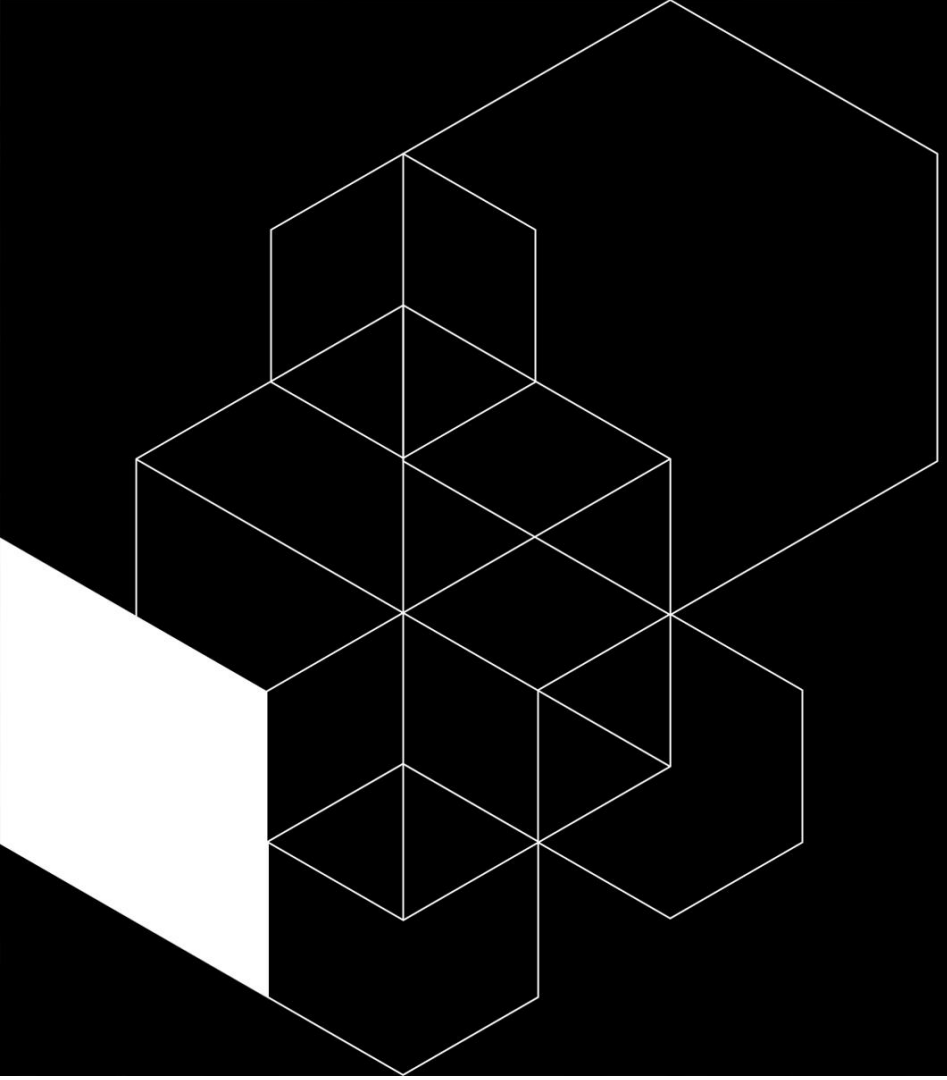


Where are we?

CERN as an engine of scientific collaboration;
IdeaSquare as the innovation space at CERN.

March 11 2024
Ole Werner

Who am I to talk to you

Ole Werner

- Galactic Firefighter at CERN IdeaSquare
- BSc Psychology, MSc Behavior Change
- Love to excite people, want to understand your minds

The CREW at IdeaSquare

Faezeh Abbasi
Senior Fellow

Catarina Batista
Edu programmes

Markus Nordberg
Fixing things

Laëtitia Pedroso
Events

Roy Pennings
CashMoneyMaster

Jimmy Poulaillon
Communications

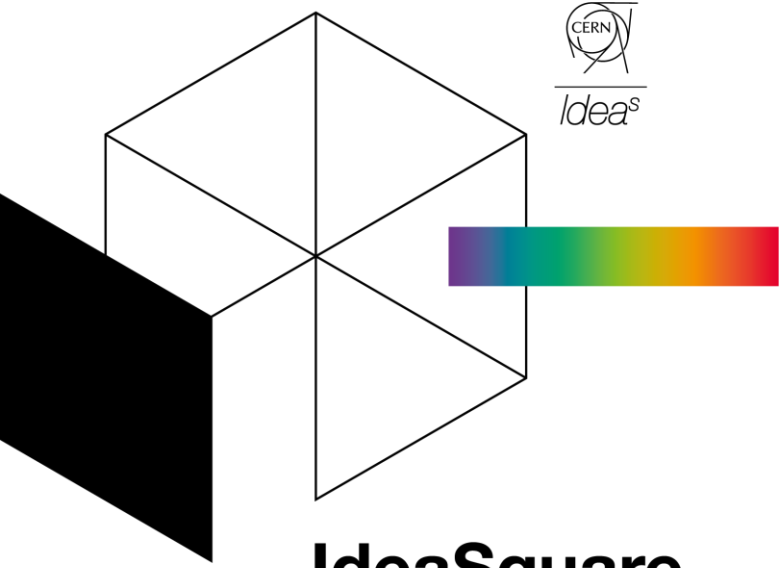
Pablo Garcia Tello
Wizard of EU

Lauri Valtonen
CIJ

Ole Werner
Edu Programmes

Laura Wirtavuori
Edu programmes

Dina Zimmermann
Prototyping



IdeaSquare
The innovation space at CERN

General building safety rules

Safety is first priority.

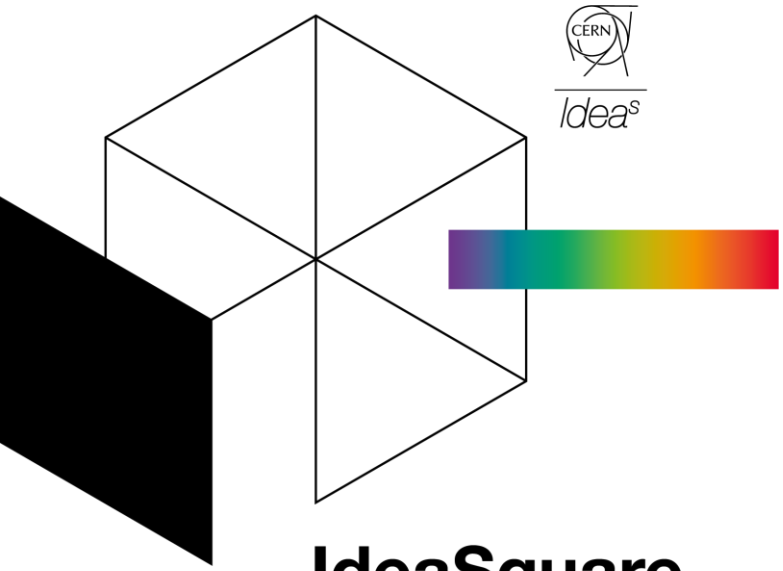
BUILDING SAFETY B3179

- In all inside areas of Building 3179 **smoking & alcoholic beverages is strictly forbidden.**
- Working is possible 24/7 with CERN access card, **sleeping is prohibited in all CERN buildings.**
- Eating, drinking, coffee breaks are encouraged in the kitchen (and open) area. But not in the Red Bus, please!
- Cameras, **photos,** posting in social media **are highly encouraged :)**


R-A05
R-103
R-102
R-401
R-101
R-201
R-A01
Machineshop
R-B03
Electroshop
R-B08
Light Lab
R-B09
Kitchen
1-D01
3D
Studio
(2nd
floor)
R-E06
Main Area
R-202
Free to use
green
Work under
supervision
yellow
Restricted area
red
red
yellow
blue

Keep in mind that you are on CERN site

- CERN is a working place. Respect the work of others.
- Do not go to unauthorized areas. You should always be accompanied by an authorized person (with CERN access card).
- No loud music please and keep your workplace tidy. Any help in tiding up is very appreciated (like the Ideasquare kitchen)!
- For CERN ways of working, see CERN Code of Conduct.



IdeaSquare
The innovation space at CERN

Workshops and laboratories safety

WORKING AREA POLICY B3179

In laboratory areas:

- **Machineshop** 3179-R-A01
- **Electroshop** 3179-R-B03 and
- **3D Studio** 3179-1-D01

Eating and drinking are strictly forbidden.

For **grey room** (Light Lab 3179-R-B08) **and dark room** (3179-R-A06) areas access is **restricted to authorised personnel only.**

WORKSHOP SAFETY B3179

Safety is first priority! In:

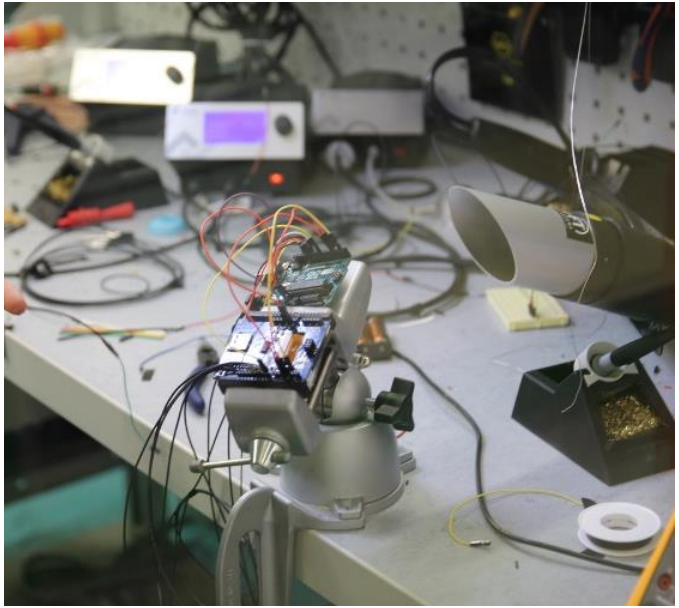
- Machineshop 3179-R-A01,
- Electroshop 3179-R-B03,
- 3D Studio 3179-1-D01

working is conducted “under supervision”.

i.e. When you want to use the workshops:

- Come talk to us (Dina, Ole or Catarina) what would you like to do and we’ll figure it out together what is the easiest and fastest way to do it safely.

Workshop Safety



You are allowed to modify things, you are not allowed to modify yourself.

- Jami Sarnikorpi

- Handheld tools? OK
- Electrically powered tools? Check with **Dina**
- Do not work alone

Don’t know how something works? Ask!

