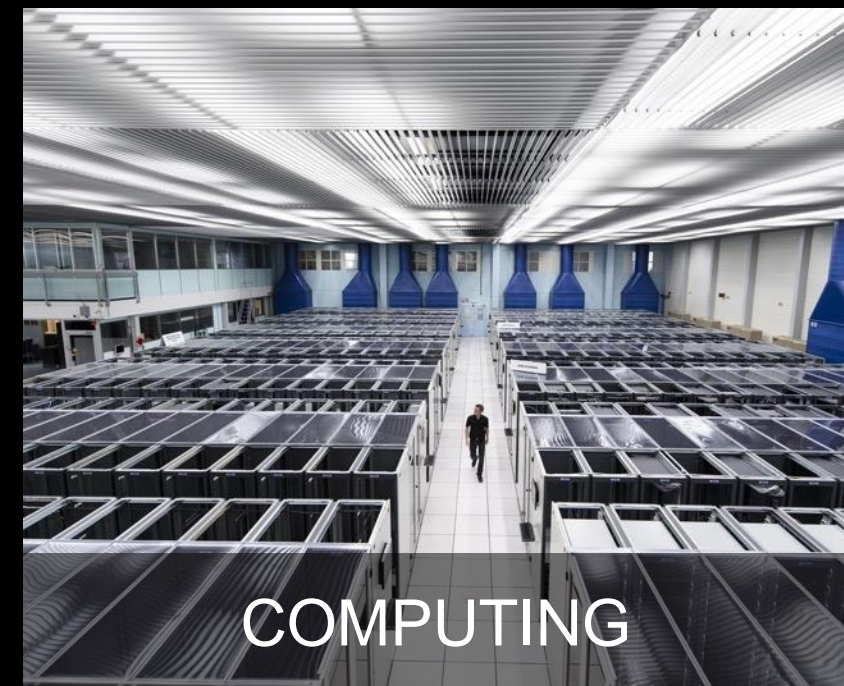


Elementary particles: quarks and electrons $< 10^{-18}$ m = 0.000000000000000001





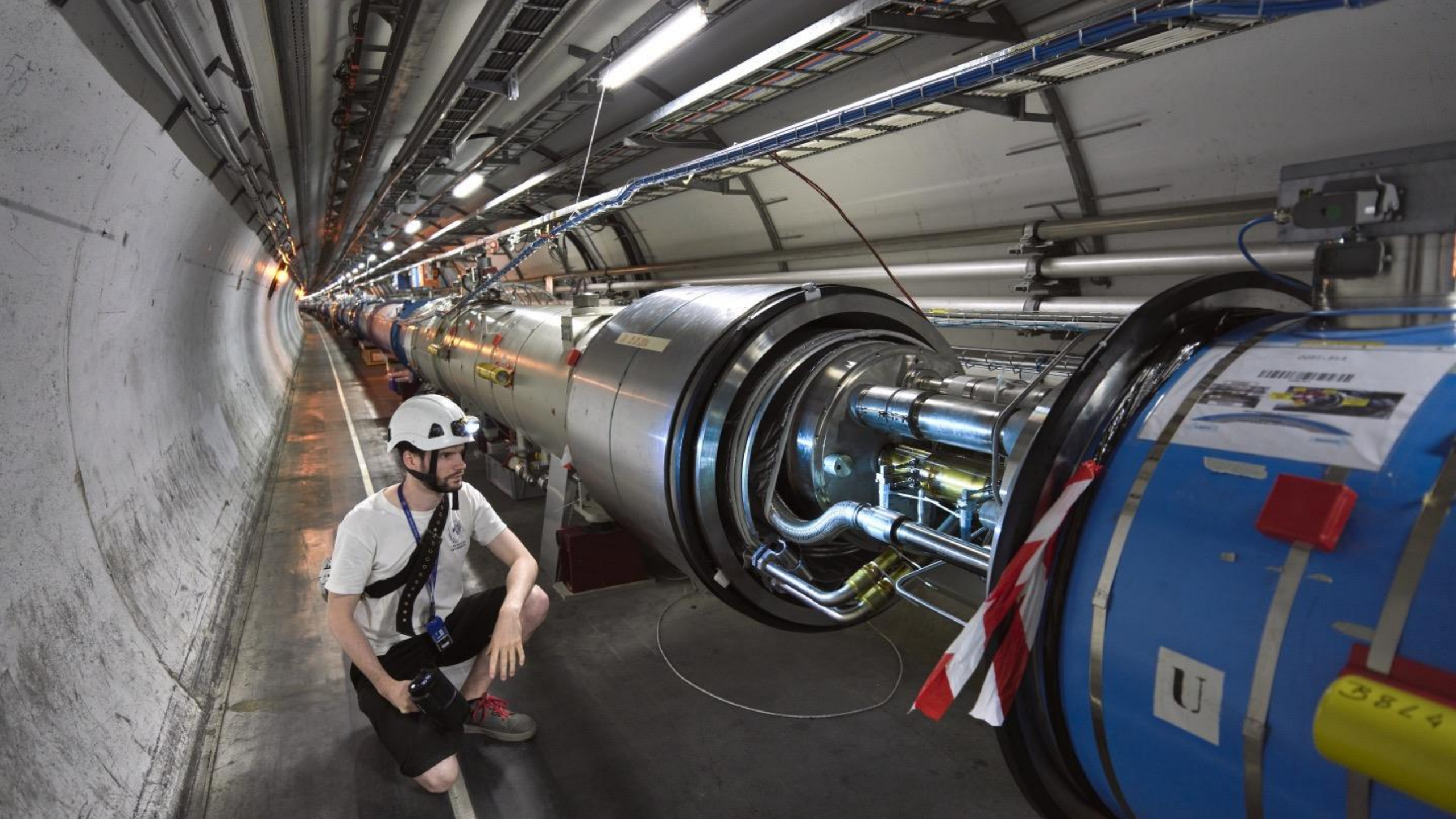
ACCELERATORS



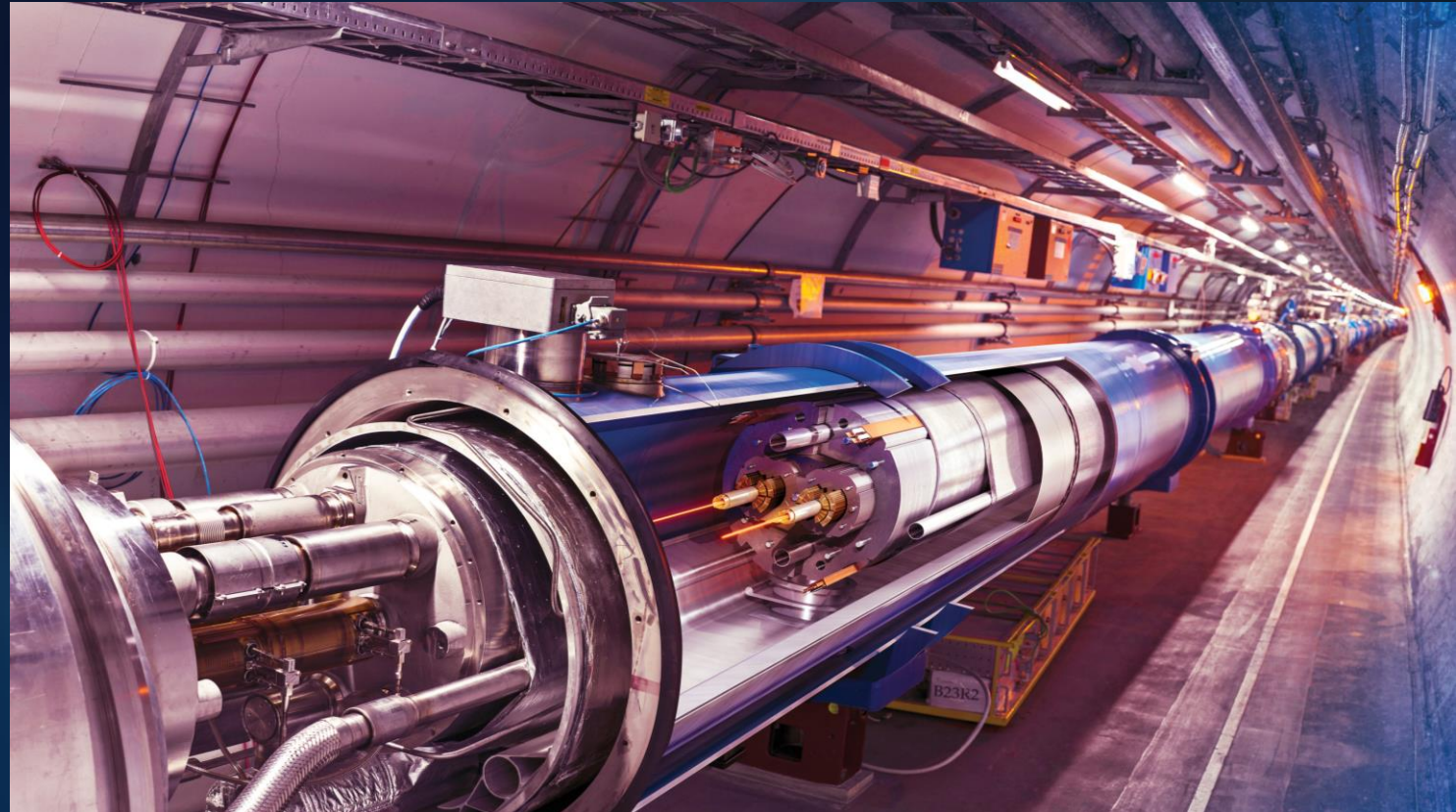
COMPUTING



DETECTORS



