



Introduction to CERN

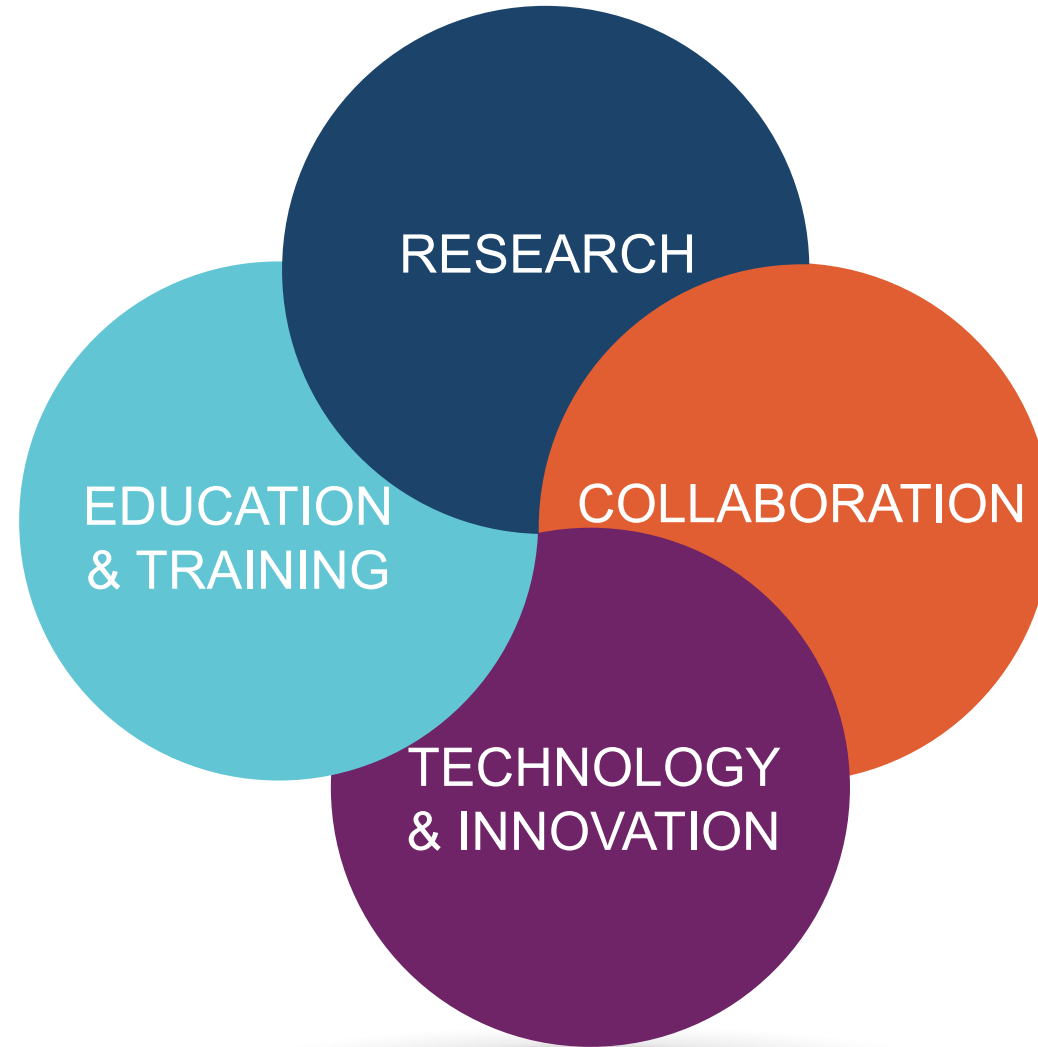
Emmanuel Tsesmelis

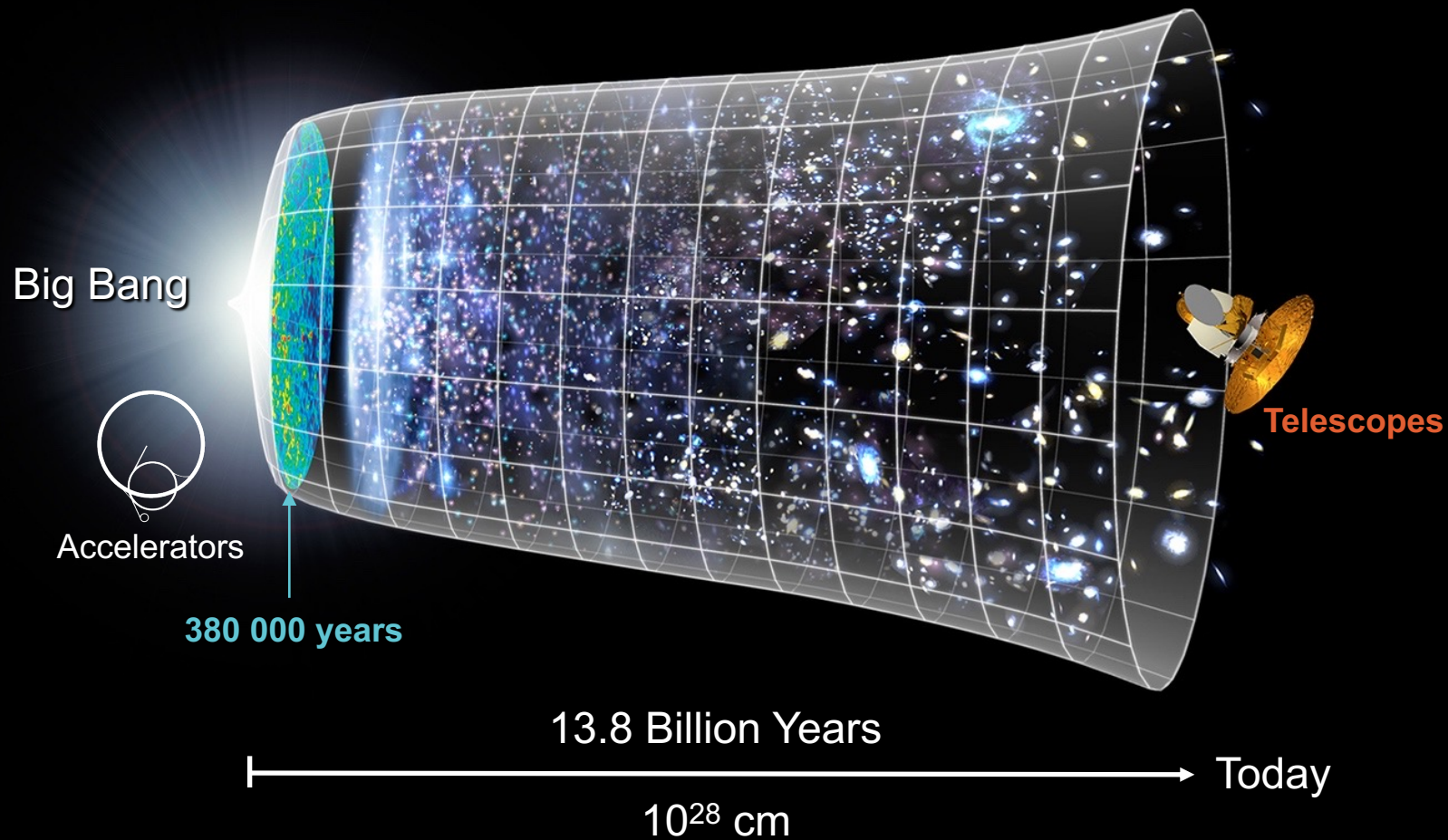
Head of Associate Member and Non-Member State Relations

