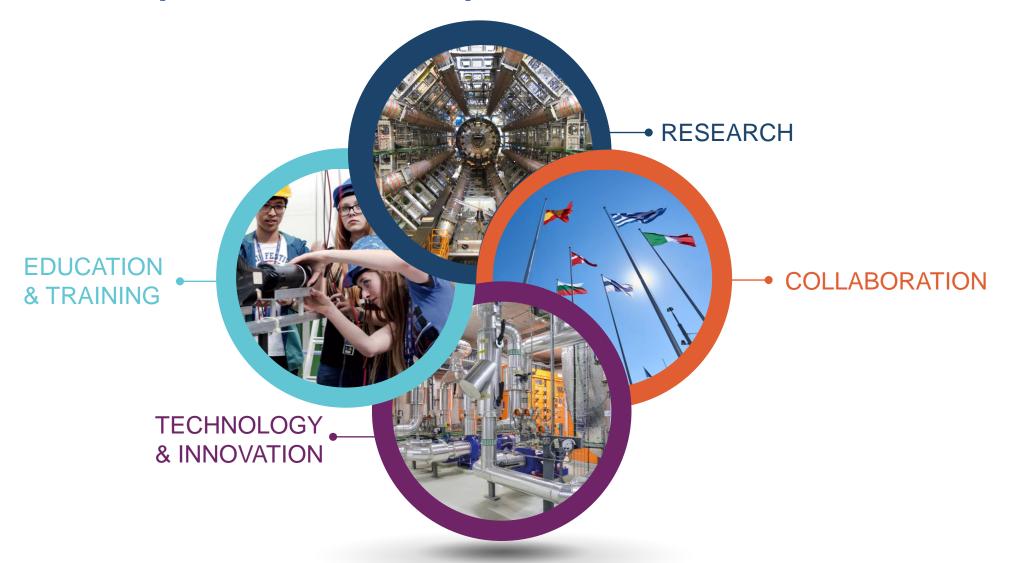


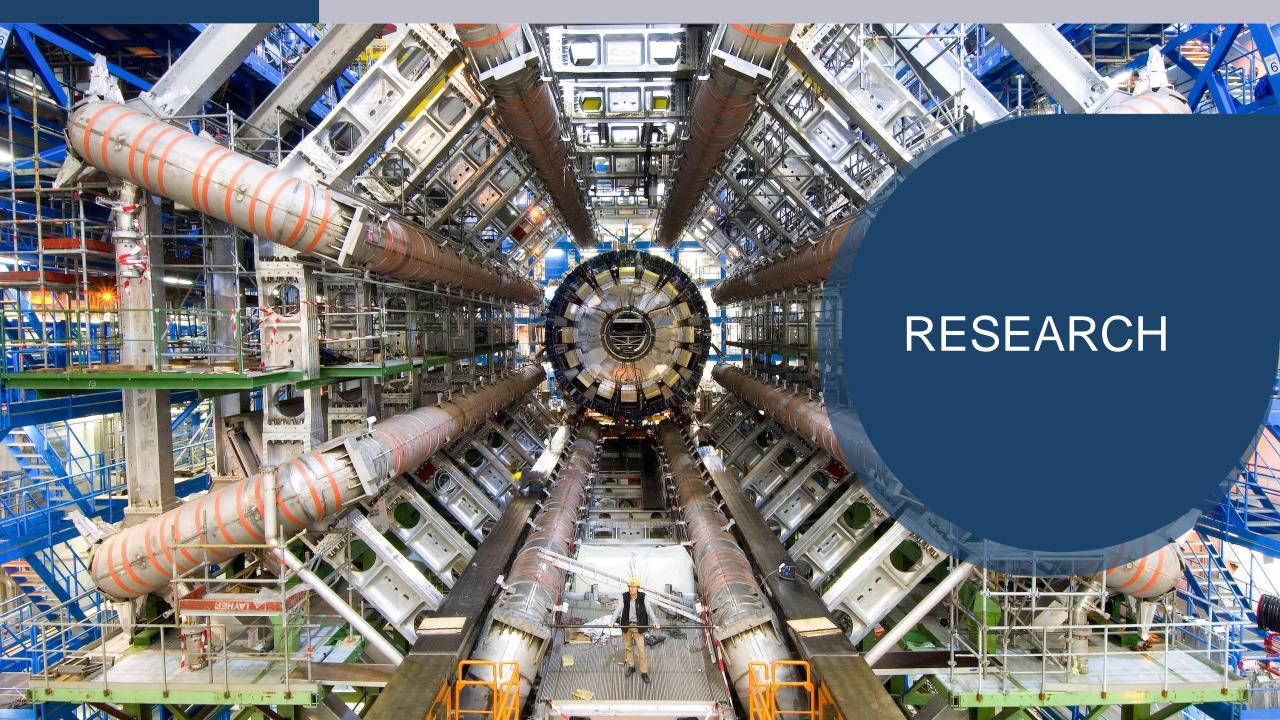


Carnegie Climate Governance Initiative