Make sure to unplug electrical equipment when you are not using it. This is especially important for the glue guns.

In case of an emergency

While evacuating, always **go away from the danger!**

Do NOT return to collect your belongings

Walk quickly and calmly to your building's designated **assembly point** or as advised by an Emergency Guide or Fire Brigade personnel

Wait at the assembly point until counted and released by the TSO/DSO or the Fire Brigade.

Give to the Fire Brigade all the information they need! **+41 22 767 44 44**

CONSIGNE d'URGENCE / EMERGENCY PROCEDURE

BATIMENT 3179- Etage R / BUILDING 3179 - Floor R

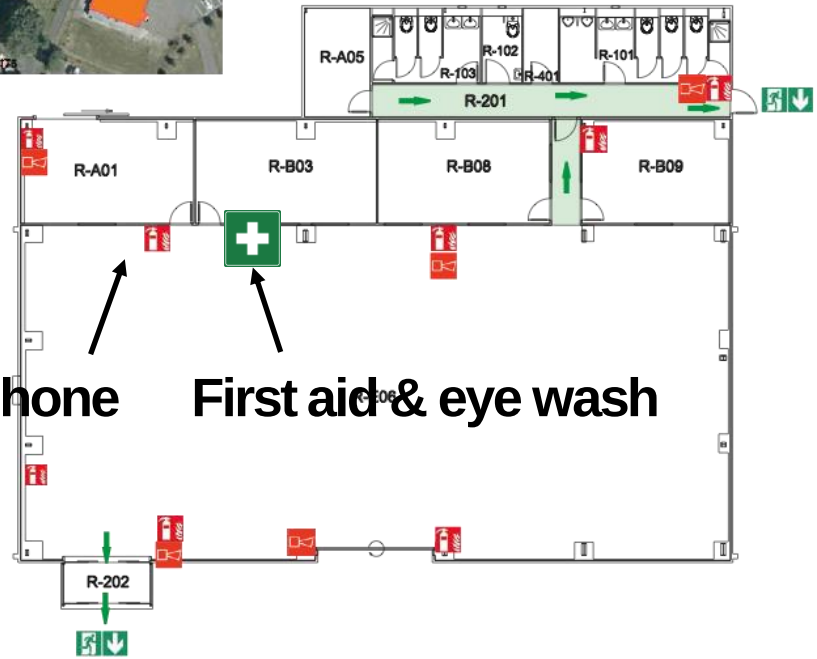
EVACUATION

- A l'audition du signal — When the alarm rings
- Fermez portes et fenêtres — Close doors and windows
- Suivez le balisage — Follow the signs
- N'utilisez pas l'ascenseur — Do not use the lift
- Se rendre au point de rassemblement — Report to the assembly point

INCENDIE/FIRE

112 ou 7 44 44

- Donnez l'alarme — Set off the alarm
- Prévenez les autres personnes — Inform others
- Fermez portes et fenêtres — Close doors and windows
- N'utilisez pas l'ascenseur — Do not use the lift
- Combattez le feu — Start fighting the fire



- Extincteur / Fire Extinguisher
- Alarme d'évacuation / Evacuation alarm
- Voie d'évacuation / Escape route
- Sortie de secours / Emergency exit

Date:11.12.2014

EDMS:1454499

Things you can avoid for these 2 weeks

- …climbing on top of the containers or the bus
- ...consuming or storing alcohol inside IdeaSquare
- …entering unauthorised areas
- …walking around without your visitor card and ID


Ideas
THINK. DO. COLLABORATE.

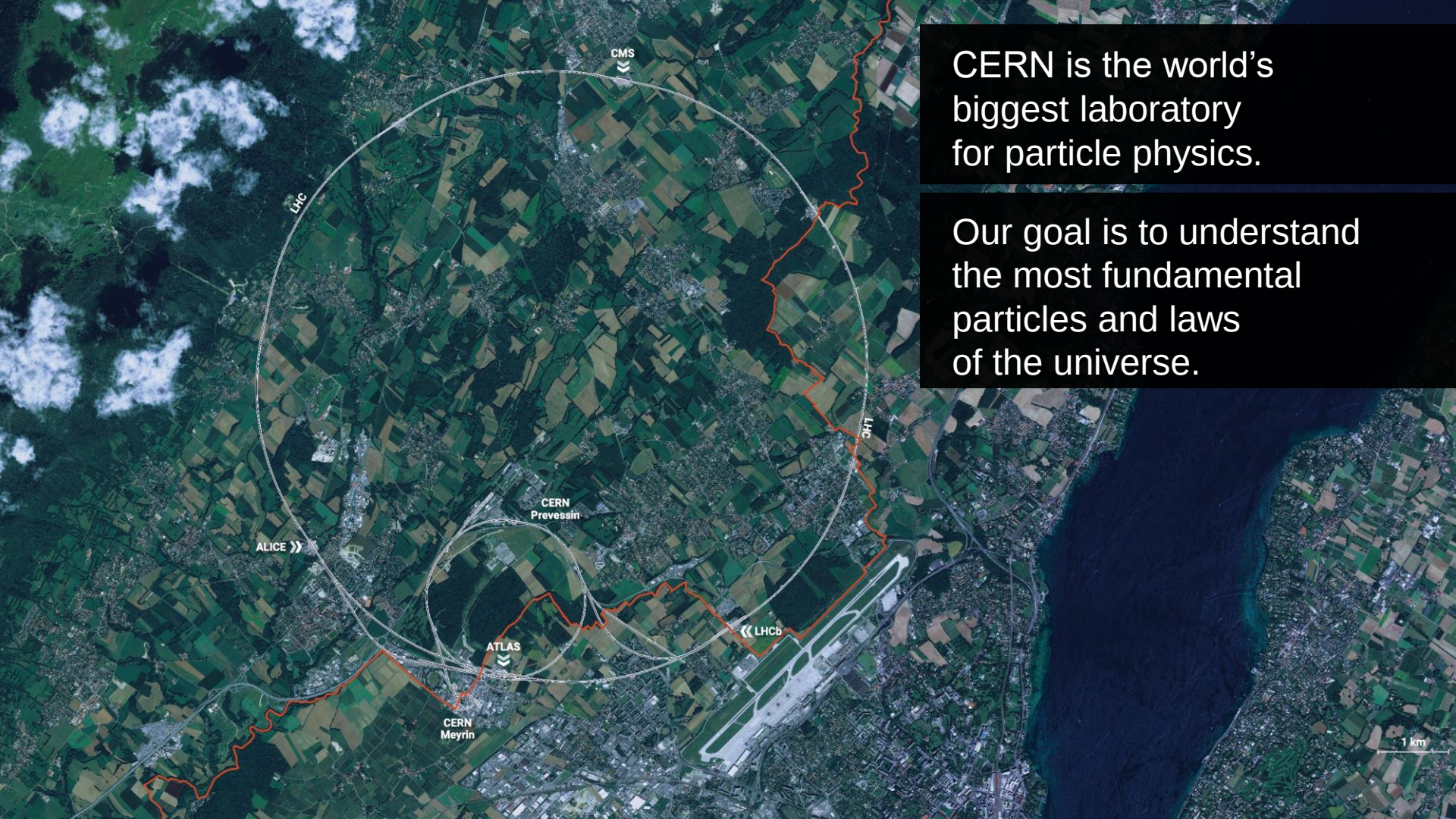
Keeping places tidy

- Please, Please Me:
  - Bring all coffee cups, plates, dishes to kitchen, and put them inside the dish washer in status “Dirty”.
  - Clean more than you mess, to fight our common enemy called Entropy.
  - Help collaboratively to clean up the space at the end of the day.

Thank you!

Greetings, the IdeaSquare Fairy named Markus

Where are we…?



CERN is the world's biggest laboratory for particle physics.

Our goal is to understand the most fundamental particles and laws of the universe.

CERN’s Mission

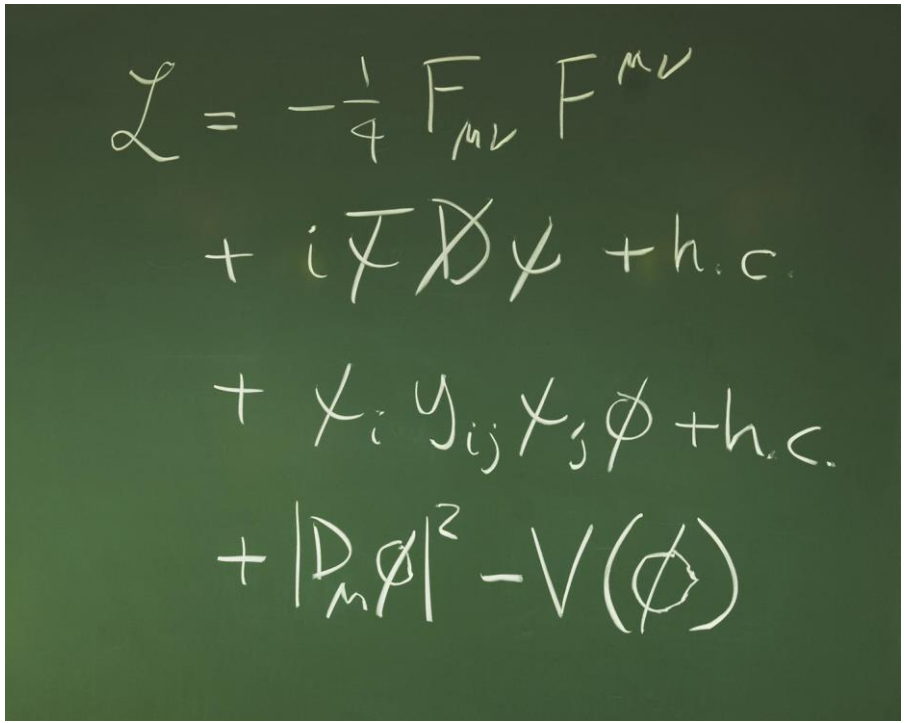
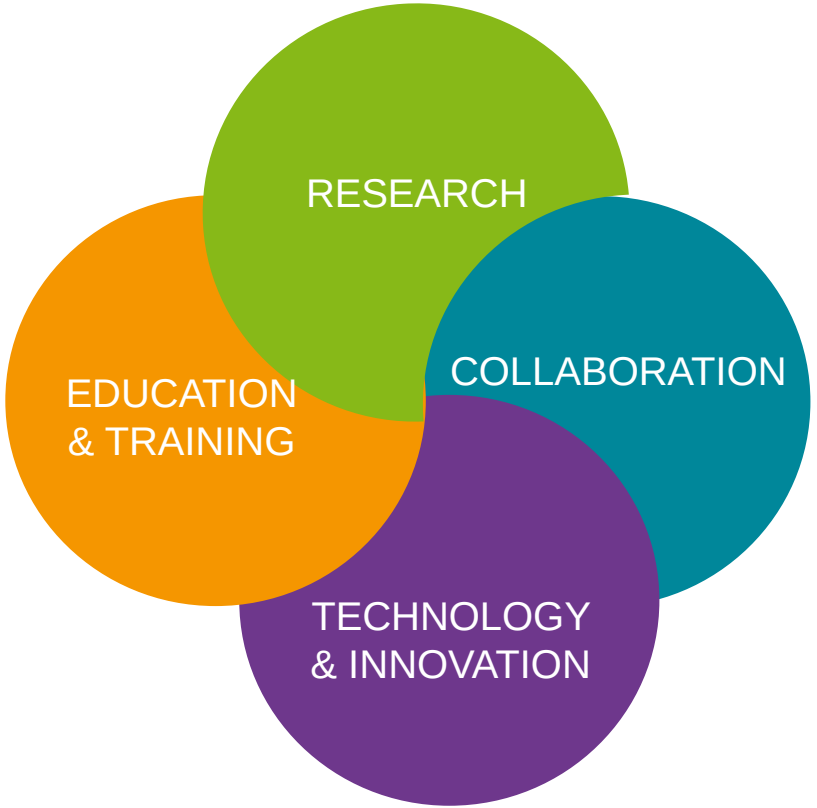