Meeting with Firms from the Region of Central Macedonia, Greece

27 May 2021

Four pillars underpin CERN's mission

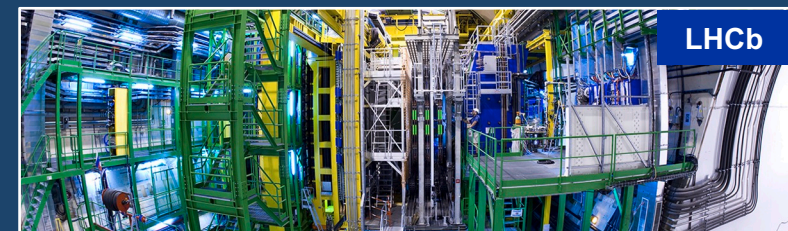
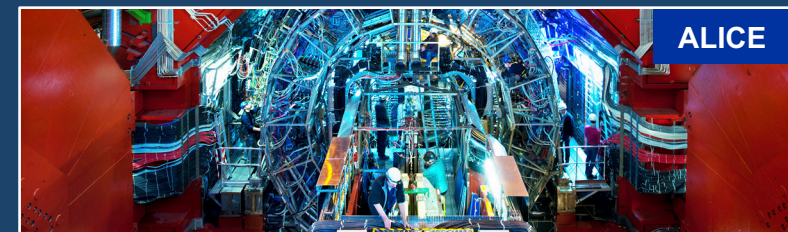
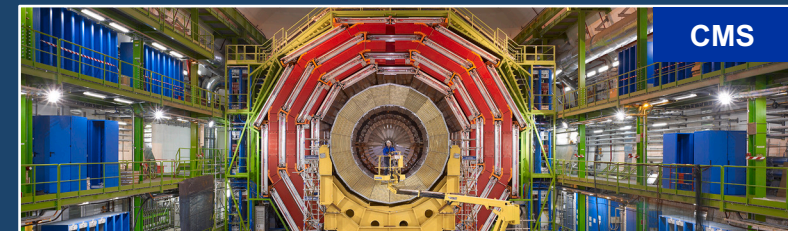
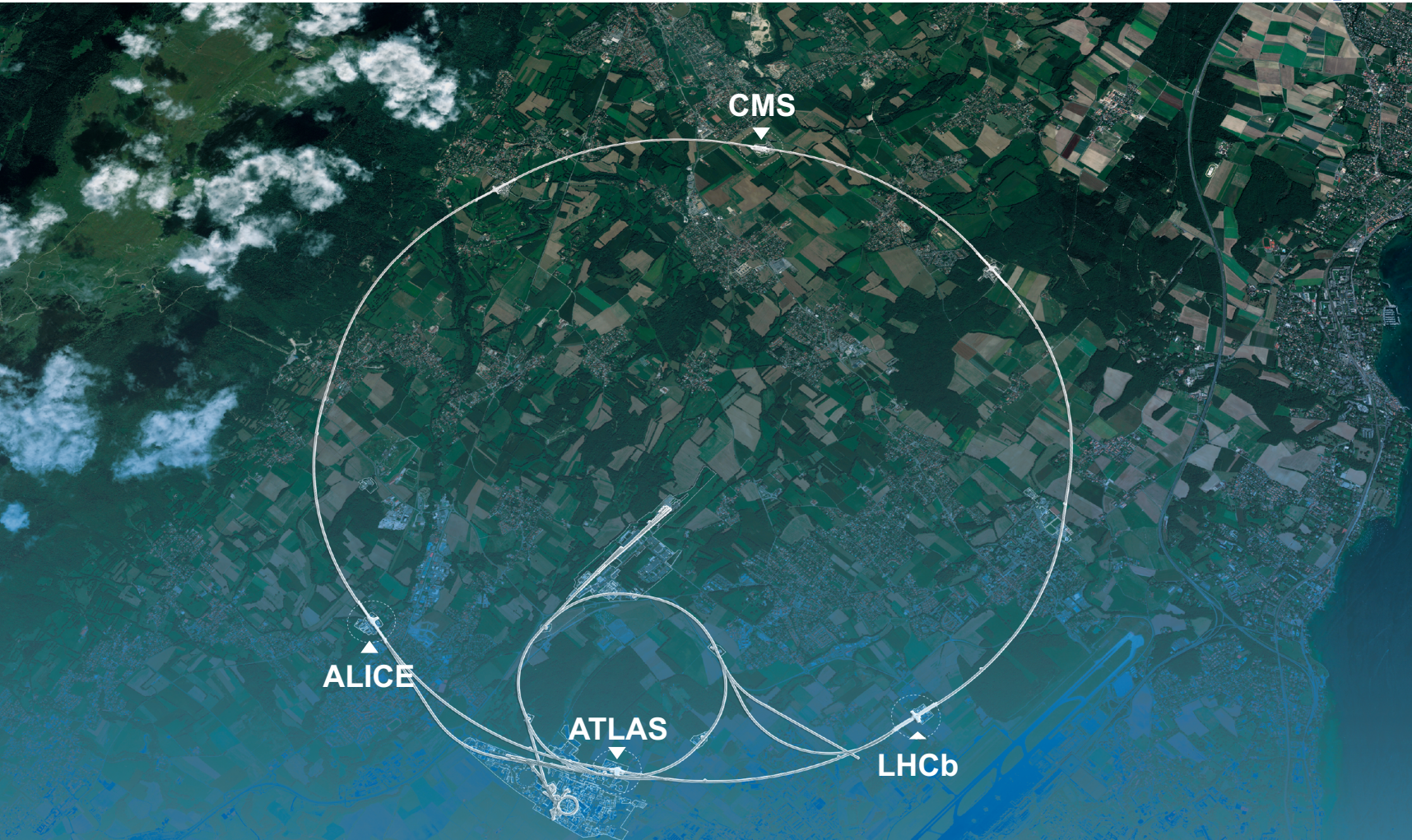