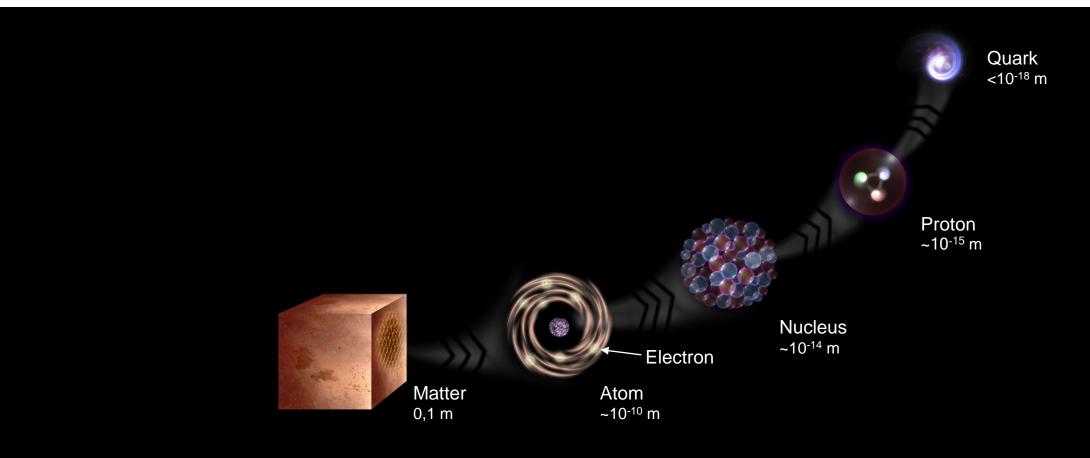
Four pillars underpin CERN's mission

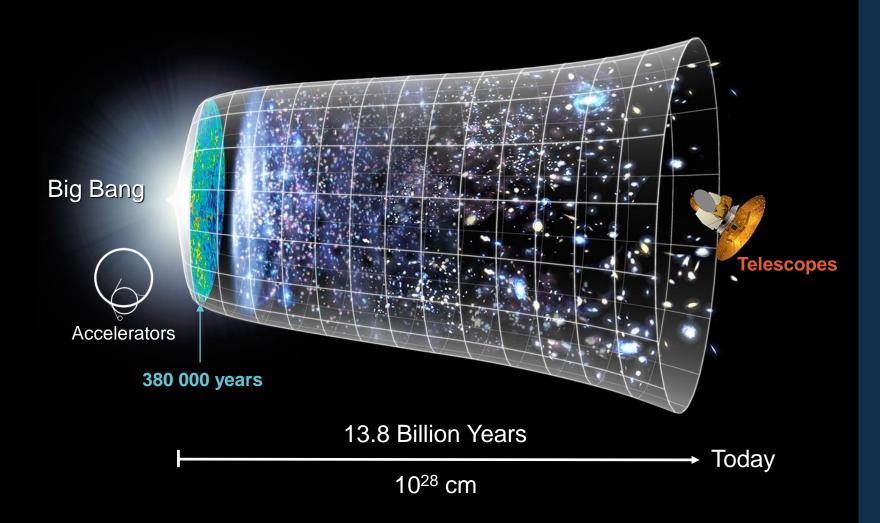




What is the universe made of?