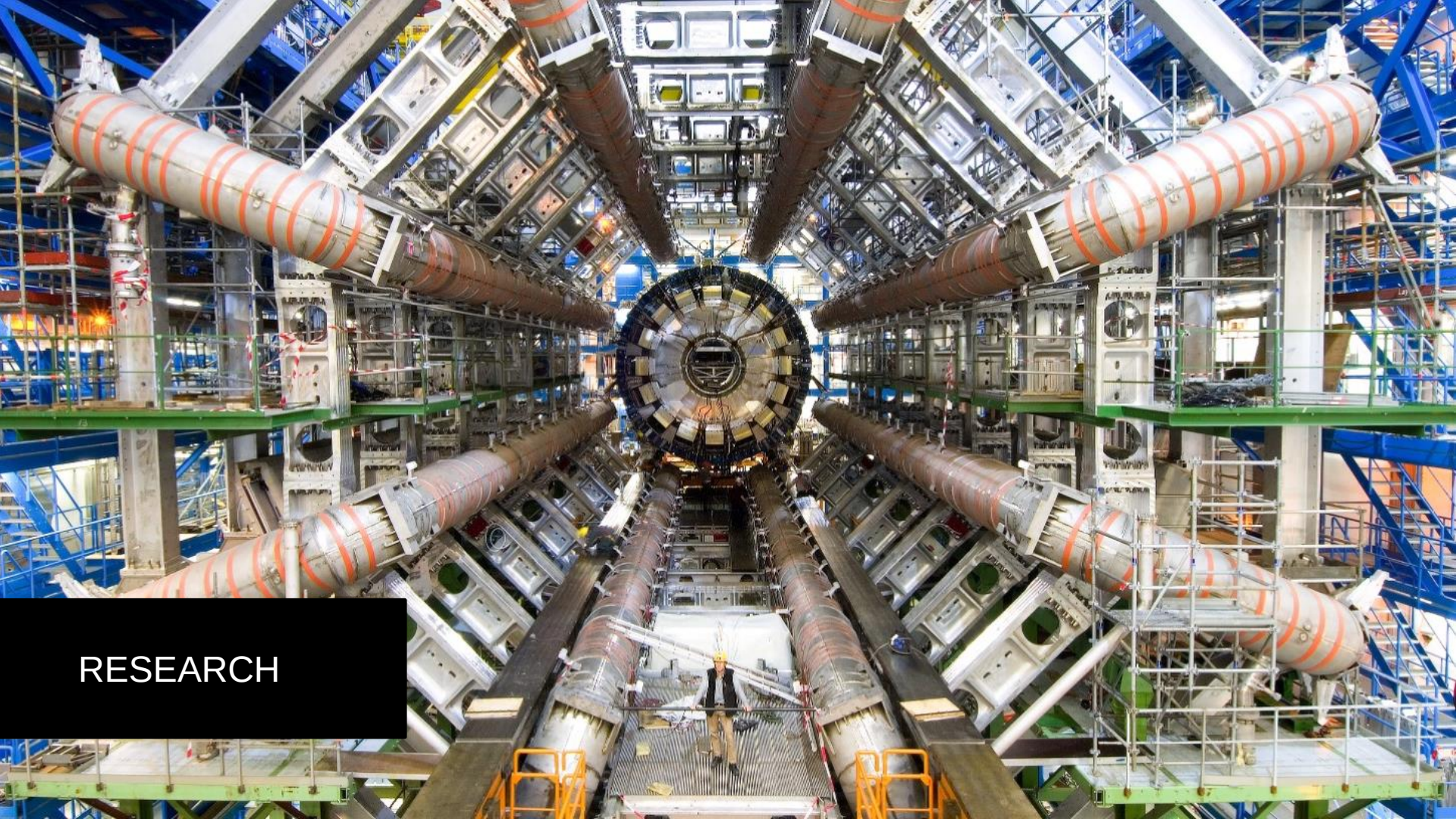
Photo by Claudia Marcelloni

CERN is a peace project, funded in the wake of the second world war that aims to:

- *Push back the frontiers of knowledge;*
- *Answer questions about the beginning and the nature of the universe;*
- *Unite people from different countries*
- *and cultures;*
- *Train scientists and engineers of tomorrow;*
- *Develop new technologies for accelerators and detectors and other new solutions , such as more effective cancer treatment.*

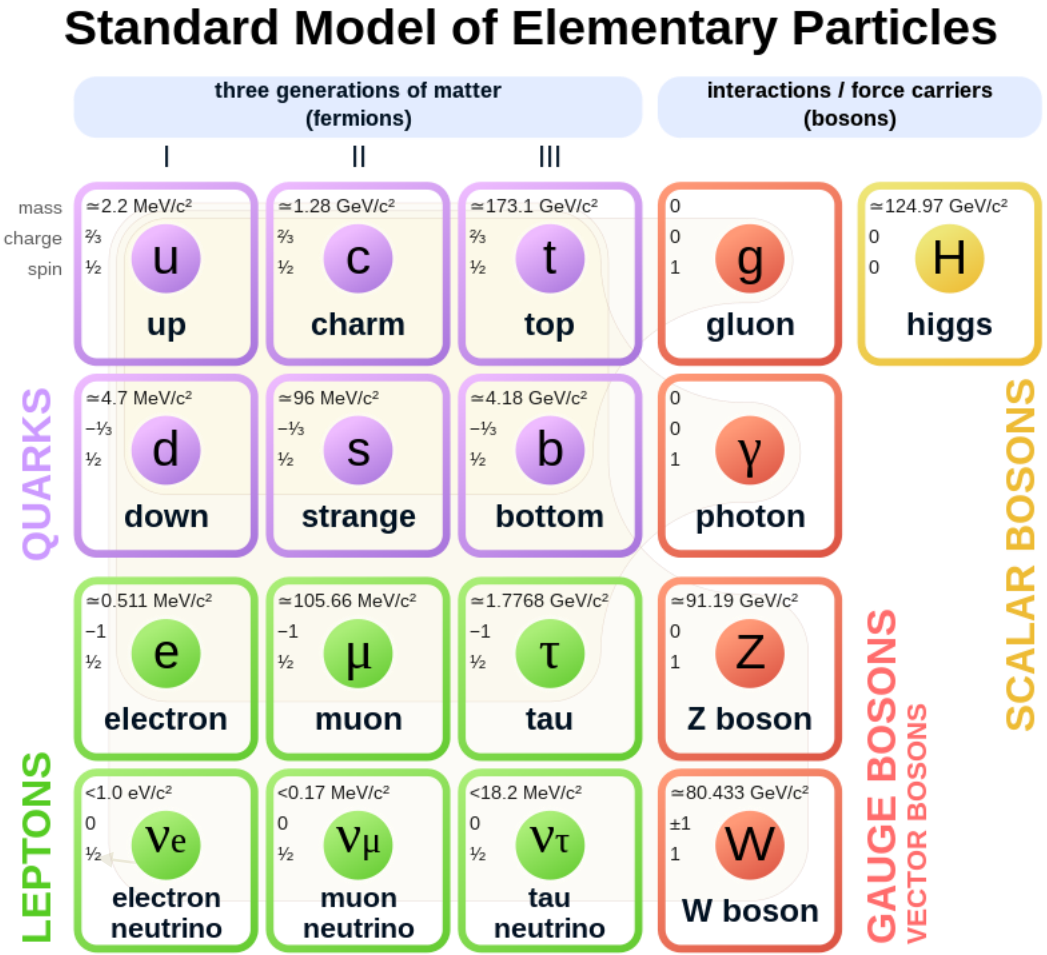
Four pillars that underpin CERN’s mission