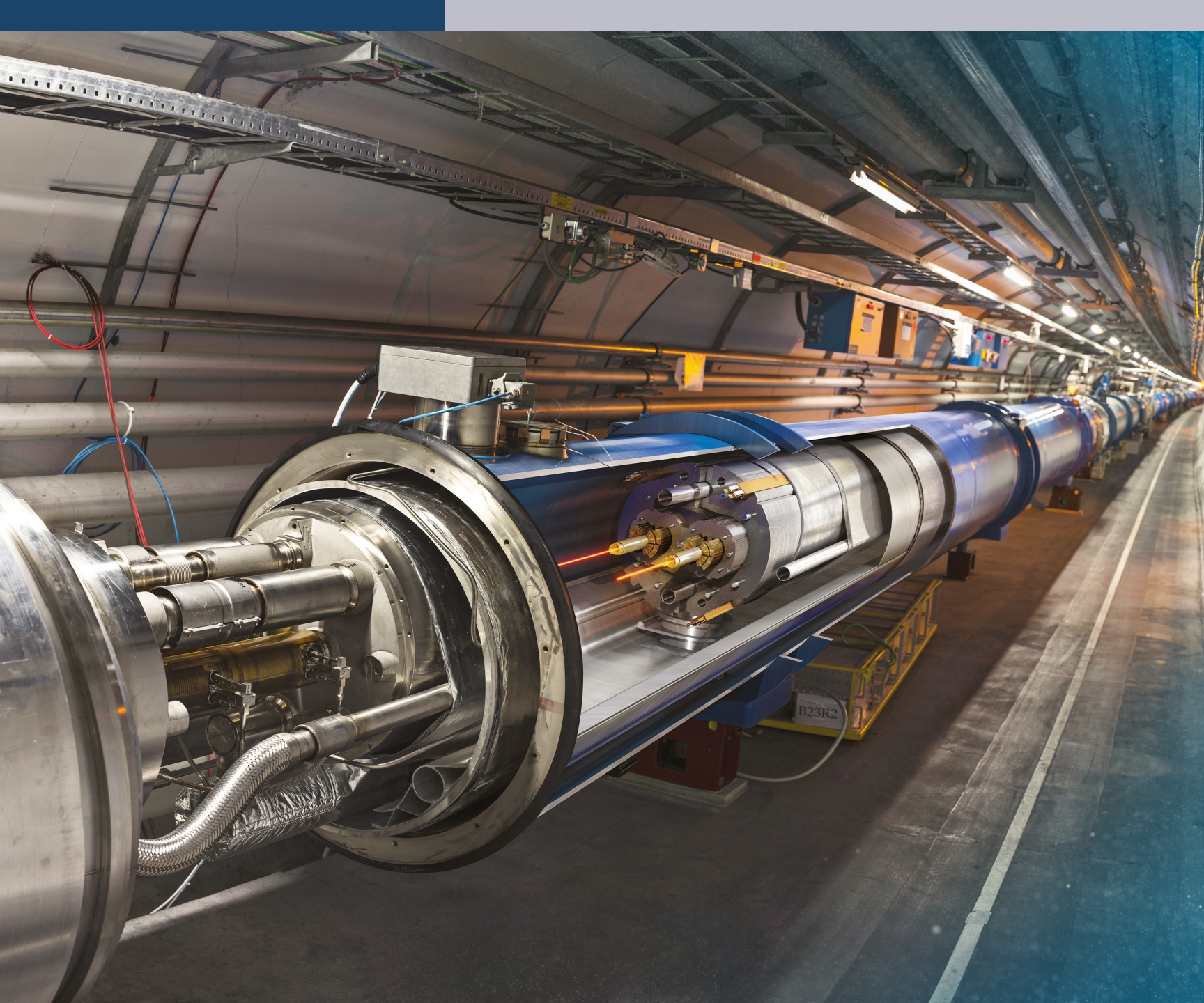
How did the universe begin?

We reproduce the conditions a fraction of a second after the Big Bang, to gain insight into the structure and evolution of the universe.

Giant detectors record the particles produced at the four collision points



Greece participates in the ALICE, ATLAS and CMS experiments



Large Hadron Collider (LHC)