We study the elementary building blocks of matter and the forces that control their behaviour





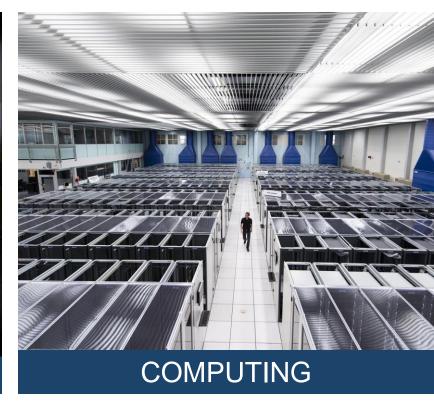
How did the universe begin?

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

We develop technologies in three key areas







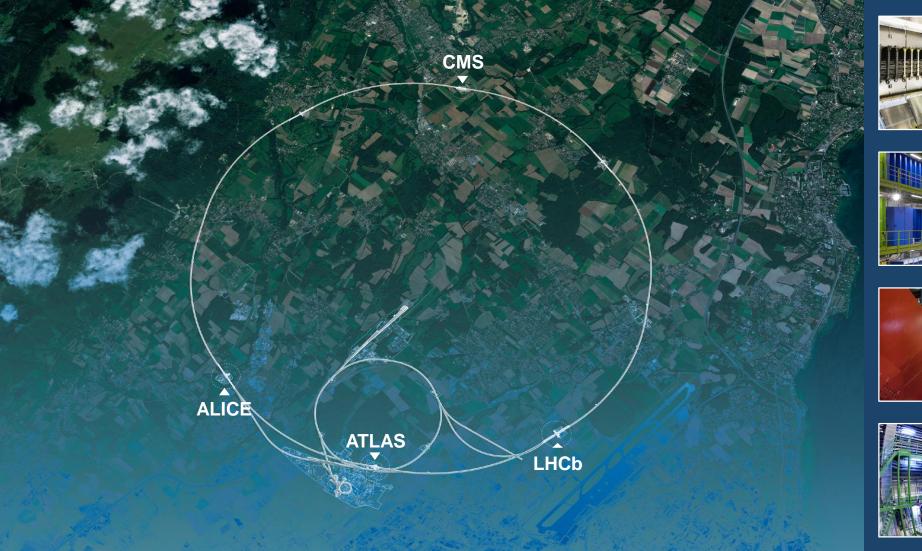
CERN | C2G



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

Giant detectors record the particles formed at the four collision points



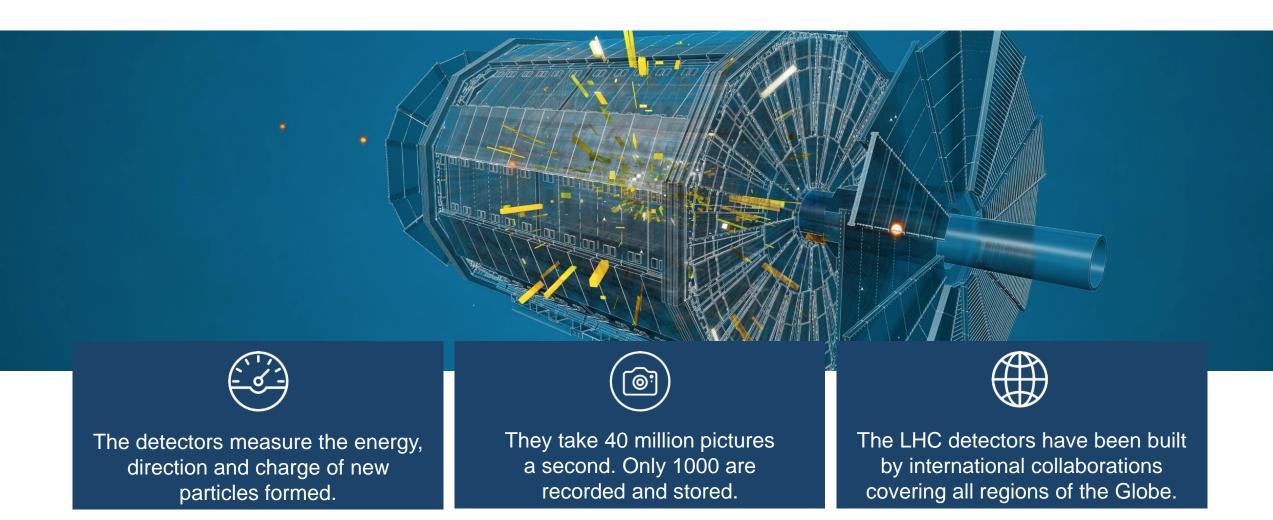








The LHC detectors are analogous to 3D cameras



The Worldwide LHC Computing Grid (WLCG)