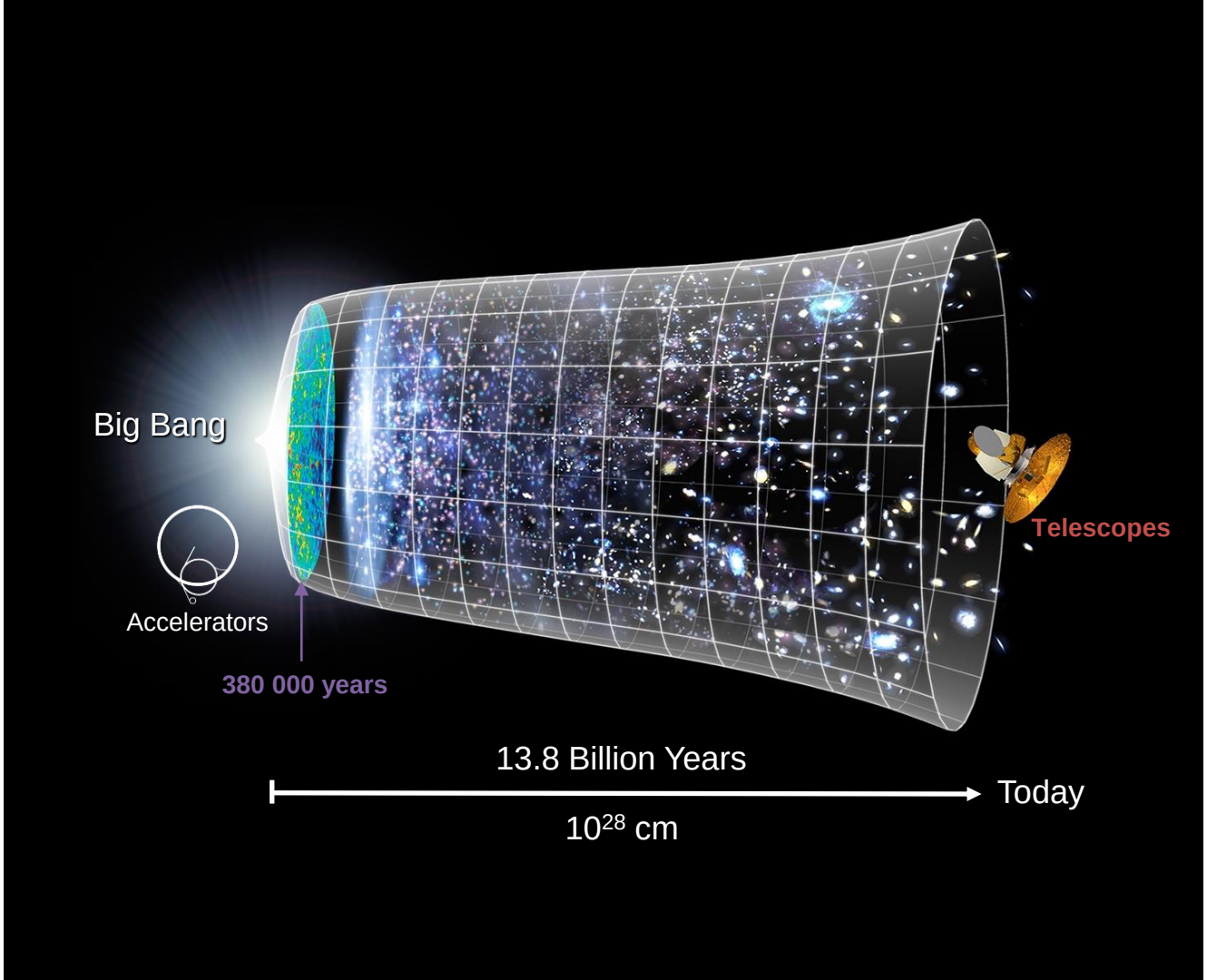
RESEARCH

What is the universe made of?



How did the universe begin?

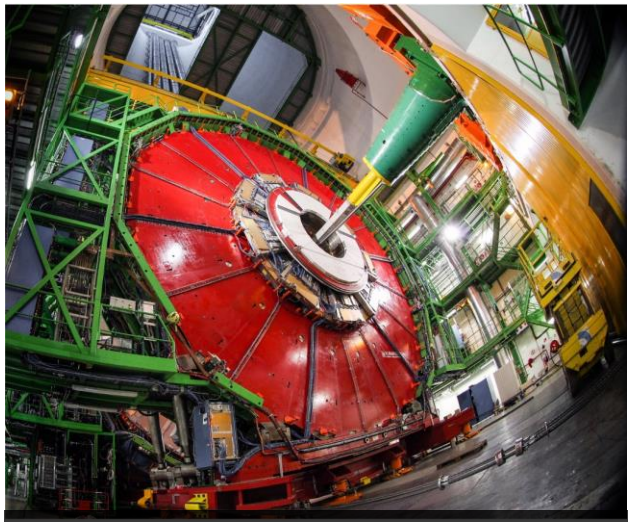
We reproduce the conditions a fraction of a second after the Big Bang, to gain insight into the structure and evolution
of the universe.



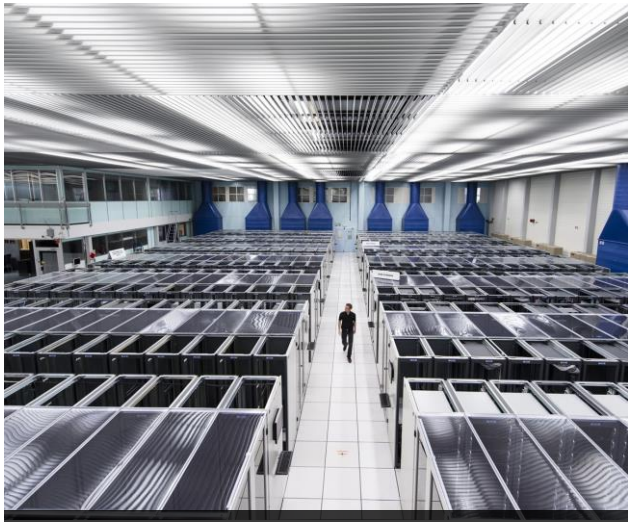
How do we do it?

•We build the largest machines to study the smallest particles in the universe.
•We develop technology to advance the limits of what is possible.