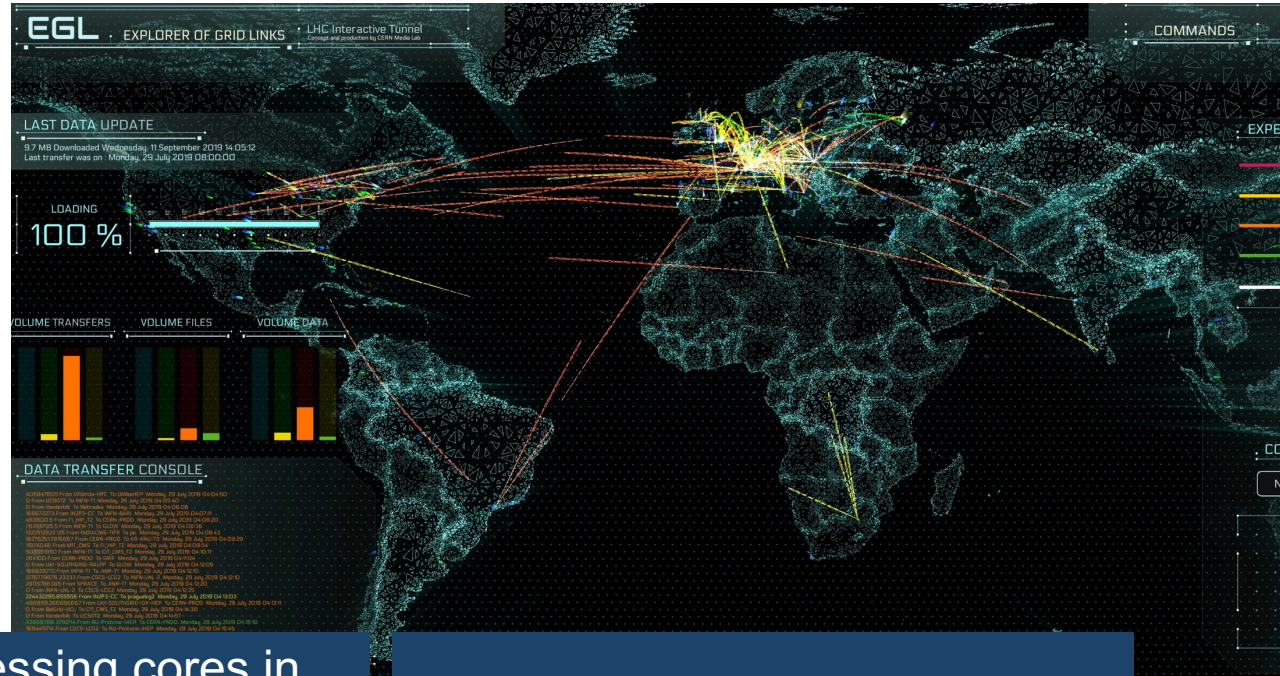
- 27 km in circumference
- About 100 m underground
- Superconducting magnets steer the particles around the ring
- Particles are accelerated to close to the speed of light

The Worldwide LHC Computing Grid (WLCG)

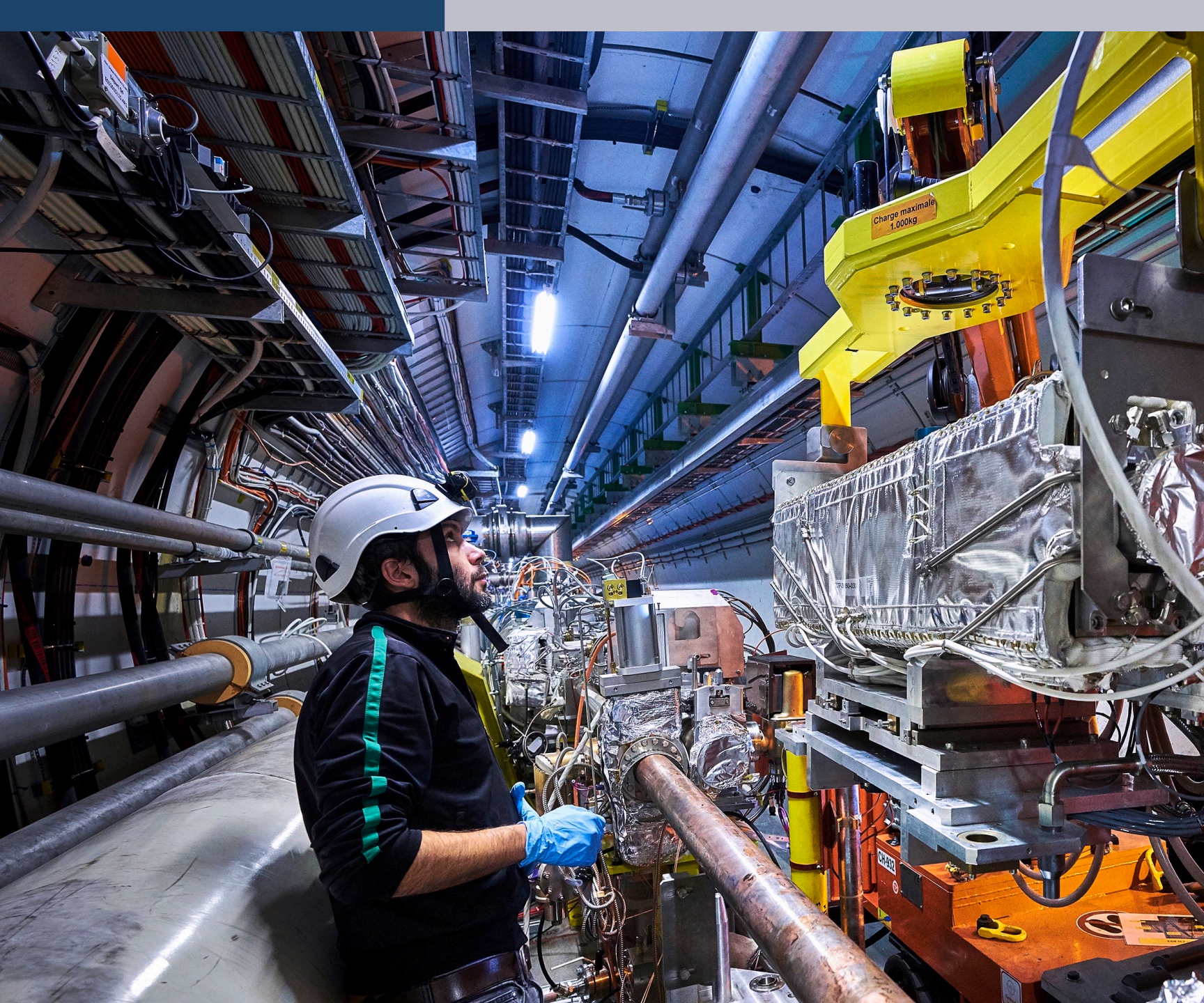


Used to store, distribute, process and analyse data.

1 million processing cores in about 160 data centres and 42 countries.



More than 1000 Petabytes of CERN data stored world-wide.