CERN has a diverse scientific programme

Nuclear Physics (ISOLDE)

Antimatter Research (Antiproton Decelerator)

Cosmic rays and cloud formation (CLOUD)



Fixed-target experiments, which include searches for rare phenomena

Contribution to the Long Baseline Neutrino Facility in the USA (LBNF)

There are many unanswered questions in fundamental physics

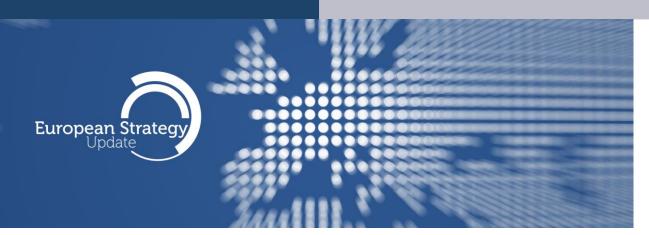
Including

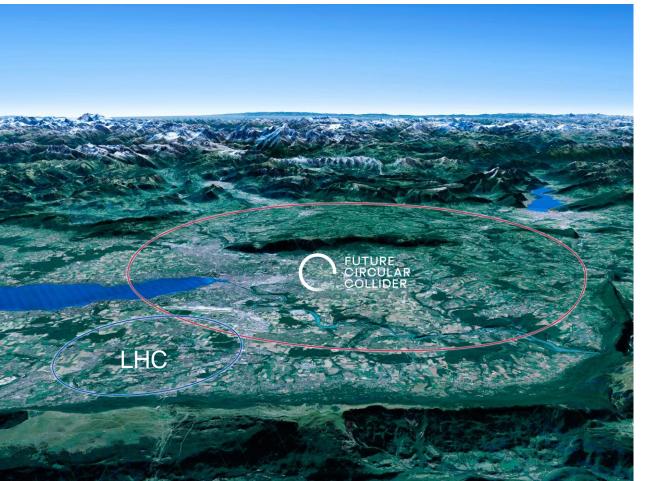
What is the unknown 95% of the mass and energy of the universe?

Is there only one Higgs boson, and does it behave exactly as expected?

Why is the universe made only of matter, with hardly any antimatter?

Why is gravity so weak compared to the other forces?





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



CERN was the result of a common vision of scientists and political leaders in post-war Europe, and the first scientific IGO, motivated by the wish to

- Renew peaceful collaboration between European States
- focus on fundamental scientific research at a scale beyond the capacity of any single nation
- restore scientific excellence in Europe
- reverse and prevent brain drain to USA

Inclusive scientific collaboration From the vision of the founders to today's global reality

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 Associate Member States in the pre-stage to membership Cyprus – Estonia – Slovenia

7 Associate Member States

Croatia – India – Latvia – Lithuania – Pakistan Turkey – Ukraine

6 Observers

Japan – Russia (suspended) – USA European Union – JINR (suspended) – UNESCO



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

As of 31 December 2021 Employees: **2676** staff, **783** fellows

Associates: **11 175** users, **1556** others

Around 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 – Honduras Iceland – Iran – Jordan – Kazakhstan – 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

A laboratory for people around the world

Distribution of all CERN Users by the country of their home institutes as of 31 December 2021



Geographical & cultural diversity
Users of 110 nationalities
19.4% women

Member States 6642

Austria 74 – Belgium 122 – Bulgaria 39 – Czech Republic 227 Denmark 42 – Finland 71 – France 811 – Germany 1129 Greece 133 – Hungary 69 – Israel 67 – Italy 1423 Netherlands 157 – Norway 69 – Poland 278 – Portugal 89 Romania 105 – Serbia 36 – Slovakia 66 – Spain 328 Sweden 88 – Switzerland 372 – United Kingdom 847