Giant dipole electromagnets - 15 m long - 30 tons



Superconductivity in the LHC

~ 10000 superconducting magnets

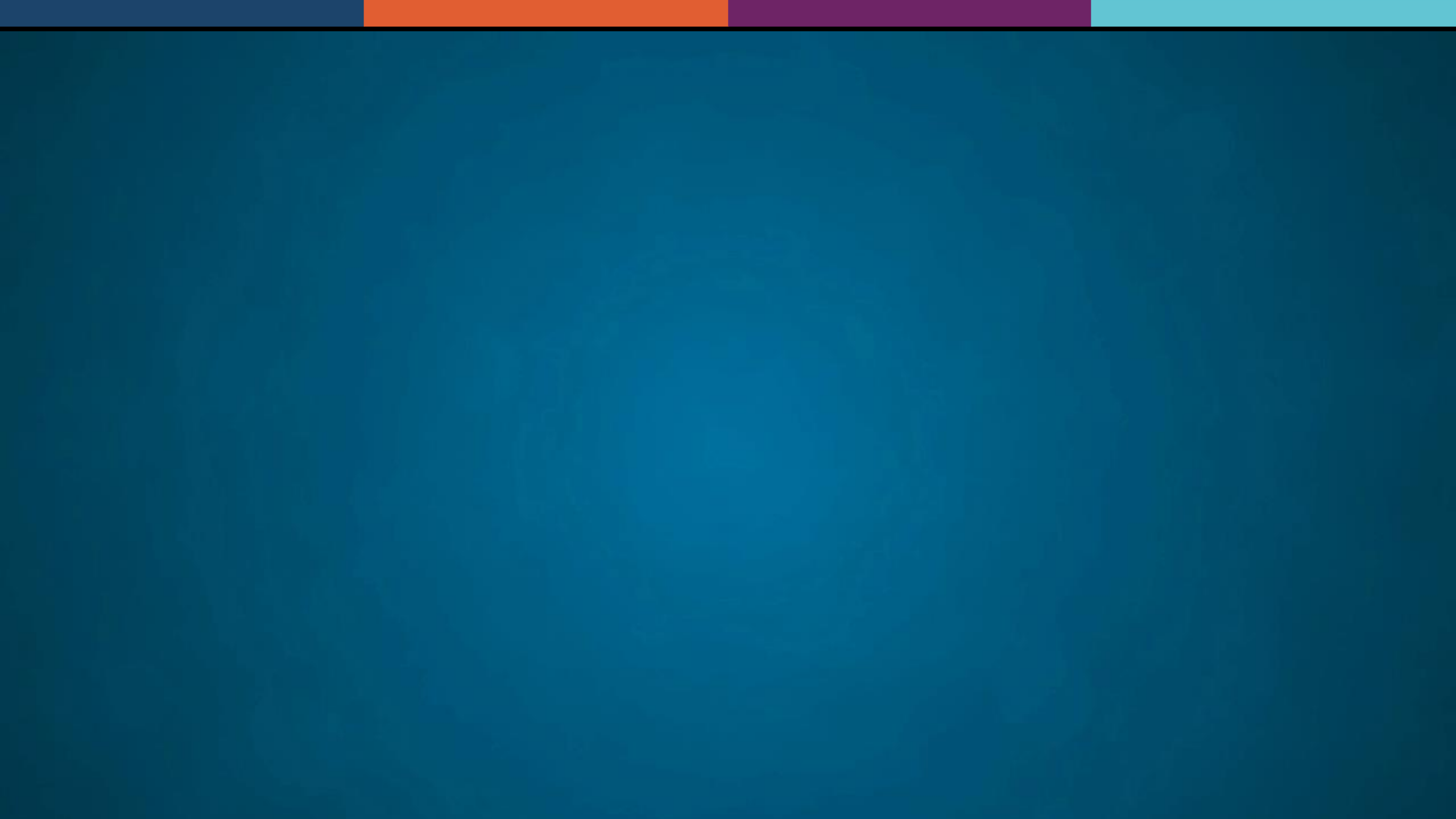
~ 1.5 Million Ampere

30 tons of superfluid helium

superfluid helium at 1.9 K (- 271.3 °C)