Upgrade to the High-Luminosity LHC is under way

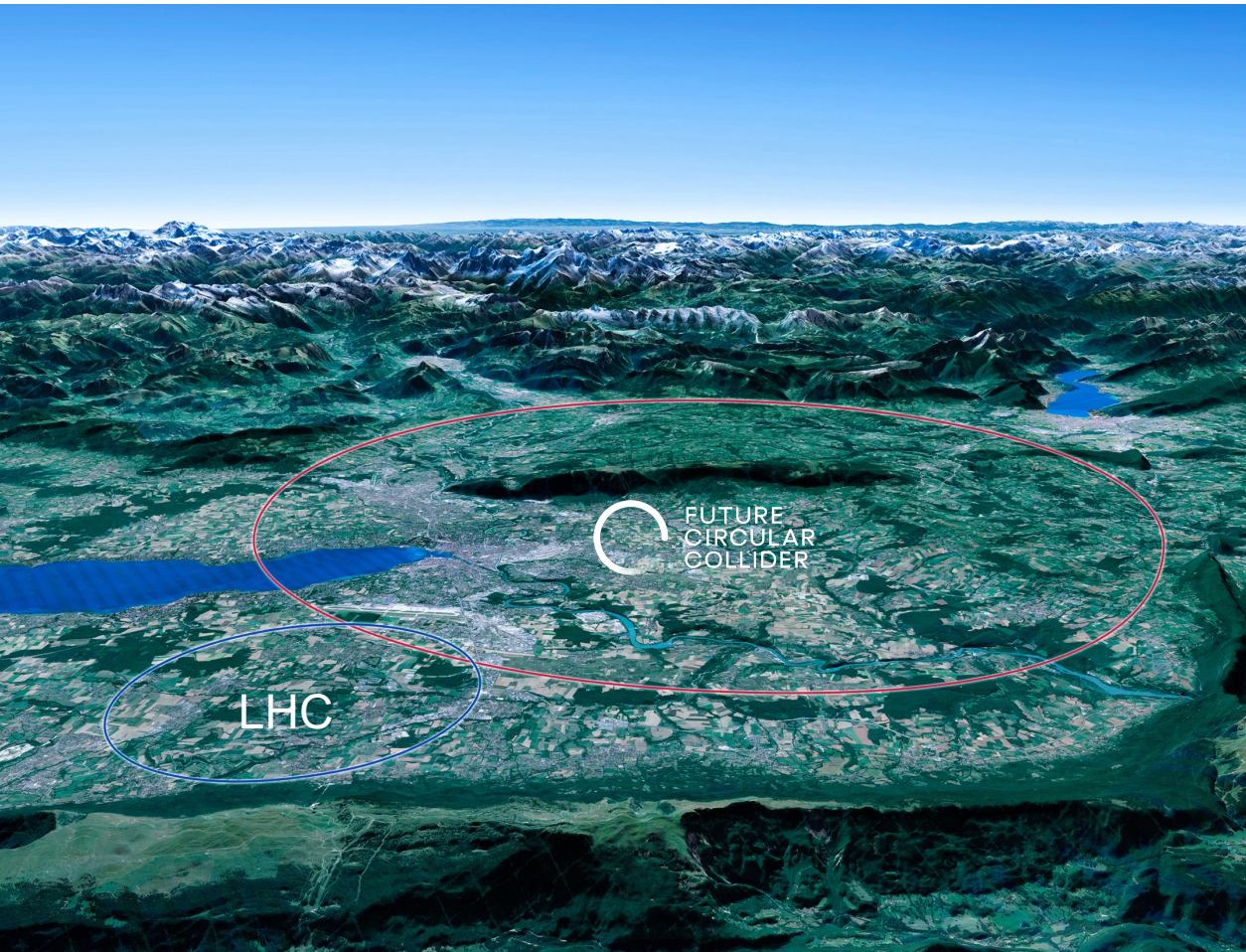
- The HL-LHC will use new technologies to provide 10 times more collisions than the LHC.
- It will provide greater precision and discovery potential.
- It will start operating in 2027 and run until 2040.



Scientific priorities for the future

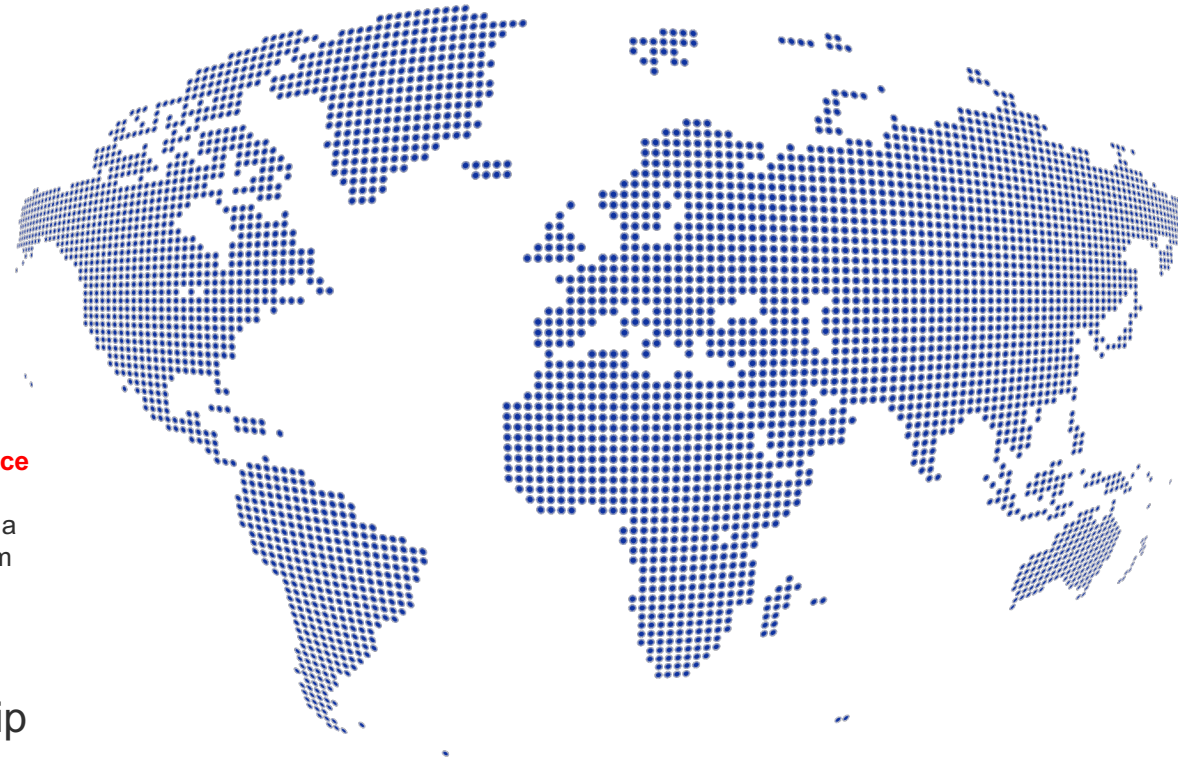
Implementation of the recommendations
of the **2020 Update of the European Strategy
for Particle Physics:**