Associate Member States

in the pre-stage to membership **55** Cyprus 10 – Estonia 24 – Slovenia 21

Associate Member States 367

Croatia 36 – India 130 – Latvia 11 – Lithuania 12 – Pakistan 30 Turkey 122 – Ukraine 26

Observers 2917

Japan 189 – Russia (suspended) 971 – United States of America 1757



Non-Member States and Territories 1194

Algeria 3 – Argentina 16 – Armenia 10 – Australia 20 – Azerbaijan 3 – Bahrain 2 – Belarus 24 – Brazil 106 Canada 189 – Chile 23 – Colombia 18 – Cuba 3 – Ecuador 6 – Egypt 16 – Georgia 36 – Hong Kong 17 Iceland 3 – Indonesia 6 – Iran 11 – Ireland 6 – Jordan 5 – Kuwait 5 – Lebanon 15 – Madagascar 1 Malaysia 4 – Malta 2 – Mexico 48 – Montenegro 5 – Morocco 18 – New Zealand 8 – Oman 1 – People's Republic of China 314 – Peru 2 – Philippines 1 – Republic of Korea 113 – Singapore 3 – South Africa 52 Sri Lanka 10 – Taiwan 45 – Thailand 18 – United Arab Emirates 6

CERN is a model for open and inclusive collaboration



The LHC experiments are models of consensus building, competition and cooperation.

SESAME, a synchrotron light source in Jordan, is modelled on CERN's governance structure.





CERN provides the IT infrastructure for the satellite-analysis technology used for emergency response.

Open Science for deeper impact

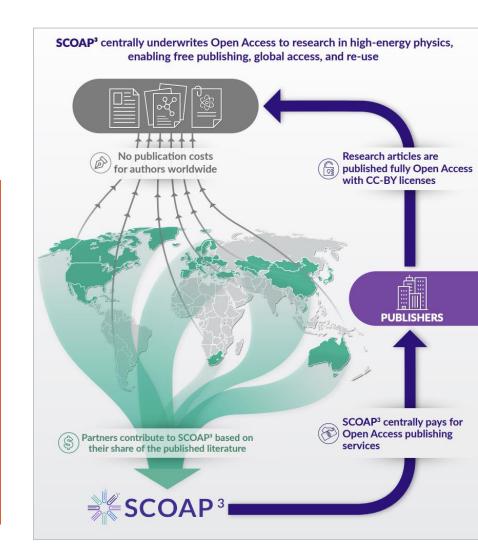
Openness and sharing are core values, driving our policies for access to results and technology development

Open Access Policy (2014)

- >90% of research produced at CERN published OA (CC-BY licenses)
- Sponsoring Consortium for Open Access Publishing in Particle Physics - SCOAP³
- Global collaboration across 44 countries
- Inspired major global OA initiatives: PlanS, OA2020, etc.

LHC Open Data Policy (2020)

- LHC experiments committed to release experimental data for diverse scientific and educational uses
- Data released together with associated analysis tools



Promoting fact-based, science-driven decision-making

CERN engages with international organisations and platforms to share the values of science and help shape a global agenda conducive to fact-based decision-making with empowered citizens.







CERN actively promotes the SDGs with partners in the international system

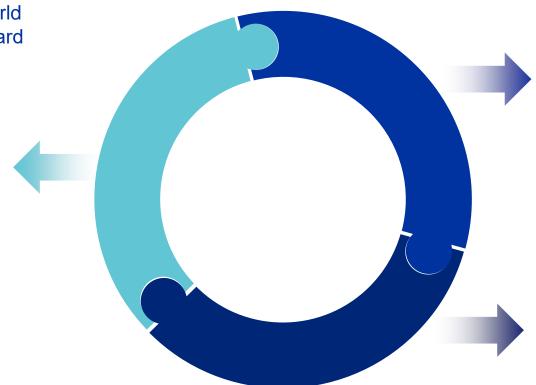
CERN in the multilateral ecosystem of International Geneva

DG member of the World Economic Forum's Board of Trustees

Cooperation Agreements with:

- IPU
- ITU
- WIPO
- WHO
- WMO
- UNITAR
- UNOG

And collaboration with many more...