ACCELERATORS



DETECTORS

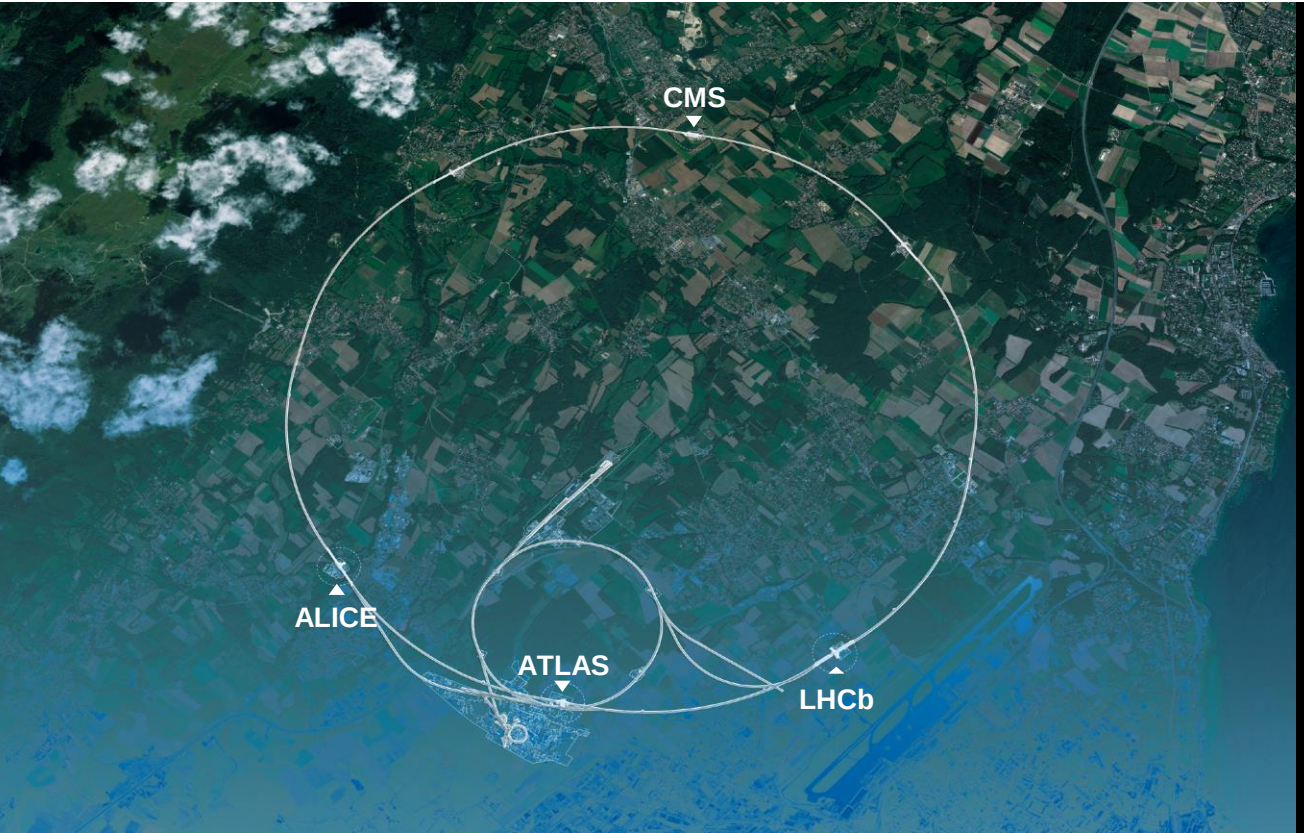


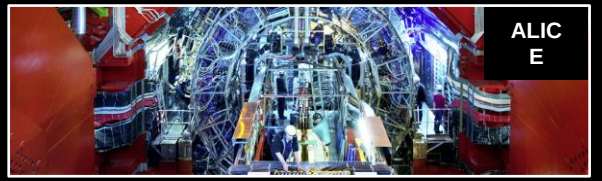
COMPUTING

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

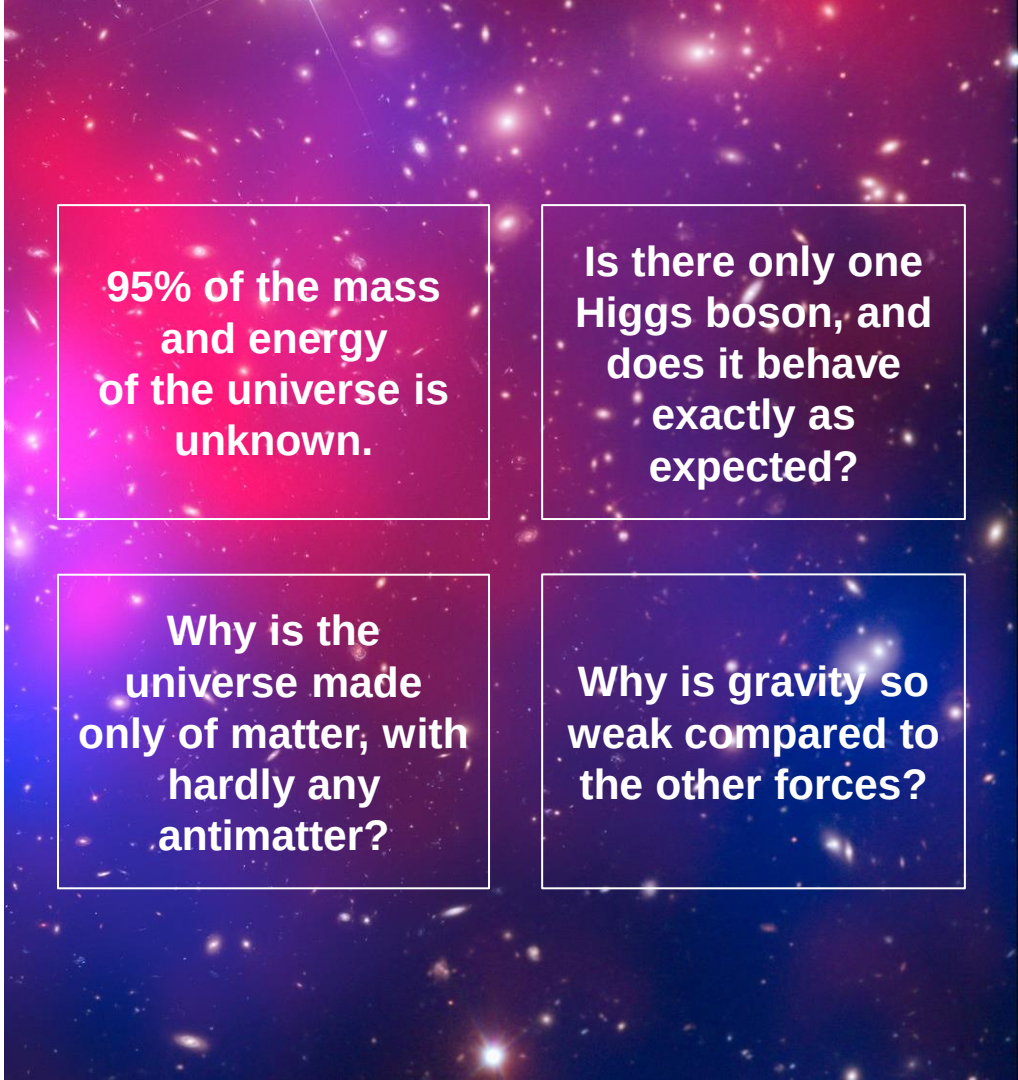
Giant detectors record the particles formed at the four collision points





Are we done? Not quite…

There are many unanswered questions in fundamental physics




COLLABORATION

A laboratory for people around the world

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 – **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

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 – **Estonia** 26 – **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

Charged-particle multiplicities in pp interactions at $\sqrt{s} = 900$ GeV measured with the ATLAS detector at the LHC ☆,☆☆

ATLAS Collaboration

ARTICLE INFO

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900 GeV
ATLAS
LHC
Minimum bias

ABSTRACT

The first measurements from proton–proton collisions recorded with the ATLAS detector at the
are presented. Data were collected in December 2009 using a minimum-bias trigger during colli
at a centre-of-mass energy of 900 GeV. The charged-particle multiplicity, its dependence on trans
momentum and pseudorapidity, and the relationship between mean transverse momentum and cha
particle multiplicity are measured for events with at least one charged particle in the kinematic
$|\eta| < 2.5$ and $p_T > 500$ MeV. The measurements are compared to Monte Carlo models of proton–p
collisions and to results from other experiments at the same centre-of-mass energy. The charged-pa
multiplicity per event and unit of pseudorapidity at $\eta = 0$ is measured to be 1.333 ± 0.003(sta
0.040(syst.), which is 5–15% higher than the Monte Carlo models predicted.

2010 Published by Elsevier

1. Introduction

Inclusive charged-particle distributions have been measured in pp and $p\bar{p}$ collisions at a range of different centre-
13]. Many of these measurements have been used to constrain phenomenological models of soft-hadronic interac
properties at higher centre-of-mass energies. Most of the previous charged-particle multiplicity measurements were
data with a double-arm coincidence trigger, thus removing large fractions of diffractive events. The data were then
remove the remaining single-diffractive component. This selection is referred to as non-single-diffractive (NSD). In so
as inelastic non-diffractive, the residual double-diffractive component was also subtracted. The selection of NSD or in
charged-particle spectra involves model-dependent corrections for the diffractive components and for effects of the
events with no charged particles within the acceptance of the detector. The measurement presented in this Letter in
strategy, which uses a single-arm trigger overlapping with the acceptance of the tracking volume. Results are pr
inelastic distributions, with minimal model-dependence, by requiring one charged particle within the acceptance of

This Letter reports on a measurement of primary charged particles with a momentum component transverse to
$p_T > 500$ MeV and in the pseudorapidity range $|\eta| < 2.5$. Primary charged particles are defined as charged particles
$\tau > 0.3 \times 10^{-10}$ s directly produced in pp interactions or from subsequent decays of particles with a shorter lifetime
tracks reconstructed in the ATLAS inner detector were corrected to obtain the particle-level distributions:

$$\frac{1}{N_{\text{ev}}} \cdot \frac{dN_{\text{ch}}}{d\eta}, \quad \frac{1}{N_{\text{ev}}} \cdot \frac{1}{2\pi p_T} \cdot \frac{d^2 N_{\text{ch}}}{d\eta\, dp_T}, \quad \frac{1}{N_{\text{ev}}} \cdot \frac{dN_{\text{ev}}}{dn_{\text{ch}}} \quad \text{and} \quad \langle p_T \rangle \text{ vs. } n_{\text{ch}},$$

where N_{ev} is the number of events with at least one charged particle inside the selected kinematic range, N_{ch} is
charged particles, n_{ch} is the number of charged particles in an event and $\langle p_T \rangle$ is the average p_T for a given number

ATLAS Collaboration

G. Aad[48], E. Abat[18a,*], B. Abbott[110], J. Abdallah[11], A.A. Abdelalim[49], A. Abdesselam[117], B. Abi[111], M. Abolins[88], H. Abramowicz[151], H. Abreu[114], E. Acerbi[89a,89b], B.S. Acharya[1], M. Ackers[20], D.L. Adams[24], T.N. Addy[56], J. Adelman[173], M. Aderholz[99], C. Adorisio[36a,3], T. Adye[128], S. Aefsky[22], J.A. Aguilar-Saavedra[123b], M. Aharrouche[81], S.P. Ahlen[21], F. Ahl[], A. Ahmad[146], H. Ahmed[2], M. Ahsan[40], G. Aielli[132a,132b], T. Akdogan[18a], P.F. Åkesson[29], G. Akimoto[153], A.V. Akimov[94], A. Aktas[48], M.S. Alam[1], M.A. Alam[76], J. Albert[167], S. Al[], M. Aleksa[29], I.N. Aleksandrov[65], M. Aleppo[89a,89b], F. Alessandria[89a], C. Alexa[25a], G. Ale[], G. Alexandre[49], T. Alexopoulos[9], M. Alhroob[20], M. Aliev[15], G. Alimonti[89a], J. Alison[119], P.P. Allport[73], S.E. Allwood-Spiers[53], J. Almond[82], A. Aloisio[102a,102b], R. Alon[169], A. Alo[], J. Alonso[14], M.G. Alviggi[102a,102b], K. Amako[66], P. Amaral[29], G. Ambrosini[16], G. Ambrosi[], C. Amelung[22], V.V. Ammosov[127,*], A. Amorim[123a], G. Amorós[165], N. Amram[151], C. Ana[], T. Andeen[29], C.F. Anders[48], K.J. Anderson[30], A. Andreazza[89a,89b], V. Andrei[58a], M.-L. Ar[]

G. Battistoni[89a], F. Bauer[136], H.S. Bawa[144], M. Bazalo[], R. Beccherle[50a], N. Becerici[18a], P. Bechtle[41], G.A. Bec[], A.J. Beddall[18c], A. Beddall[18c], V.A. Bednyakov[65], C. B[], M. Beimforde[99], G.A.N. Belanger[28], C. Belanger-Char[], G. Bella[151], L. Bellagamba[19a], F. Bellina[29], G. Bellom[], O. Beltramello[29], A. Belymam[75], S. Ben Ami[150], O. B[], M. Bendel[81], B.H. Benedict[161], N. Benekos[163], Y. Ber[], M. Benoit[114], J.R. Bensinger[22], K. Benslama[129], S. Be[], E. Bergeaas Kuutmann[144a,144b], N. Berger[4], F. Bergha[], P. Bernat[114], R. Bernhard[48], C. Bernius[77], T. Berry[76], M.I. Besana[89a,89b], N. Besson[135], S. Bethke[99], R.M. B[], J. Biesiada[14], M. Biglietti[131a,131b], H. Bilokon[47], M. B[], C. Bini[131a,131b], C. Biscarat[178], R. Bischof[62], U. Biten[], J. B. Blanchard[114], G. Blanchot[29], C. Blocker[22], J. Ble[]

D. Fassouliotis[8], B. Fatholahzadeh[156], L. Fayar[], O.L. Fedin[120], I. Fedorko[29], W. Fedorko[29], L. [], A.B. Fenyuk[127], J. Ferencei[143b], J. Ferland[93], [], J. Ferrando[117], V. Ferrara[41], A. Ferrari[164], P. F[], D. Ferrere[49], C. Ferretti[87], F. Ferro[50a,50b], M. [], A. Filippas[9], F. Filthaut[104], M. Fincke-Keeler[], P. Fischer[20], M.J. Fisher[108], S.M. Fisher[128], H.[], P. Fleischmann[171], S. Fleischmann[20], F. Fleure[], F. Föhlisch[58a], M. Fokitis[9], T. Fonseca Martin[], D. Fortin[157a], J.M. Foster[82], D. Fournier[114], A.[], P. Francavilla[121a,121b], S. Franchino[118a,118b], [], M. Fraternali[118a,118b], S. Fratina[119], J. Freestor[], J.A. Frost[27], C. Fukunaga[154], E. Fullana Torreg[], T. Gadfort[24], S. Gadomski[49], G. Gagliardi[50a,5], V. Gallo[16], B.J. Gallop[128], P. Gallus[124], E. Galy[], A. Gaponenko[14], M. Garcia-Sciveres[14], C. Gar[], N. Garelli[29], H. Garitaonandia[105], V. Garonne[], P. Gauzzi[131a,131b], L.L. Gavrilenko[94], C. Gay[166], C.N.P. Gee[128], Ch. Geich-Gimbel[20], K. Gellerst[], S. Gentile[131a,131b], F. Georgatos[9], S. George[76], H. Ghazlane[134d], P. Ghez[4], N. Ghodbane[33], B.[], V. Giangiobbe[121a,121b], F. Gianotti[29], B. Gibba[], L.M. Gilbert[117], M. Gilchriese[14], O. Gildemeis[], J. Ginzburg[151], N. Giokaris[8], M.P. Giordani[162], P.F. Giraud[29], P. Girtler[62], D. Giugni[89a], P. Giu[], A. G[], T. G[], N. G[], R. G[], B. G[], H.A.[], S.A.[], M. G[], A.G.[], K.-J.[], M. Medinnis[41], R. Meera-Lebbai[110], T.M. Meg[]