- Fully exploit the HL-LHC
- Build a Higgs factory to further understand this unique particle
- Investigate the technical and financial feasibility of a future energy-frontier 100 km collider at CERN
- Ramp up relevant R&D
- Continue supporting other projects around the world



Science for peace

CERN was founded in 1954 with 12 European Member States



23 Member States

Austria – Belgium – Bulgaria – Czech Republic
Denmark – Finland – France – Germany – **Greece**
Hungary – Israel – Italy – Netherlands – Norway
Poland – Portugal – Romania – Serbia – Slovakia
Spain – Sweden – Switzerland – United Kingdom

3 Associates Member States in the pre-stage to membership

Cyprus – Estonia – Slovenia

6 Associate Member States

Croatia – India – Lithuania – Pakistan – Turkey – Ukraine

6 Observers

Japan – Russia – USA
European Union – JINR – UNESCO

More than 50 Cooperation Agreements with non-Member States and Territories

Albania – Algeria – Argentina – Armenia – Australia – Azerbaijan – Bangladesh – Belarus – Bolivia
Bosnia and Herzegovina – Brazil – Canada – Chile – Colombia – Costa Rica – Ecuador – Egypt – Georgia – Iceland
Iran – Jordan – Kazakhstan – Latvia – Lebanon – Malta – Mexico – Mongolia – Montenegro – Morocco – Nepal
New Zealand – North Macedonia – Palestine – Paraguay – People's Republic of China – Peru – Philippines – Qatar
Republic of Korea – Saudi Arabia – Sri Lanka – South Africa – Thailand – Tunisia – United Arab Emirates – Vietnam

CERN's annual budget
is 1200 MCHF (equivalent
to a medium-sized European
university)

As of 31 December 2020
Employees:
2635 staff, 756 fellows

Associates:
11 399 users, 1687 others

A laboratory for people around the world

Distribution of all CERN Users by the country of their home institutes as of 31 December 2020



Geographical & cultural diversity
Users of **110 nationalities**
~ **23% women**

Member States **6632**

Austria 82 – Belgium 122 – Bulgaria 37 – Czech Republic 221
Denmark 35 – Finland 79 – France 794 – Germany 1185
Greece 138 – Hungary 67 – Israel 63 – Italy 1388
Netherlands 166 – Norway 78 – Poland 272 – Portugal 80
Romania 99 – Serbia 35 – Slovakia 66 – Spain 325
Sweden 96 – Switzerland 329 – United Kingdom 875

Associate Member States **27** in the pre-stage to Membership

Cyprus 11 – Estonia 26 – Slovenia 16

Associate Member States **390**

Croatia 38 – India 151 – Lithuania 13 – Pakistan 35
Turkey 124 – Ukraine 29

Observers **3071**

Japan 211 – Russia 1021 – United States of America 1839



Numbers for GR



- Personnel by nationality as of 31 December 2020
 - **211 users**
 - **52 staff**
 - **56 fellows**
 - **34 students**

Other countries **1279**

Algeria 2 – Argentina 15 – Armenia 10 – Australia 23 – Azerbaijan 2 – Bahrain 2 – Belarus 26 – Brazil 108
Canada 196 – Chile 22 – Colombia 15 – Cuba 3 – Ecuador 4 – Egypt 14 – Georgia 35
Hong Kong 20 – Iceland 3 – Indonesia 7 – Iran 13 – Ireland 6 – Kuwait 2 – Latvia 6 – Lebanon 17
Malaysia 4 – Malta 3 – Mexico 49 – Montenegro 5 – Morocco 18 – New Zealand 11 – Oman 1
People's Republic of China 334 – Peru 2 – Puerto Rico 2 – Republic of Korea 132 – Singapore 3
South Africa 57 – Sri Lanka 8 – Taiwan 50 Thailand 16 – United Arab Emirates 2

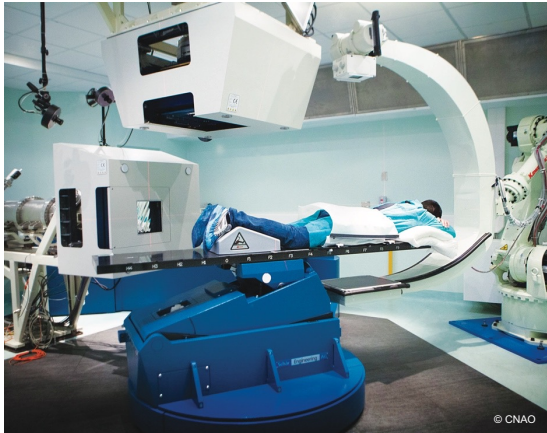
CERN's technological innovations have applications in many fields

CERN is the birthplace of the World Wide Web

And there are many more examples

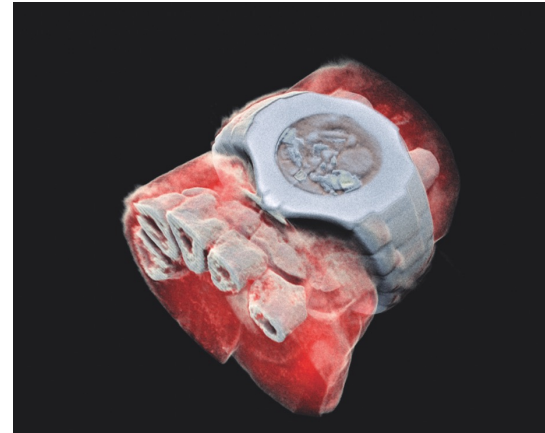
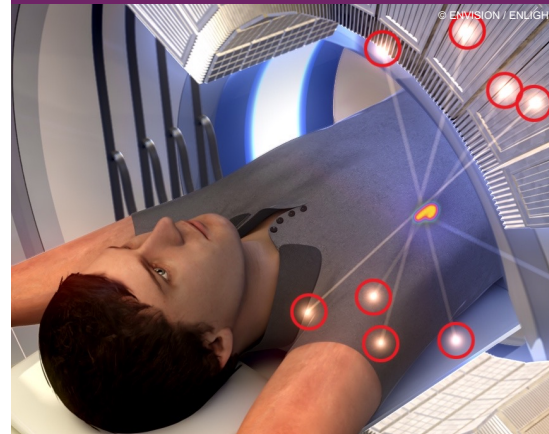
Medical imaging, cancer therapy, material science, cultural heritage, aerospace, automotive, environment, health & safety, industrial processes.