Member of:

- Geneva Peace building Platform
- Geneva Internet Platform
- Science Policy Interface
- Geneva Science and Diplomacy Anticipator

Member of the International Gender Champions

Providing platform for humanitarian hackathons and challenge-based innovation

CERN and the Global Goals

SDG 3 - HEALTH

CERN helps to develop technologies that contribute to better healthcare for all, such as medical imaging and hadron therapy.

SDG 4 - EDUCATION

Education is one of CERN's core missions. We offer high quality programmes that inspire thousands of students, teachers and young researchers each year.

SDG 5 - GENDER

Diversity is a core value for CERN. Our diversity policy aims at leveraging the added value that comes from bringing together people of different nationalities, genders, professions and ages.

SDG 7 - ENERGY

CERN develops strategies for minimise the increase of energy consumed by the installations, increase energy efficiency and implement energy recovery.

SDG 9 - INNOVATION

CERN inventions are brought to industry through knowledge transfer, to have a positive impact on society and innovation.

SDG 16 & 17 - INTERNATIONAL COOPERATION

CERN is a successful model for international collaboration. CERN gathers researchers from all over the world, contributing to human knowledge and peace, for the benefit of all.



THERAPY

Accelerators provide particle beams for more targeted cancer treatment.



BEAMLINE FOR SCHOOLS COMPETITION

Students from the two winning teams spend a week at CERN to carry out their experiment using a CERN accelerator.



25 BY 25 DIVERSITY & INCLUSION INITIATIVE

First ever targets-based strategy to boost the nationality and gender diversity within the Staff and Fellows population.



HEATING LOCAL HOUSING

Heat recovered from CERN's accelerator cooling systems to heat a new residential area in the town of Ferney-Voltaire, benefiting up to 8000 people.



A MAGNET IN THE LHC TUNNEL

Exploring the universe requires new technologies and ingenious engineering to build the machines that explore physics at a new frontier.



SESAME

This new synchrotron light source in Jordan started operation in 2017. It is a unique collaboration between eight Middle East members, modelled on CERN's governance structure.

IYBSSD2022

Increasing visibility and creating new partnerships

- The United Nations General Assembly has promulgated 2022 as the International Year of Basic Sciences for Sustainable Development (IYBSSD2022).
- > 90 national and international science academies, scientific networks, research and education centres engaged to organise events and activities to showcase and improve the links between basic sciences and the SDGs.
- IYBSSD2022 will be inaugurated at UNESCO (Paris) on 8 July 2022 and be closed at the CERN Science Gateway in 2023.



































A coalition of 27 international scientific unions and research organisations, led by the International Union of Pure and Applied Physics (IUPAP), mobilised in support of the UNGA Resolution.

https://www.iybssd2022.org/en/home/

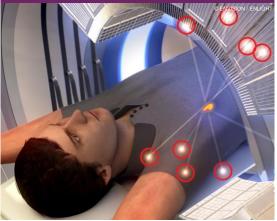




CERN's technological innovations have important applications in medicine and healthcare



Accelerator technologies are applied in cancer radiotherapy with protons, ions and electrons. Technologies applied at CERN are also used in PET, for medical imaging and diagnostics.





Pixel detector technologies are used for high resolution 3D colour X-ray imaging. CERN produces innovative radioisotopes for nuclear medicine research.



Underlying principles: open collaboration, open software, open hardware.



Radon dose monitor for better air quality







CERN's training, education and outreach programmes

300 Undergraduate students in Summer programmes >3000 registered PhD students.

>1000 Fellows, Technical and Doctoral Students in research and applied physics, engineering and computing. 13 304 teachers since 1998 and 2000 participants in the webinar since 2020.



151 000 visitors on guided tours of CERN in 2019, from 95 countries.

CERN engages with citizens across the globe:
on-site and travelling exhibitions in 15 countries, > 1 million visitors

Science Gateway will open in 2023, expanding CERN's outreach reach and impact, locally and globally.

There are many unanswered questions in fundamental physics

CERN will continue to play a crucial role in the journey of exploration