1200 tons/7600 km of Nb-Ti cables





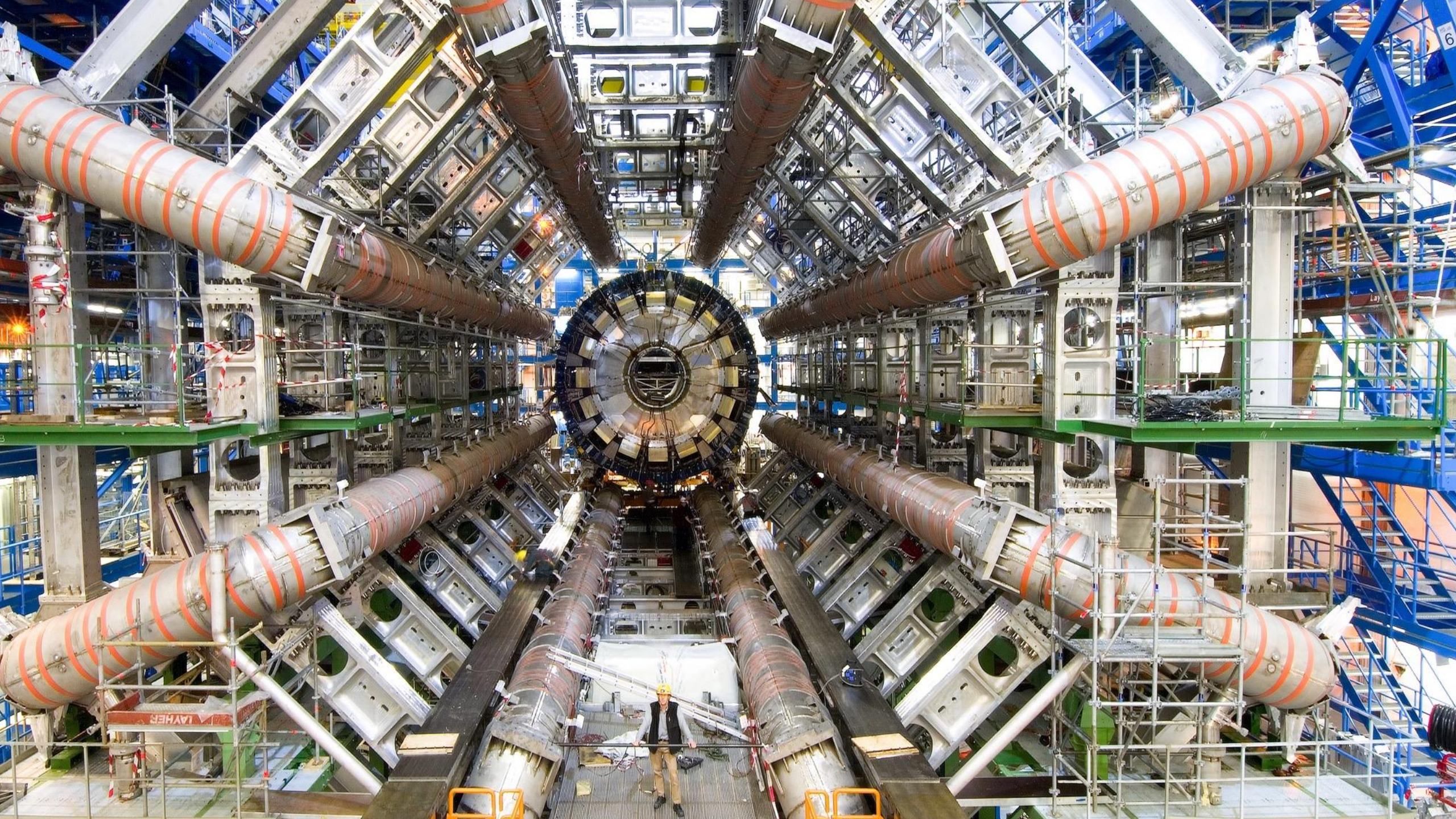
I Ferri del Mestiere di Fisico delle Particelle