CERN's technological innovations have important applications in medicine and healthcare



Technologies applied at CERN are also used in PET, for medical imaging and diagnostics.

Accelerator technologies are applied in cancer radiotherapy with protons, ions and electrons.



Pixel detector technologies are used for high resolution 3D colour X-ray imaging.

CERN produces innovative radioisotopes for nuclear medicine research.



CERN trains the next generation of physicists, engineers and technicians

>3000 PhD students are registered at CERN.

600 PhD theses are completed each year.

300 undergraduate students in Summer programmes.

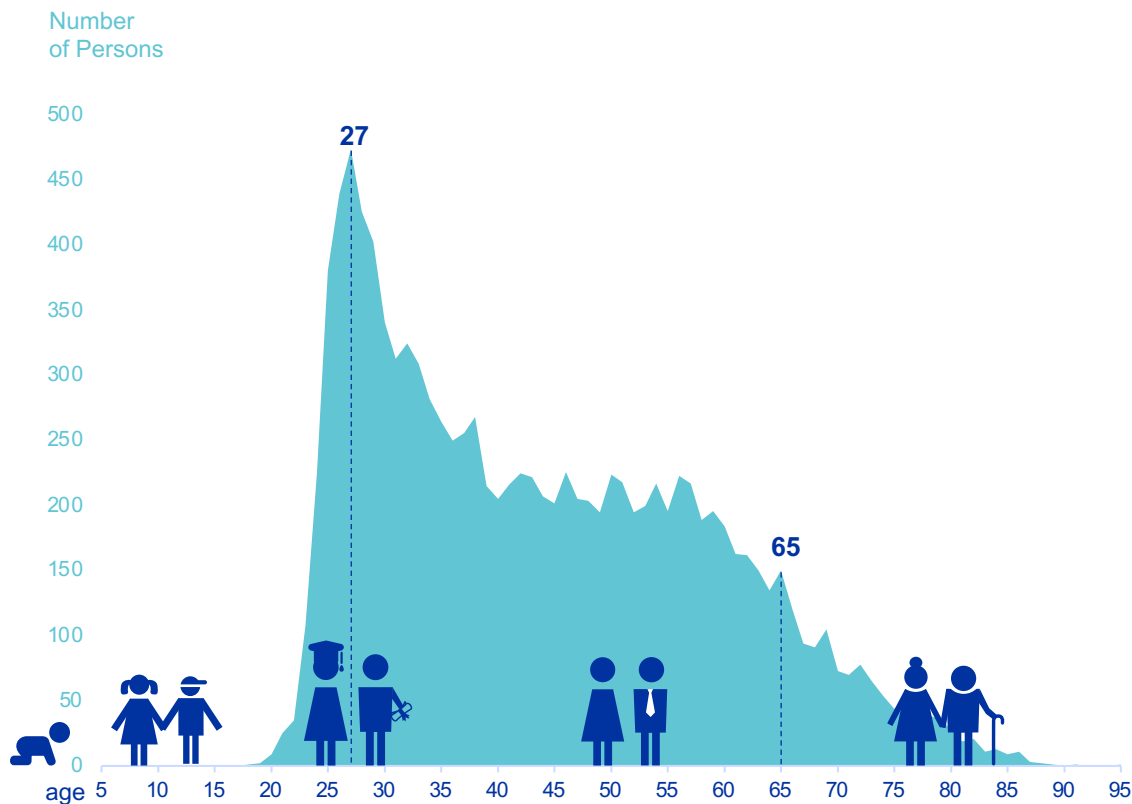


~800 fellows in research and applied physics, engineering and computing.

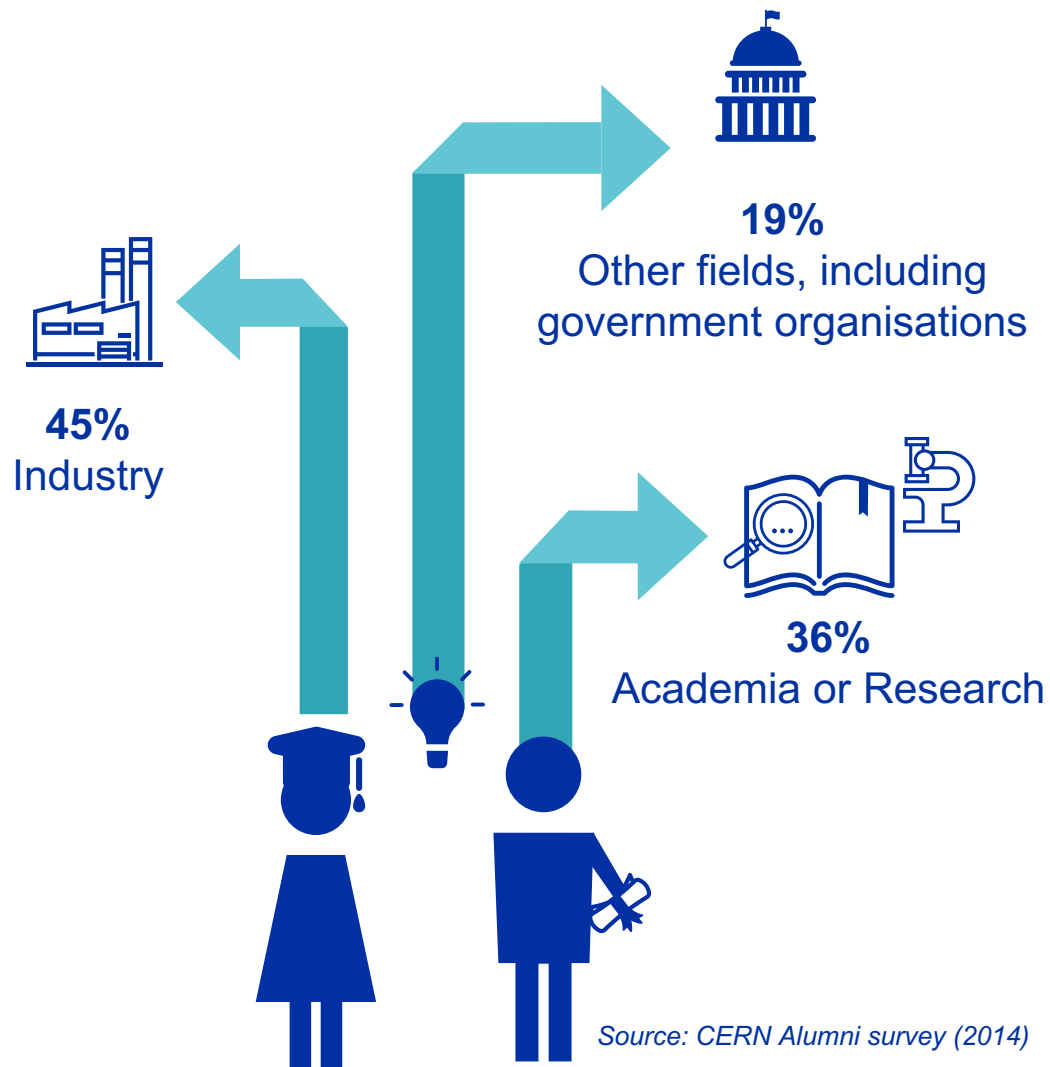
~200 Technical and Doctoral Students in applied physics, engineering and computing.