N. Massol[4], A. Mastroberardino[36a,36b], T. Mas[], H. Matsunaga[153], T. Matsushita[67], C. Mattrave[], J.K. Mayer[156], A. Mayne[138], R. Mazini[149], M. [], F. Mazzucato[49], J. Mc Donald[85], S.P. Mc Kee[87], K.W. McFarlane[56,*], S. McGarvie[76], H. McGlone[], T.R. McMahon[76], T.J. McMahon[17], R.A. McPhe[], M. Medinnis[41], R. Meera-Lebbai[110], T.M. Meg[]

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Z. Zhao[32b], A. Zhemchugov[65], S. Zheng[32a], J. Zhong[149,z], B. Zhou[87], N. Zhou[34], Y. Zhou[149], C.G. Zhu[32d], H. Zhu[41], Y. Zhu[170], X. Zhuang[98], V. Zhuravlov[99], B. Zilka[143a], R. Zimmermann[20], S. Zimmermann[20], S. Zimmermann[48], M. Ziolkowski[140], R. Zitoun[4], L. Živković[34], V.V. Zmouchko[127,*], G. Zobernig[170],

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[63] University of Iowa, 203 Van Allen Hall, Iowa City, IA 52242-1479, United States
[64] Iowa State University, Department of Physics and Astronomy, Ames High Energy Physics Group, Ames, IA 50011-3160, United States
[65] Joint Institute for Nuclear Research, JINR Dubna, RU-141 980 Moscow Region, Russia
[66] KEK, High Energy Accelerator Research Organization, 1-1 Oho, Tsukuba-shi, Ibaraki-ken 305-0801, Japan
[67] Kobe University, Graduate School of Science, 1-1 Rokkodai-cho, Nada-ku, JP - Kobe 657-8501, Japan
[68] Kyoto University, Faculty of Science, Oiwake-cho, Kitashirakawa, Sakyou-ku, Kyoto-shi, JP - Kyoto 606-8502, Japan
[69] Kyoto University of Education, 1 Fukakusa, Fujimori, fushimi-ku, Kyoto-shi, JP - Kyoto 612-8522, Japan
[70] Universidad Nacional de La Plata, FCE, Departamento de Física, IFLP (CONICET-UNLP), C.C. 67, 1900 La Plata, Argentina
[71] Lancaster University, Physics Department, Lancaster LA1 4YB, United Kingdom
[72] INFN Sezione di Lecce[(a)]; Università del Salento, Dipartimento di Fisica[(b)], Via Arnesano, IT-73100 Lecce, Italy
[73] University of Liverpool, Oliver Lodge Laboratory, P.O. Box 147, Oxford Street, Liverpool L69 3BX, United Kingdom
[74] Jožef Stefan Institute and University of Ljubljana, Department of Physics, SI-1000 Ljubljana, Slovenia
[75] Queen Mary University of London, Department of Physics, Mile End Road, London E1 4NS, United Kingdom
[76] Royal Holloway, University of London, Department of Physics, Egham Hill, Egham, Surrey TW20 0EX, United Kingdom
[77] University College London, Department of Physics and Astronomy, Gower Street, London WC1E 6BT, United Kingdom
[78] Laboratoire de Physique Nucléaire et de Hautes Energies, Université Pierre et Marie Curie (Paris 6), Université Denis Diderot (Paris-7), CNRS/IN2P3, Tour 33, 4 place Jussieu, FR-75252 Paris Cedex 05, France
[79] Lunds Universitet, Naturvetenskapliga Fakulteten, Fysiska Institutionen, P.O. Box 118, SE-221 00 Lund, Sweden
[80] Universidad Autonoma de Madrid, Facultad de Ciencias, Departamento de Física Teorica, ES-28049 Madrid, Spain
[81] Universität Mainz, Institut für Physik, Staudinger Weg 7, D-55099 Mainz, Germany
[82] University of Manchester, School of Physics and Astronomy, Manchester M13 9PL, United Kingdom
[83] CPPM, Aix-Marseille Université, CNRS/IN2P3, Marseille, France
[84] University of Massachusetts, Department of Physics, 710 North Pleasant Street, Amherst, MA 01003, United States
[85] McGill University, High Energy Physics Group, 3600 University Street, Montreal, Quebec H3A 2T8, Canada
[86] University of Melbourne, School of Physics, AU - Parkville, Victoria 3010, Australia
[87] The University of Michigan, Department of Physics, 2477 Randall Laboratory, 500 East University, Ann Arbor, MI 48109-1120, United States
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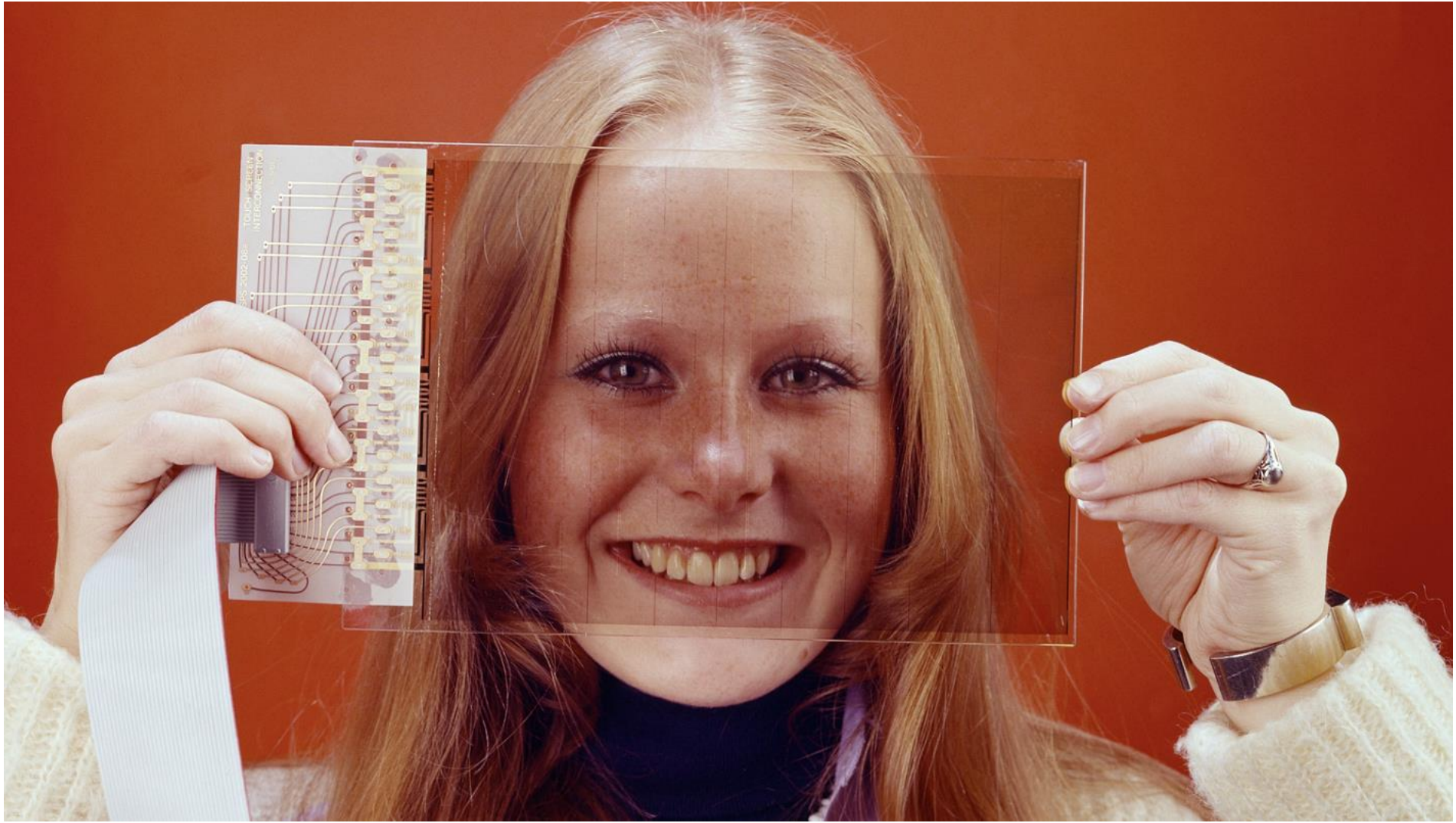
[138] University of Sheffield, Department of Physics & Astronomy, Hounsfield Road, Sheffield S3 7RH, United Kingdom
[139] Shinshu University, Department of Physics, Faculty of Science, 3-1-1 Asahi, Matsumoto-shi, JP - Nagano 390-8621, Japan
[140] Universität Siegen, Fachbereich Physik, D-57068 Siegen, Germany
[141] Simon Fraser University, Department of Physics, 8888 University Drive, CA - Burnaby, BC V5A 1S6, Canada
[142] SLAC National Accelerator Laboratory, Stanford, CA 94309, United States
[143] Comenius University, Faculty of Mathematics, Physics & Informatics[(a)], Mlynska dolina F2, SK-84248 Bratislava; Institute of Experimental Physics of the Slovak Academy of Sciences, Dept. of Subnuclear Physics[(b)], Watsonova 47, SK-04353 Kosice, Slovak Republic
[144] Stockholm University, Department of Physics[(a)]; The Oskar Klein Centre[(b)], AlbaNova, SE-106 91 Stockholm, Sweden
[145] Royal Institute of Technology (KTH), Physics Department, SE-106 91 Stockholm, Sweden
[146] Stony Brook University, Department of Physics and Astronomy, Nicolls Road, Stony Brook, NY 11794-3800, United States
[147] University of Sussex, Department of Physics and Astronomy, Pevensey 2 Building, Falmer, Brighton BN1 9QH, United Kingdom
[148] University of Sydney, School of Physics, AU - Sydney NSW 2006, Australia
[149] Insitute of Physics, Academia Sinica, TW - Taipei 11529, Taiwan
[150] Technion, Israel Inst. of Technology, Department of Physics, Technion City, IL - Haifa 32000, Israel
[151] Tel Aviv University, Raymond and Beverly Sackler School of Physics and Astronomy, Ramat Aviv, IL - Tel Aviv 69978, Israel
[152] Aristotle University of Thessaloniki, Faculty of Science, Department of Physics, Division of Nuclear & Particle Physics, University Campus, GR-54124 Thessaloniki, Greece
[153] The University of Tokyo, International Center for Elementary Particle Physics and Department of Physics, 7-3-1 Hongo, Bunkyo-ku, JP - Tokyo 113-0033, Japan
[154] Tokyo Metropolitan University, Graduate School of Science and Technology, 1-1 Minami-Osawa, Hachioji, Tokyo 192-0397, Japan
[155] Tokyo Institute of Technology, 2-12-1-H-34 O-Okayama, Meguro, Tokyo 152-8551, Japan
[156] University of Toronto, Department of Physics, 60 Saint George Street, Toronto M5S 1A7, Ontario, Canada
[157] TRIUMF[(a)], 4004 Wesbrook Mall, Vancouver, B.C. V6T 2A3; York University[(b)], Department of Physics and Astronomy, 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada
[158] University of Tsukuba, Institute of Pure and Applied Sciences, 1-1-1 Tennoudai, Tsukuba-shi, JP - Ibaraki 305-8571, Japan
[159] Tufts University, Science & Technology Center, 4 Colby Street, Medford, MA 02155, United States
[160] Universidad Antonio Nariño, Centro de Investigaciones, Cra 3 Este No.47A-15, Bogota, Colombia

TECHNOLOGY & INNOVATION


CERN
World Wide Web Initiative
EIZO



Two Birds With One Proton Beam: CERN Now Makes Radioisotopes For Medical Research

Forbes

EDUCATION
& TRAINING

CERN trains the next generation of physicists, engineers and technicians

>3000 PhD students are registered at CERN.