ACCELERATORS



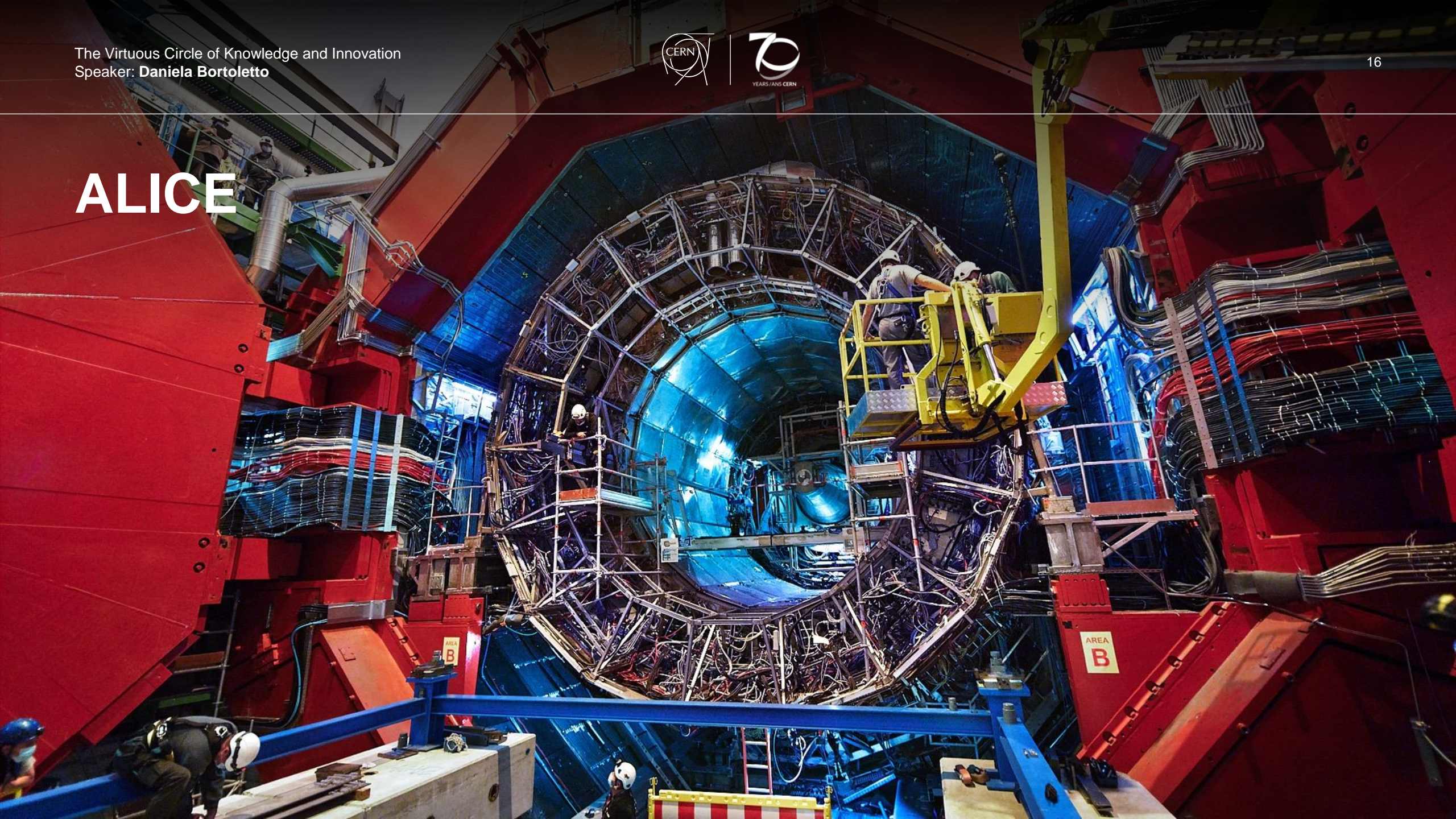
DETECTORS



CMS

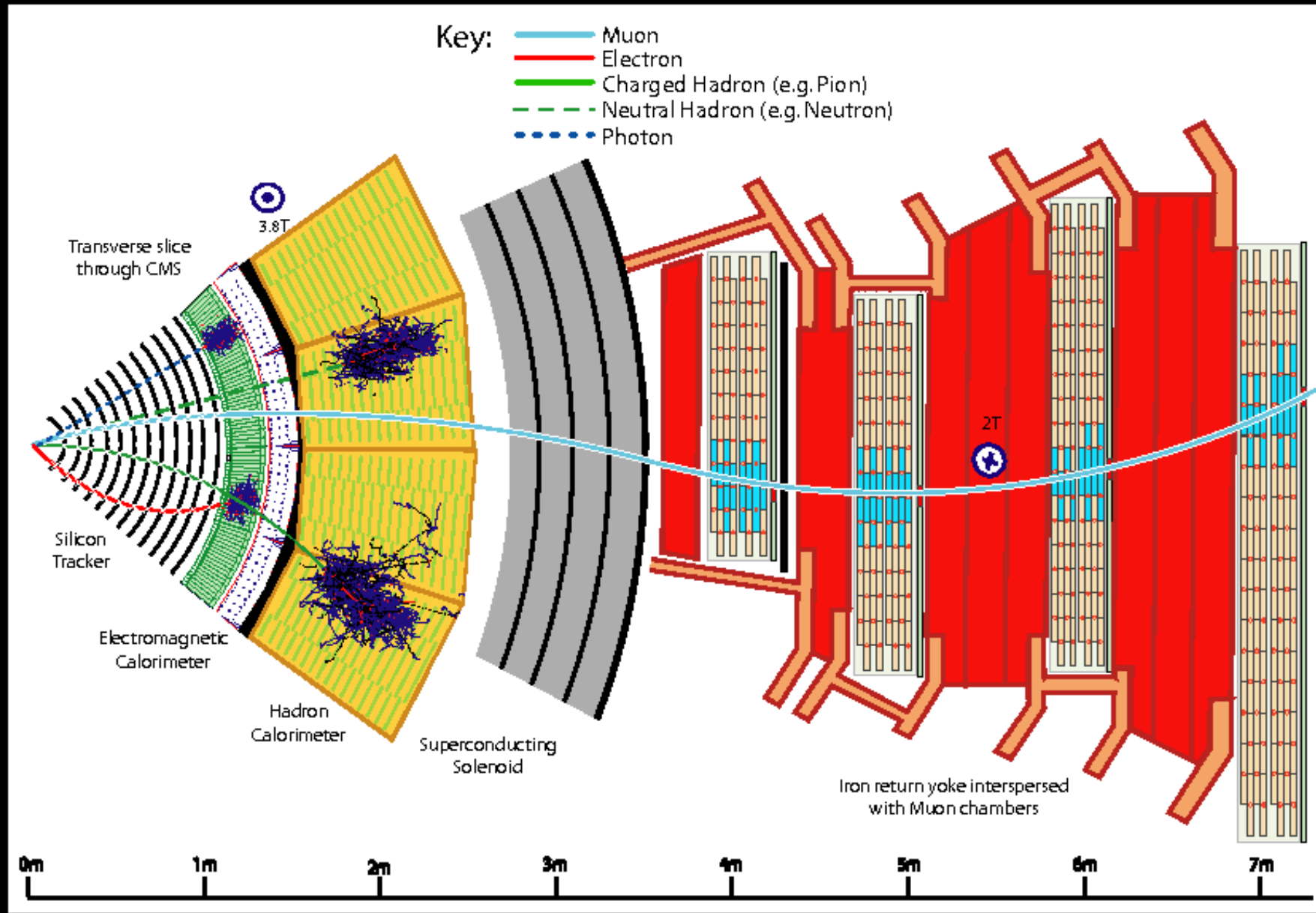


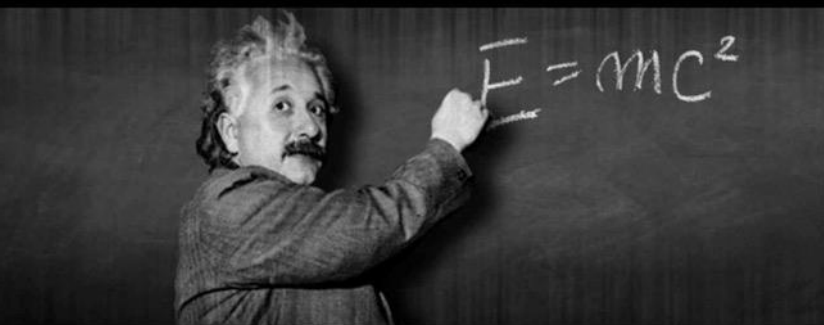
ALICE



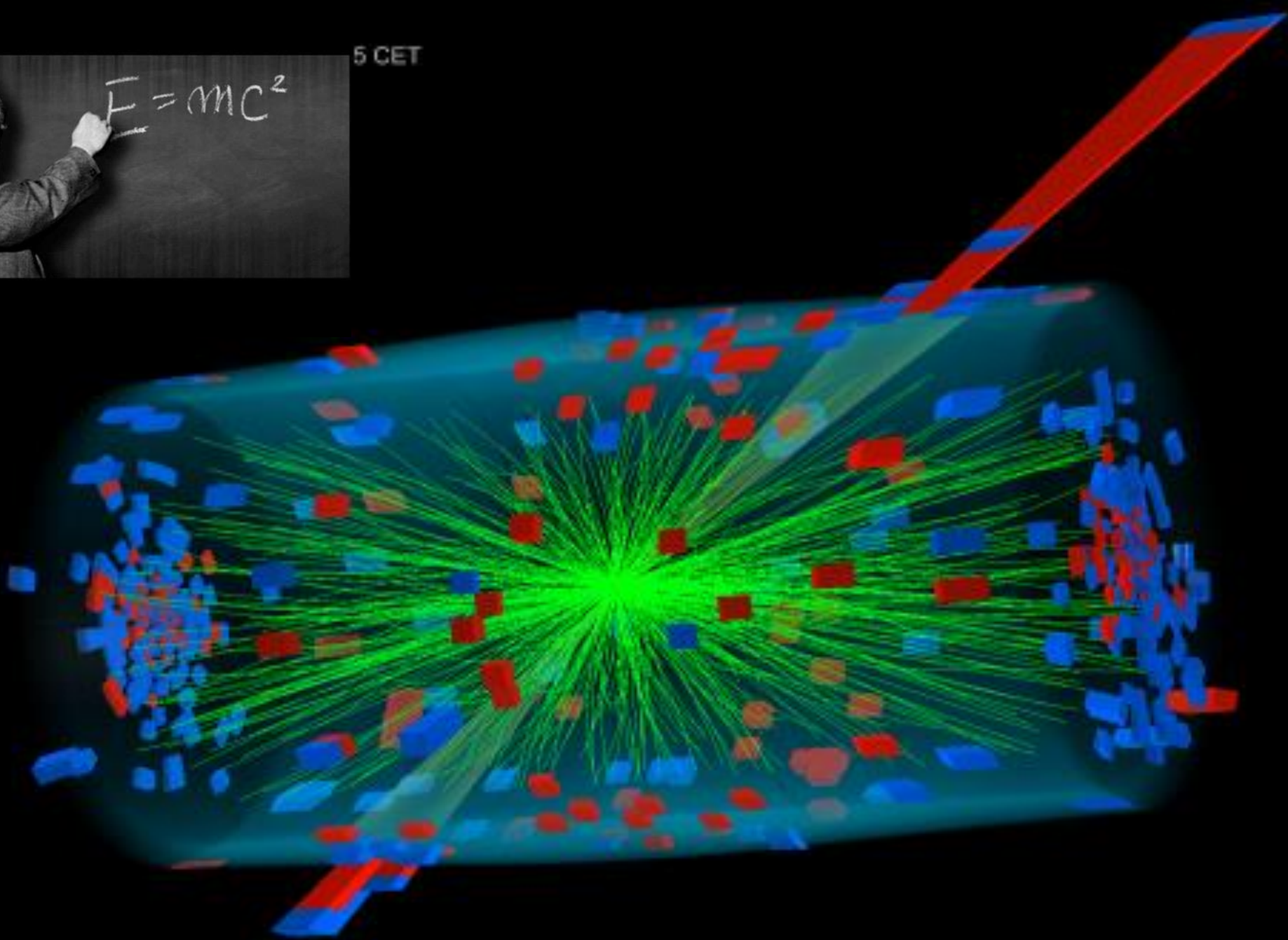
LHCb





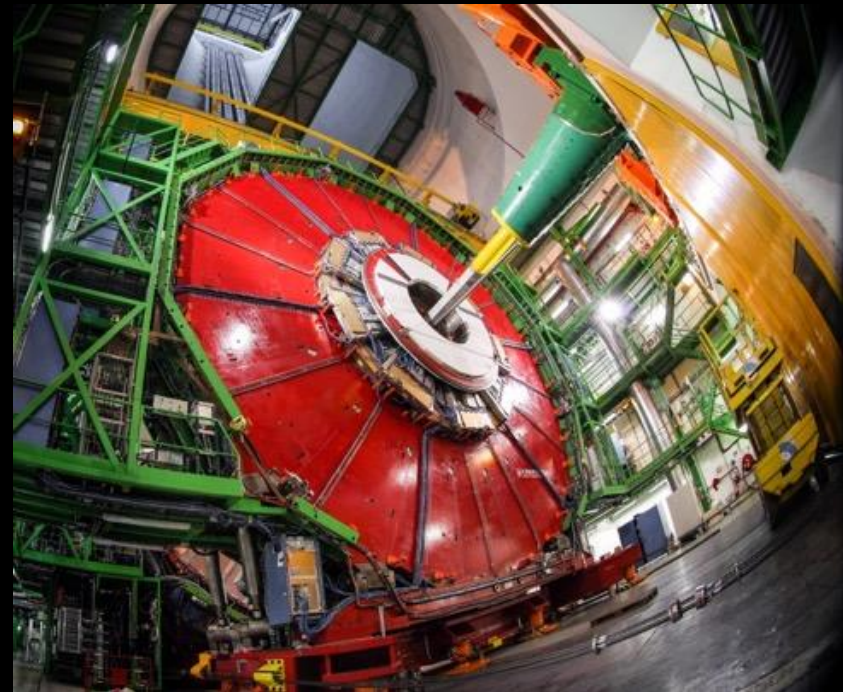


5 CET

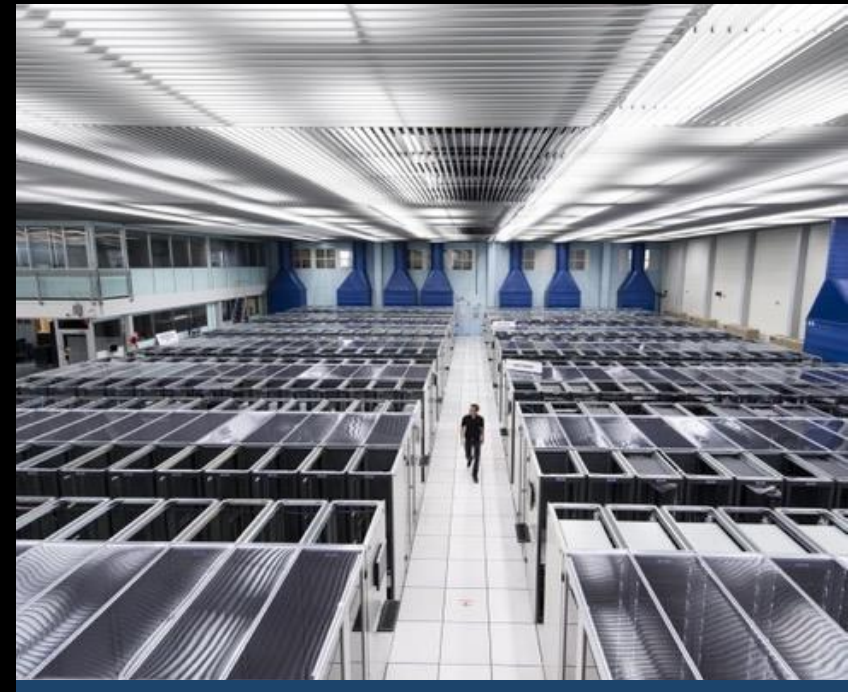




ACCELERATORS



DETECTORS



COMPUTING

WHERE THE WEB WAS BORN

In the office of the director of the...
Wide Web were born.

Started in 1980 from a group of...
was first started when...
Networking Division...
Computing in Physics Division

In 1981 the first...
It was...
Robert Callan...
Communication

At the end of 1981...
Communication...
was...
the...
M...
Automation...

In 1983...
...
...
...

DATA DISPLAY

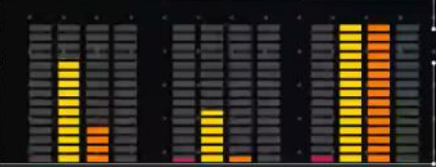
03 February 2023 - 10:00

Average number of cores used by LHC VO: 1070651

Power delivered to LHC VO: 1338.317 H506

LHC VO transfer throughput: 17.05 GB/s

VOLUME TRANSFERS · VOLUME FILES · VOLUME DATA



CURRENTLY DISPLAYING

FROM: 03 February 2023 - 08:00

TO: 03 February 2023 - 10:59

LAST DATA UPDATE · LOADING 100 %

3 B downloaded on Friday, 03 February 2023
Last transfer was on Friday, 03 February 2023

DATA TRANSFER · CONSOLE

62857254B From SAWS-MATRIX to CDF-MR on Friday, 03 February 2023
791520016J From N04N-Asseco to HEP-EDMS-7316 on Friday, 03 February 2023
74932018 From INFN-BOLOGNA to IEP505-Science on Friday, 03 February 2023
298001000 From INFN-Asseco to FN-TC00 on Friday, 03 February 2023
39231 From INFN-BOLOGNA to INFN on Friday, 03 February 2023
88108377 From RD-LF-NPHE to FN-TC00 on Friday, 03 February 2023
87018001 From INFN-Asseco to INFN on Friday, 03 February 2023