CERN organises schools for undergraduates and postgraduates, in all regions.

CERN opens a world of career opportunities



Age Distribution of Scientists working at CERN



PhD and Technical students leaving CERN

Our education programmes reach thousands of teachers and students from around the world each year



Numbers for GR

5 summer students during 2019
882 teachers in Teacher Programmes since 1998
54 teams in BL4S competition since 2014
665 students participating in S'Cool LAB

Teachers from > 40 countries participate in National and International Teacher Programmes

> 6000 students use S'Cool Lab, for hands-on physics experiments

> 1000 students propose an experiment to carry out at CERN in the Beamline4Schools competition

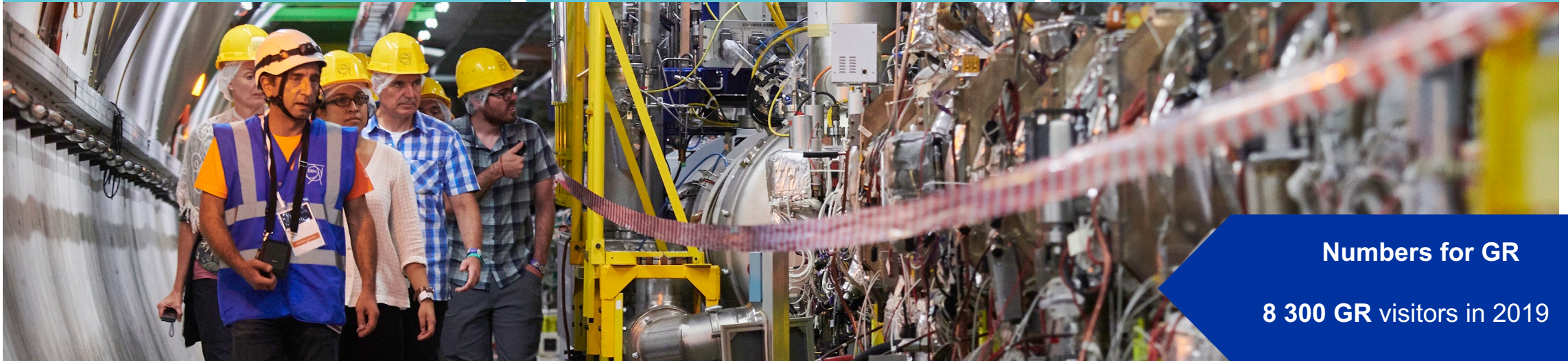
22 students from each Member State shadow researchers in the High-School Student Internship Programme

CERN engages with citizens across the globe

151 000 visitors on guided tours of CERN in 2019, from 95 countries (> 60% come from more than 600 km away).

On-site and travelling exhibitions in 15 countries, with >1 million visitors.

Open Days during Long Shutdowns: two days in 2019, 75 000 visitors, 2800 volunteers.

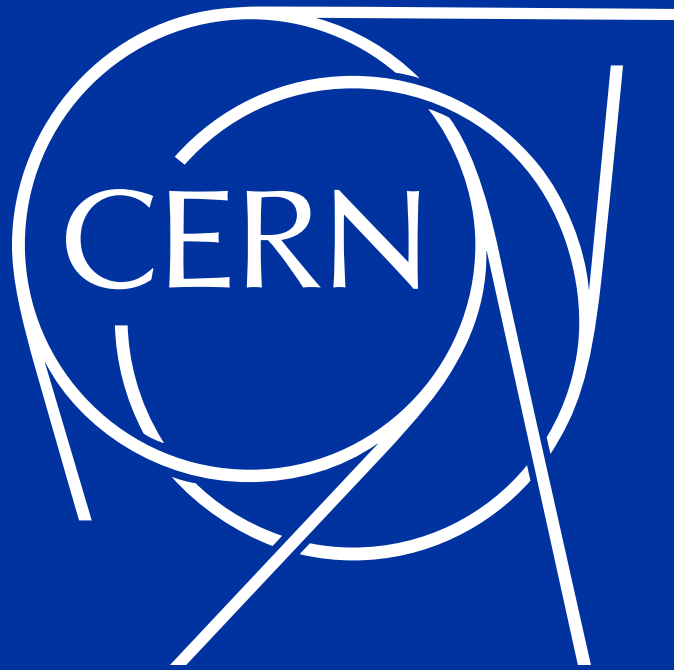


Numbers for GR



8 300 GR visitors in 2019

During the COVID-19 pandemic, several outreach and education activities moved online: virtual talks by CERN guides for schools and general public; educational resources; social media “lives” from LHC experiments and other facilities.



Thank You!
Σας ευχαριστώ!