600 PhD theses are completed each year.

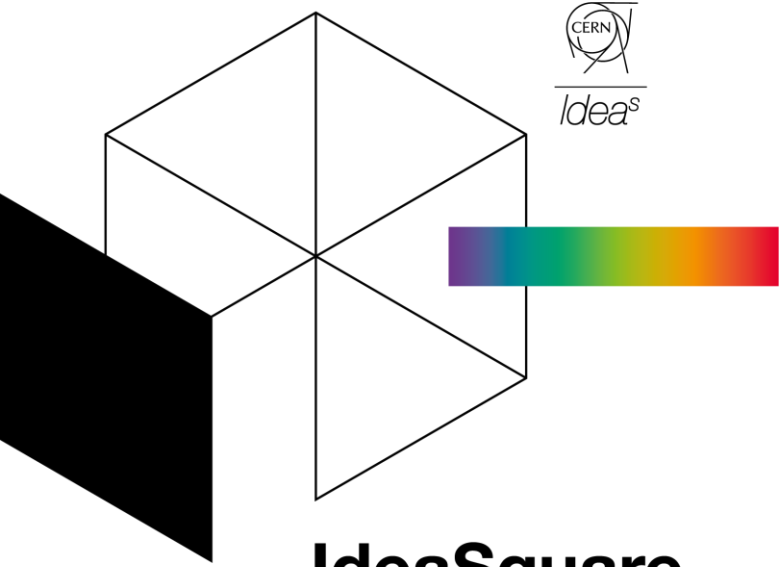
300 undergraduate students in Summer programmes.

~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 Science Gateway



IdeaSquare

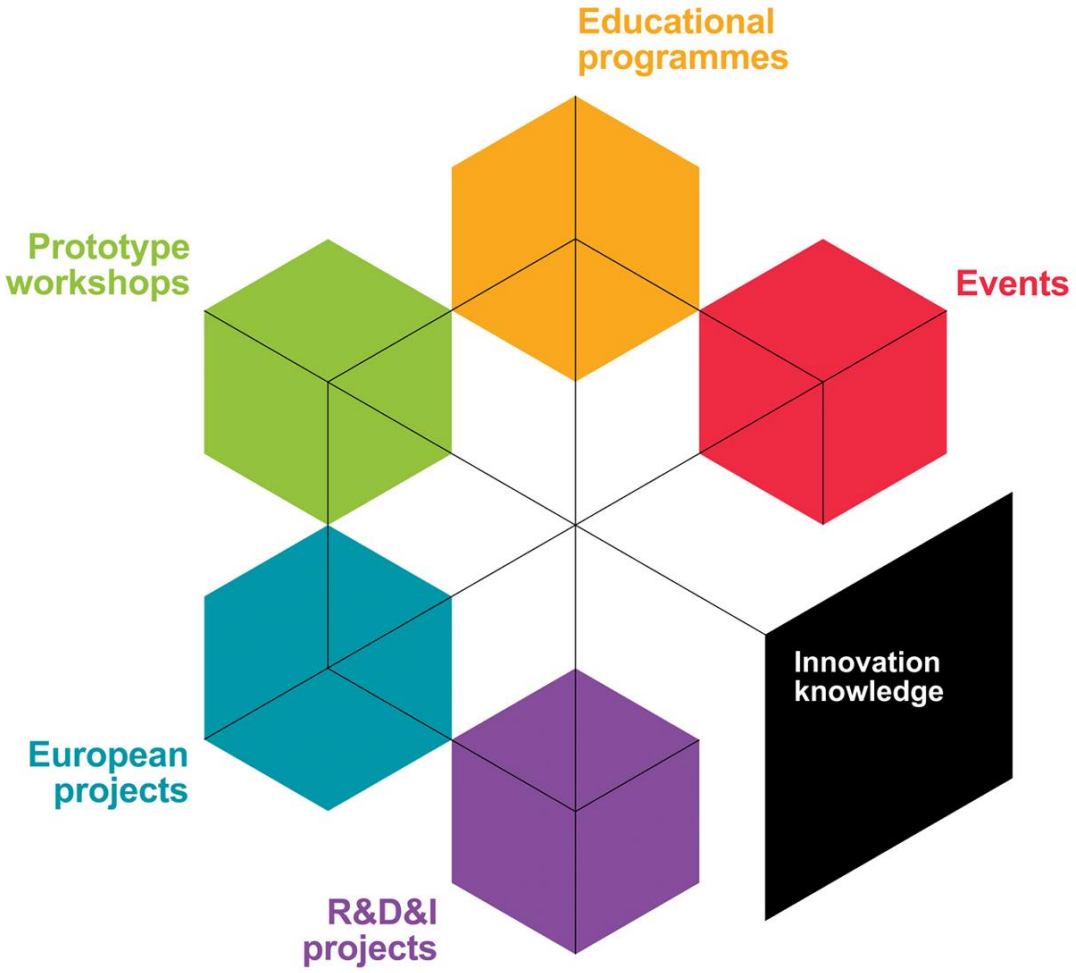
Why and How?

IdeaSquare

The Innovation Space at CERN

- collaborative methodologies
- access to CERN expertise
- cross-connectivity

To ideate solutions for the **future of humankind.**



Why IdeaSquare?

We believe that for **fundamental change** to be made, we need **more than traditional** innovation **methods and mindsets.**

We enable students and innovators to **imagine a future** worth fighting for, and we give them the **tools and confidence** to start building that future.

Linking science innovation and the SDGs

ATTRACT

Developing breakthrough technologies
for science and society

Absorbing and reducing the risk to the market

Public funding

Private investment

From ideas to prototypes

ATTRACT phase 1
Risk absorption

From prototypes to pre-market products

ATTRACT phase 2
Risk mitigation

From pre-market products to solutions

Connecting curious minds

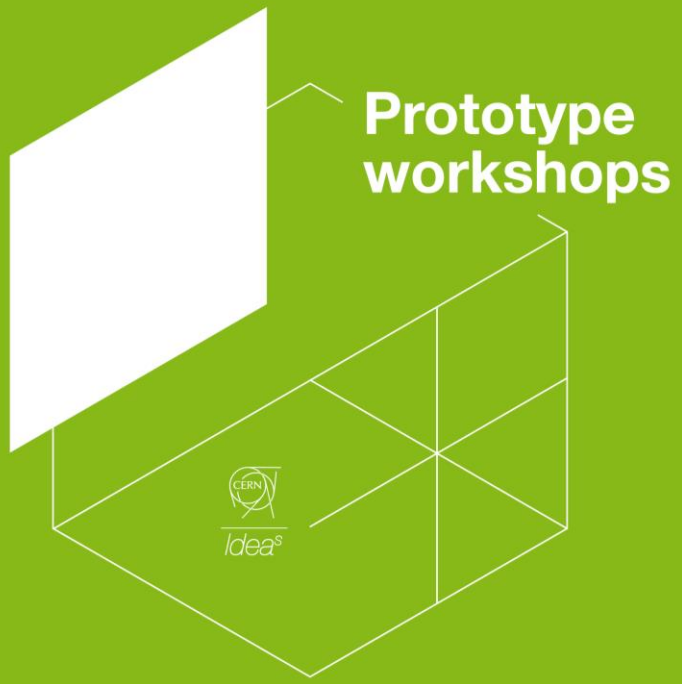
Events, workshops and hackatons

When the building is not in full use, Ideasquare can offer access to its open work areas, rapid prototyping facilities and its meeting rooms for short, deadline driven Challenge Events, such as :

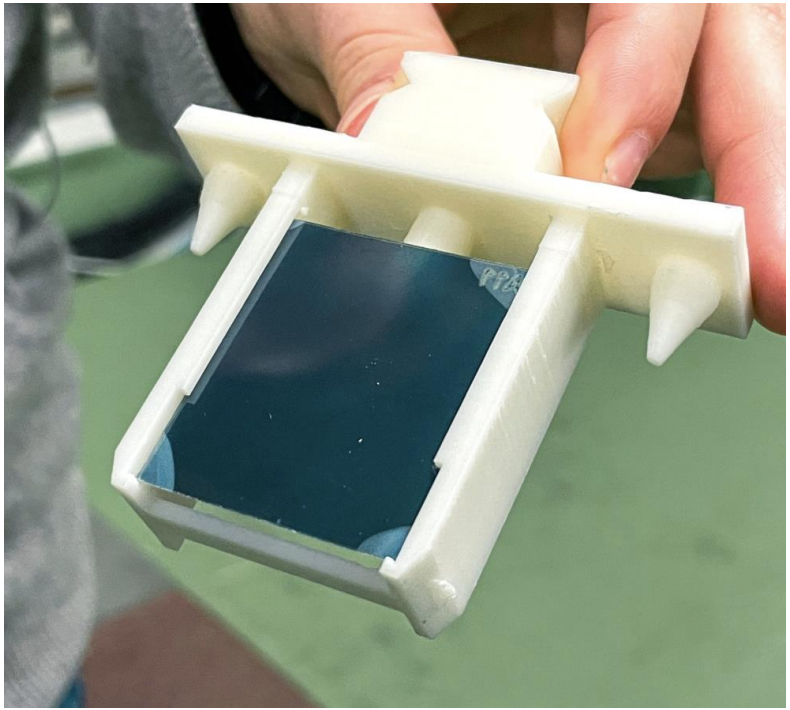
- Innovation Events,
- Workshops
- Hackathons (an event compressed into a short number of days where participants work towards a concept prototype).