GLOBE VIEW · MAP VIEW

EXPERIMENTS SELECTION

Click on experiment names to filter tracks

- ALICE
- ATLAS
- CMS
- LHCb

TIERS SELECTION · ENABLED

Click on tier buttons to filter data

- TIER 0
- TIER 1
- TIER 2
- TIER 3

DATES SELECTION · ACTIVE

Use calendar to filter a period of time

SELECT DATES



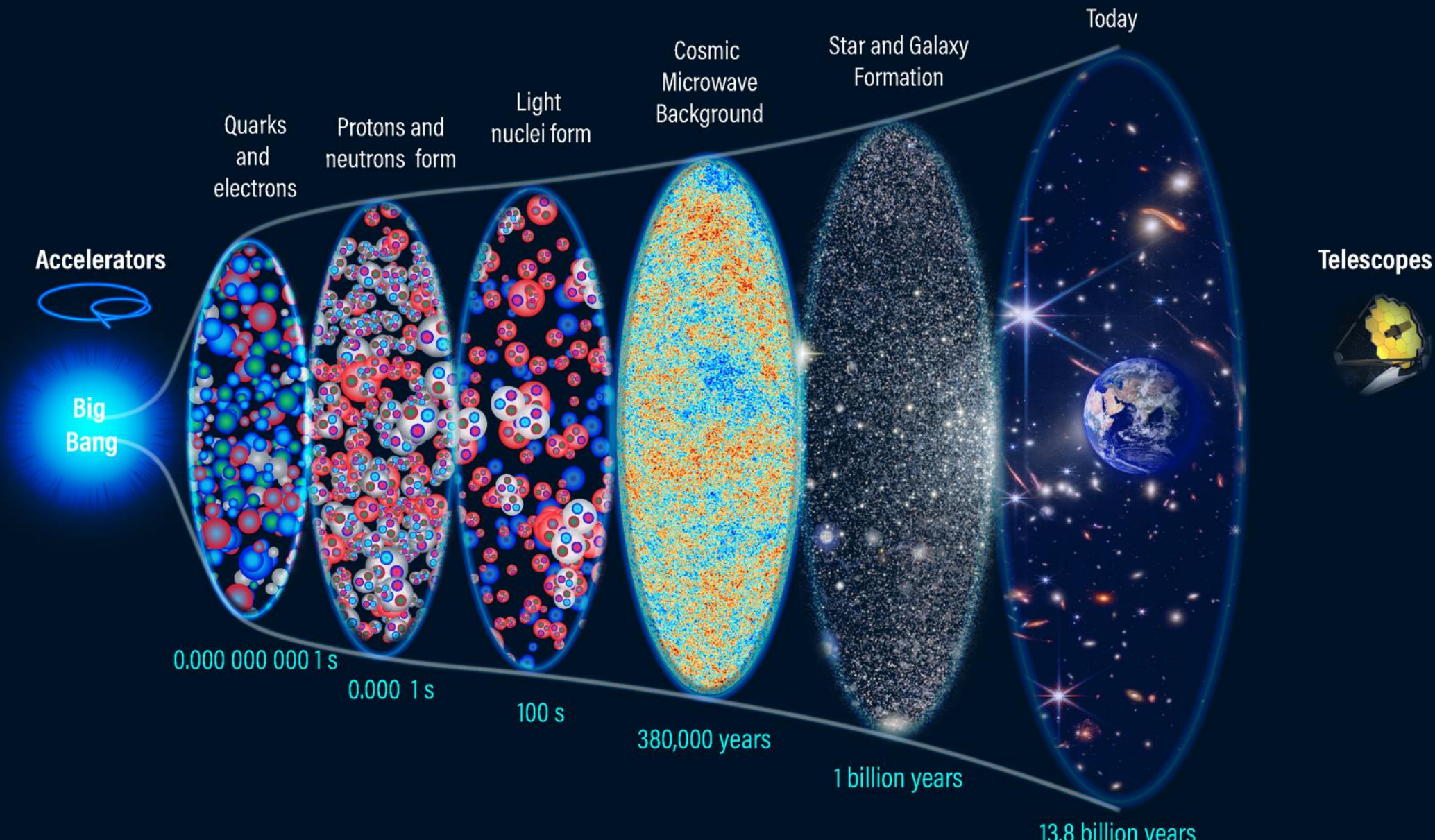
COUNTRIES SELECTION · LIST

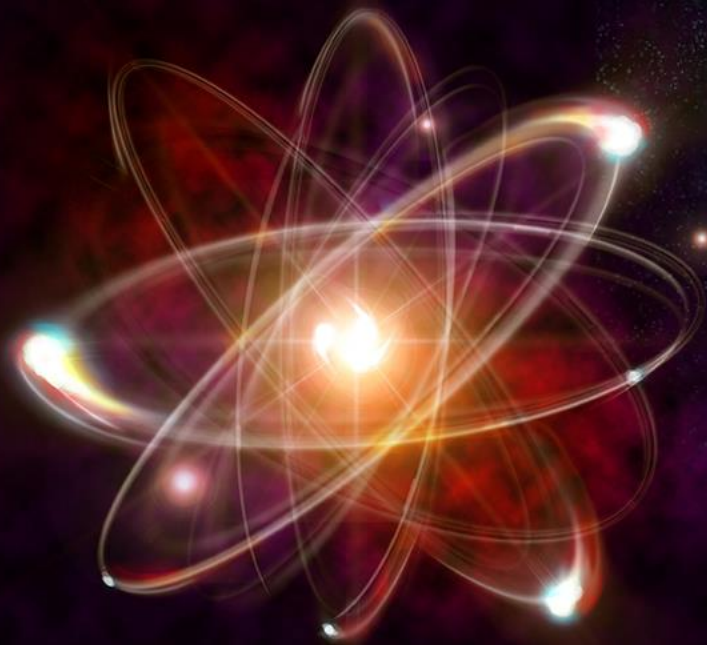
Select name from list to filter by country

NO COUNTRY SELECTED

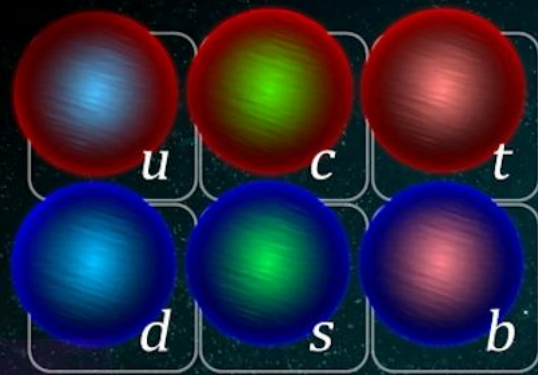
- Afghanistan
- Aland
- Albania
- Algeria
- American Samoa
- Andorra
- Angola

HISTORY OF THE UNIVERSE

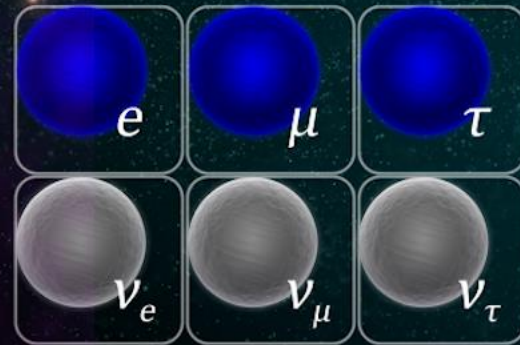




The atom



Quarks



Leptons

The Standard Model



Higgs boson



Forces





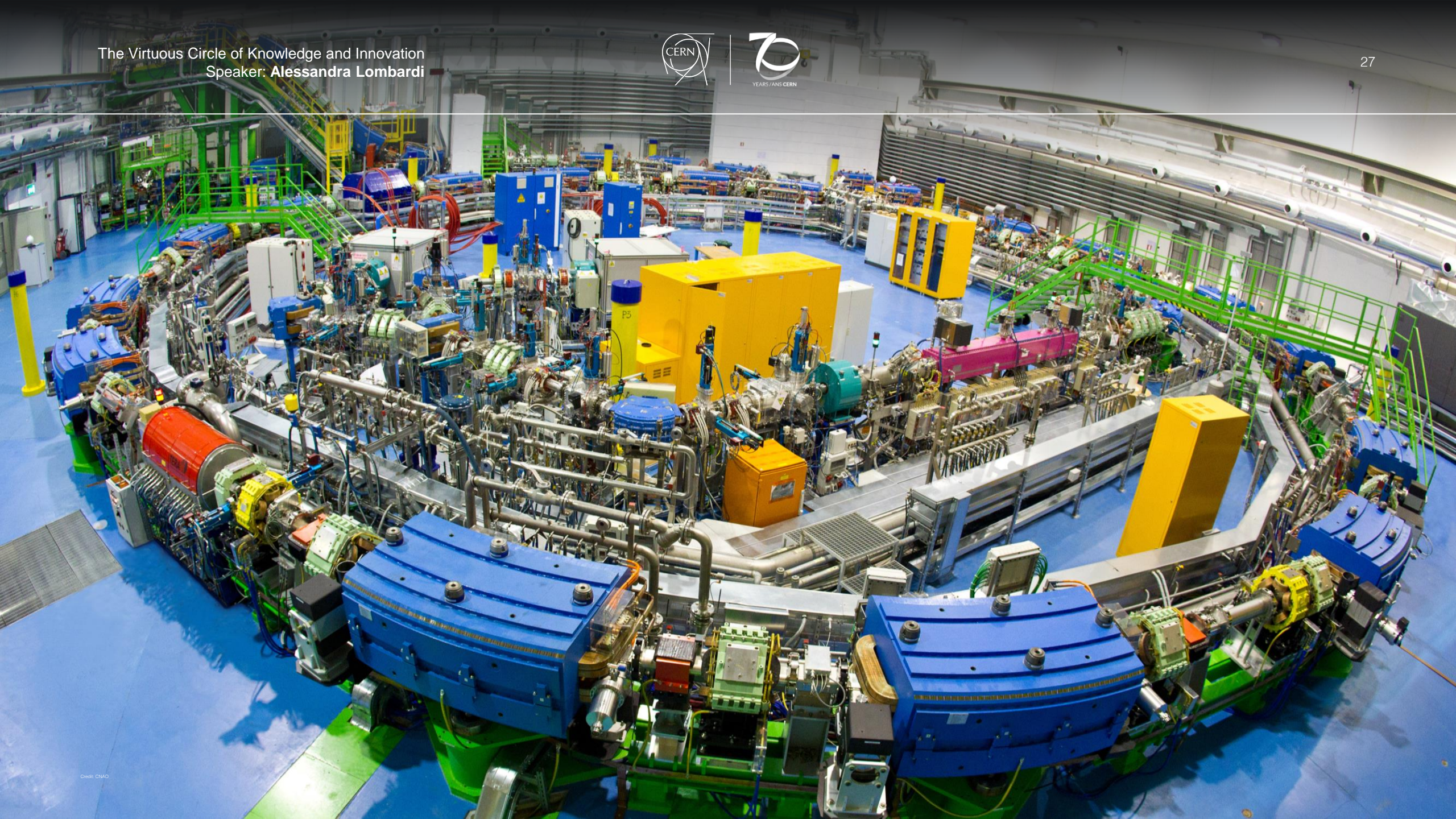
42,200 accelerators worldwide

- 27,000 (64%) in industry
- 14,000 (33%) for medical
- 1,200 (3%) for basic research

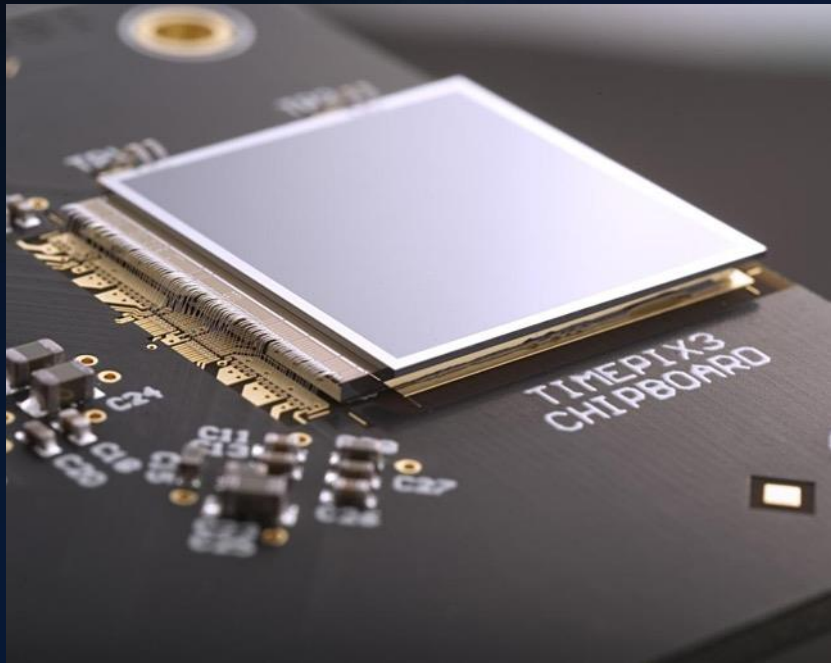
- 70 companies produce accelerators for industrial applications

1,100 industrial systems per year for a market value of \$2.2B

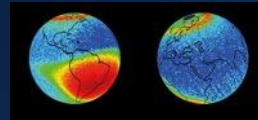




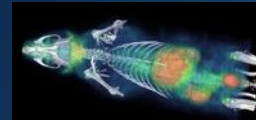
From particle physics to technology and back



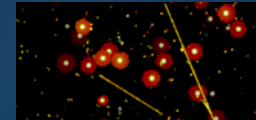
Space



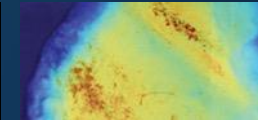
Biology



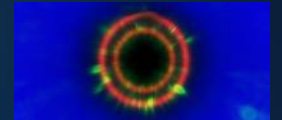
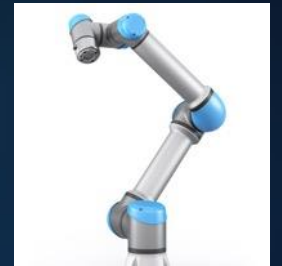
Research



Mining



Non-destructive testing

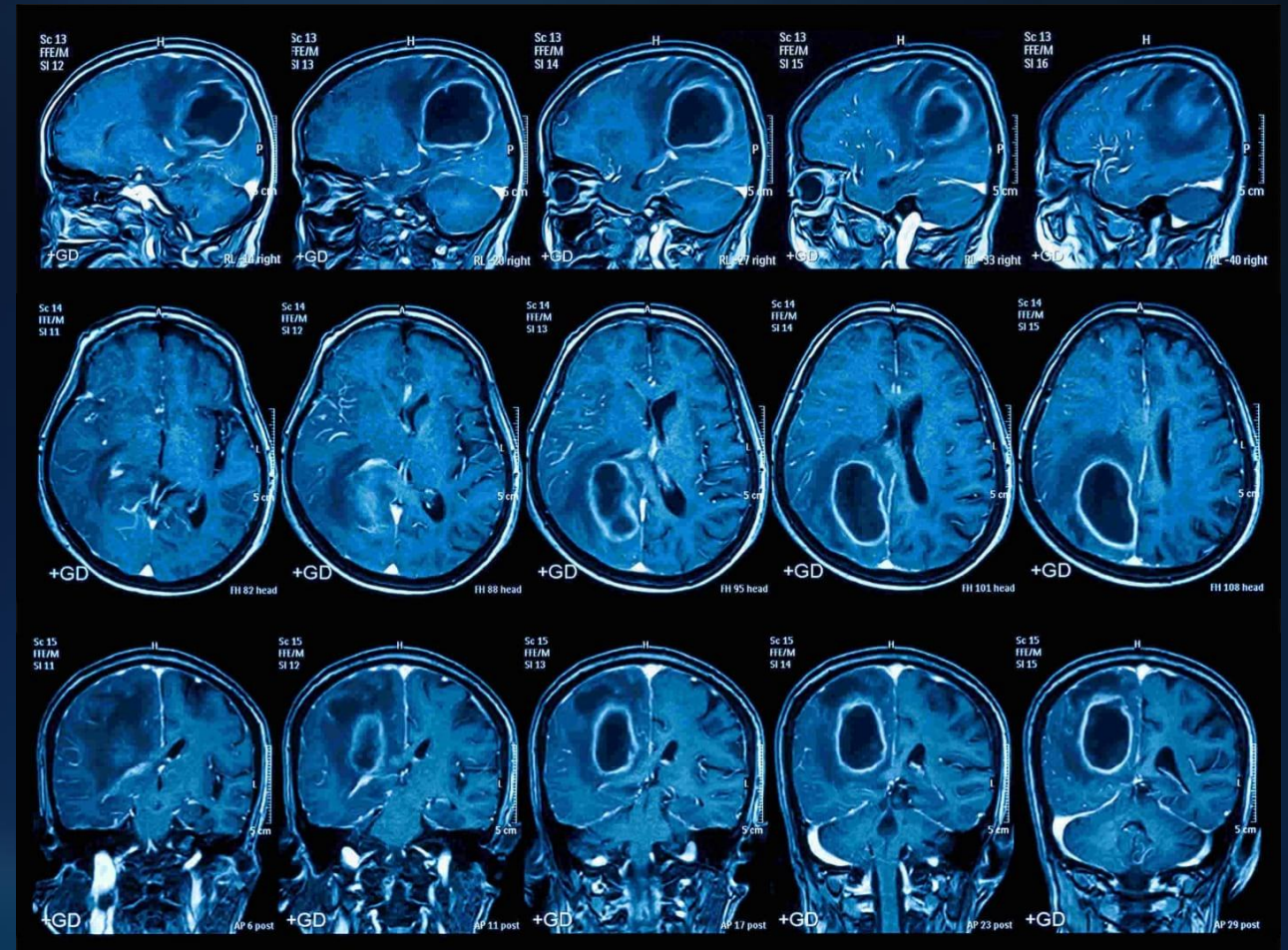


MRI Magnets

Superconducting magnets in MRI:
Non-invasive 3D anatomical imaging

MRI industry consumes ~4000 tons of Nb-Ti annually

Over 50,000 MRI scanners worldwide



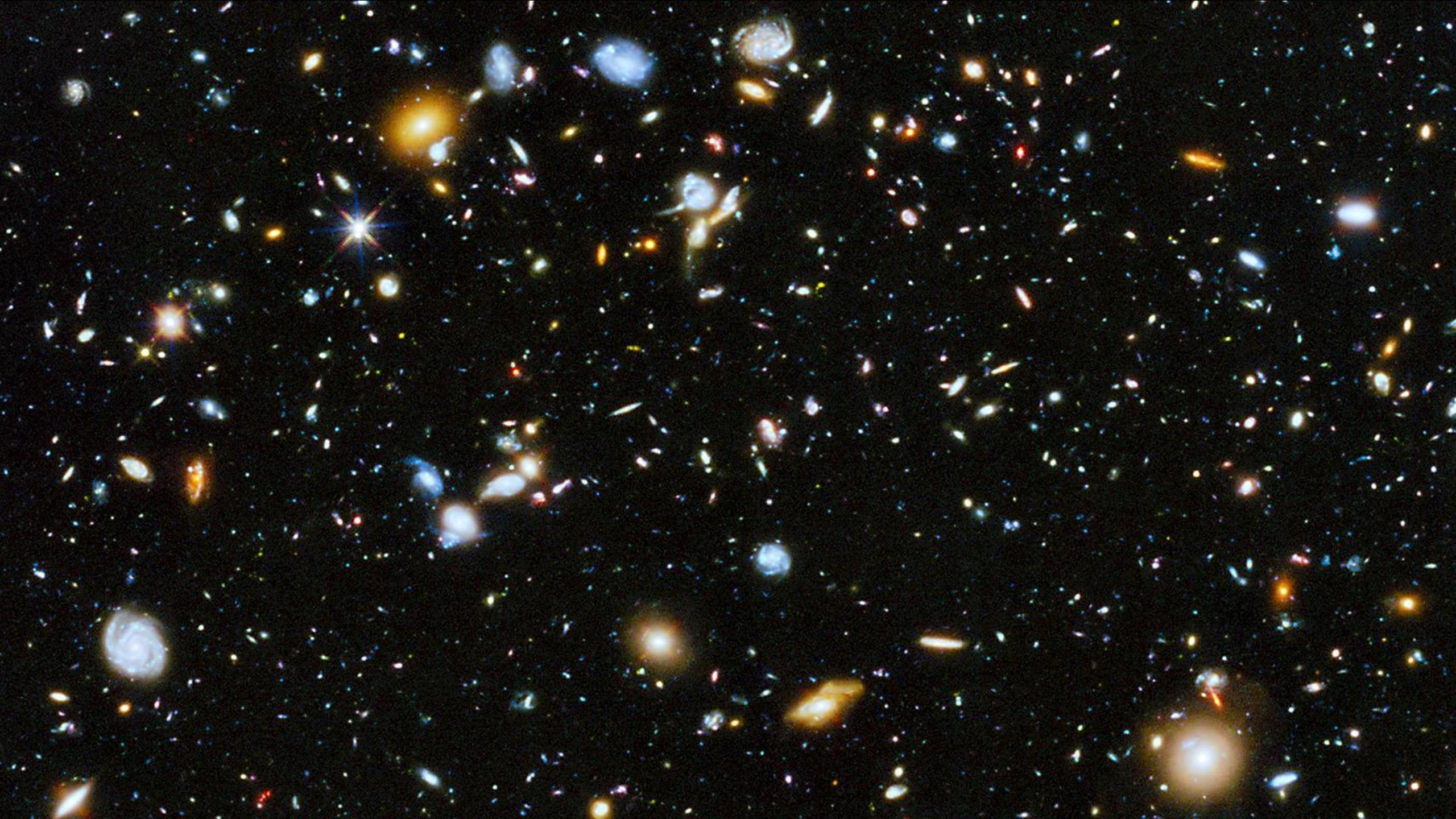
Superconducting Technology for future low-emission aeroplanes



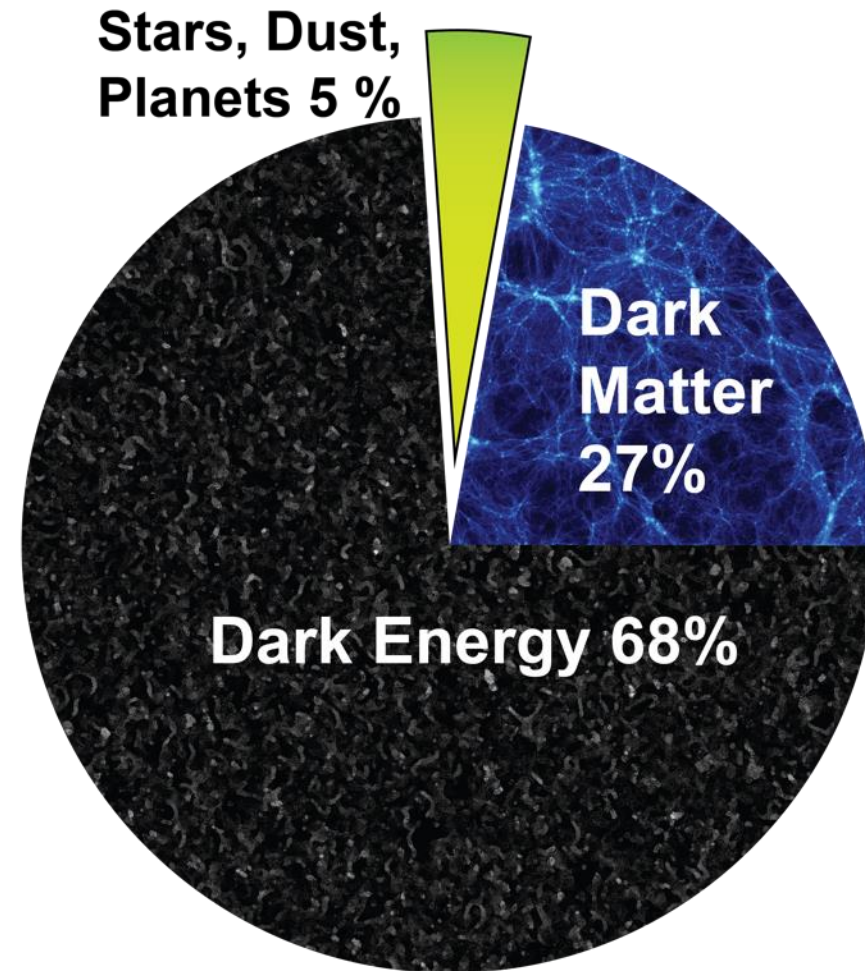
Levitation & Transportation







95 % of the mass-energy content of the Universe are unknown 'dark energy' and 'dark matter'





Galaxies rotate too fast

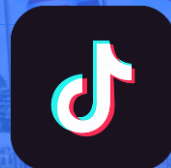
Movement of galaxy clusters

Gravitational lensing

Cosmic Microwave Background



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