IdeaSquare Open Doors event 2018

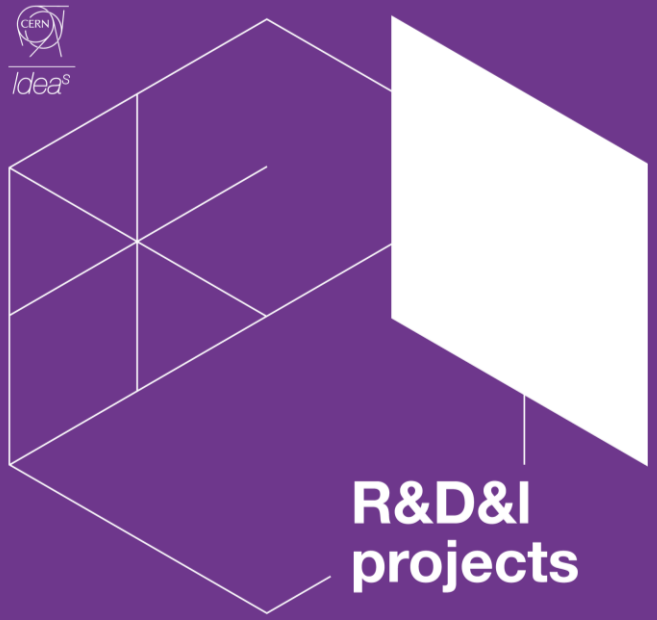
Hackathon for the visually impaired for the development of the CERN Exhibitions



Fast forward through prototyping

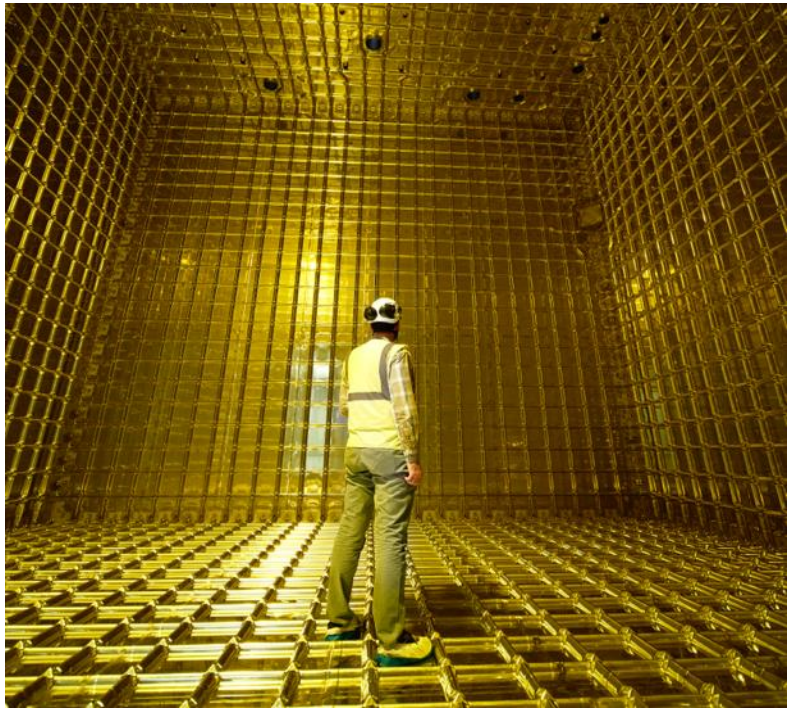


- CLEAR primary focus is on general accelerator R&D and component studies for existing and possible future machines
- Prototyping and validation of accelerator components, and studies of high-gradient acceleration methods.
- Radiation hardness of electronic components for space and high-energy physics;
- Dosimetry for medical applications (cancer therapy).



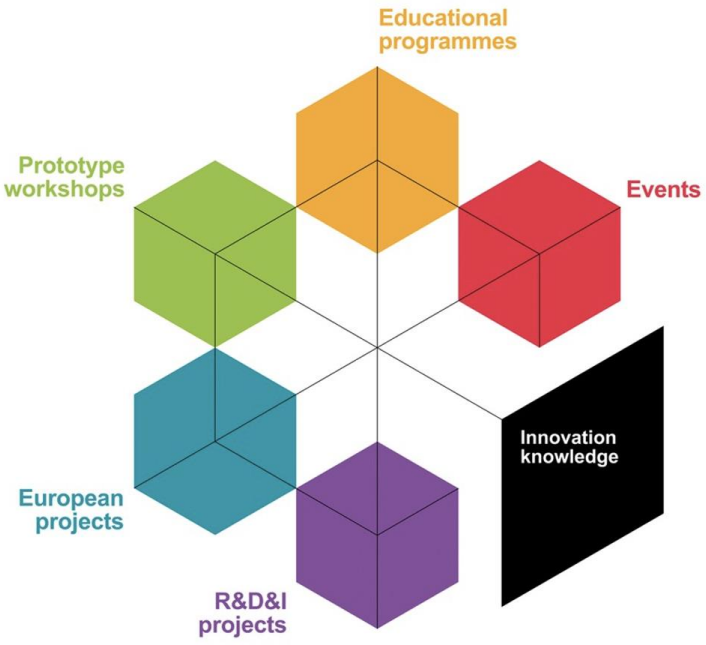
Stimulating instrumentation in research

Neutrino Platform



- Neutrino Platform (CENF) fosters fundamental research in the field of Neutrino Accelerator Physics
- CENF supports generic detector, neutrino beams R&D and large detector prototypes or demonstrators. It gives technical, financial and logistics support to approved projects
- Currently includes seven projects, including significant involvement in (Proto) Dune
- CERN & IdeaSquare provides a facility for R&D on future technologies (HW and SW) and partner in several neutrino research programs

Journal for experimental innovation (CIJ)



- IdeaSquare is uniquely positioned to collect knowledge on innovation practices.
- To collect and share this knowledge, we established CIJ – an open journal for experimental innovation.
- Additionally, our blogs and videos from the innovation café aim to harvest the success (or experimentations) stories of those at CERN that use our space or collaborate with us in any of our activities.

CIJ is only in its 5th edition and has already become a publication of reference for thought-provoking, contemporary and experimental innovation research. It has published 46 original papers and counted with the contribution of more than 250 authors from 20 countries around the world.

Educational programmes

Training and experimenting with the innovators of the future

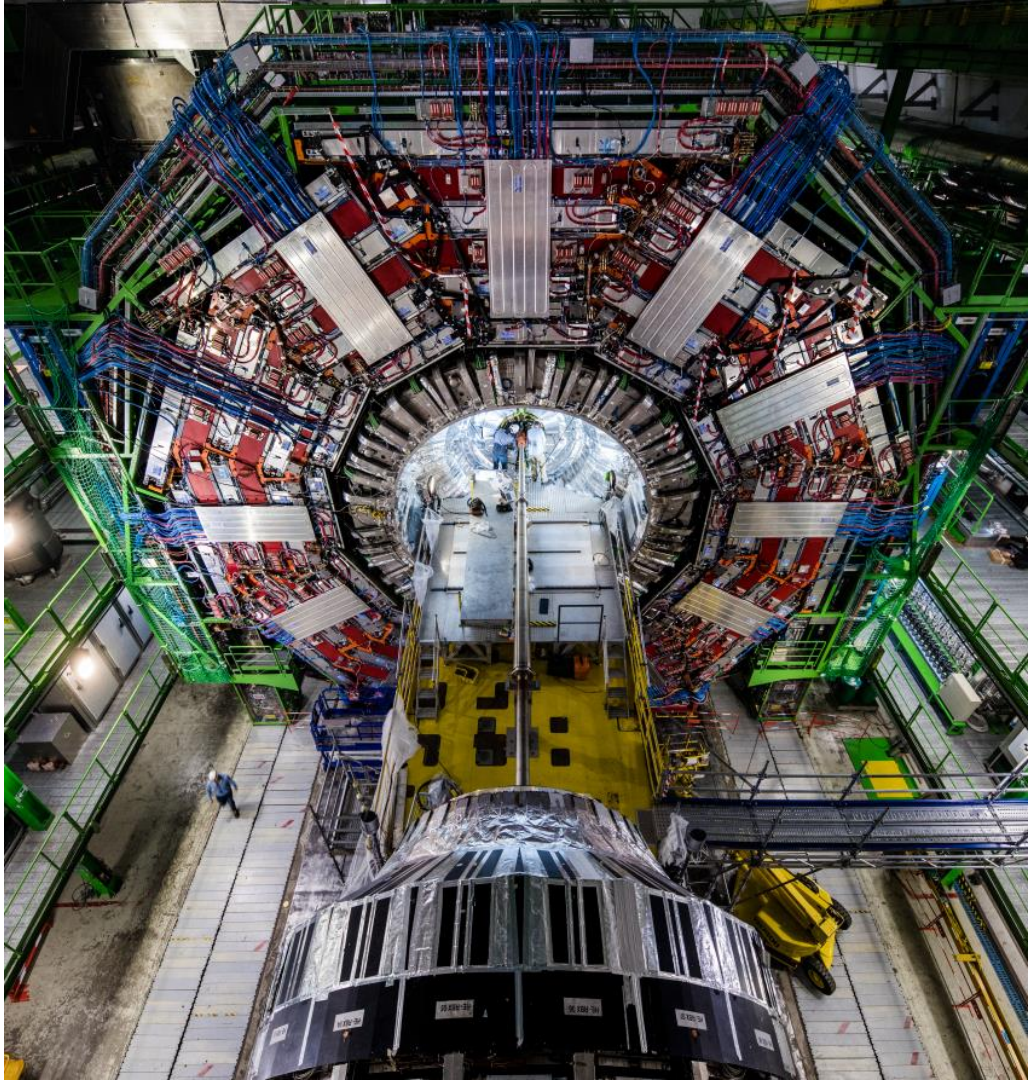
Challenge Based Innovation (CBI)

- **+22** active program collaborations;
- Universities from **8 different countries;**
- **Design Thinking** methods to solve global challenges, intersected with **deep tech**;
- **UN Sustainable Development Goals** as a lens in the process;
- **Multidisciplinary teams** of students: business, design, engineering, social sciences…
- CERN researchers who act as technological coaches.

Business as usual is not in our DNA, but we also don’t want any “magic”…

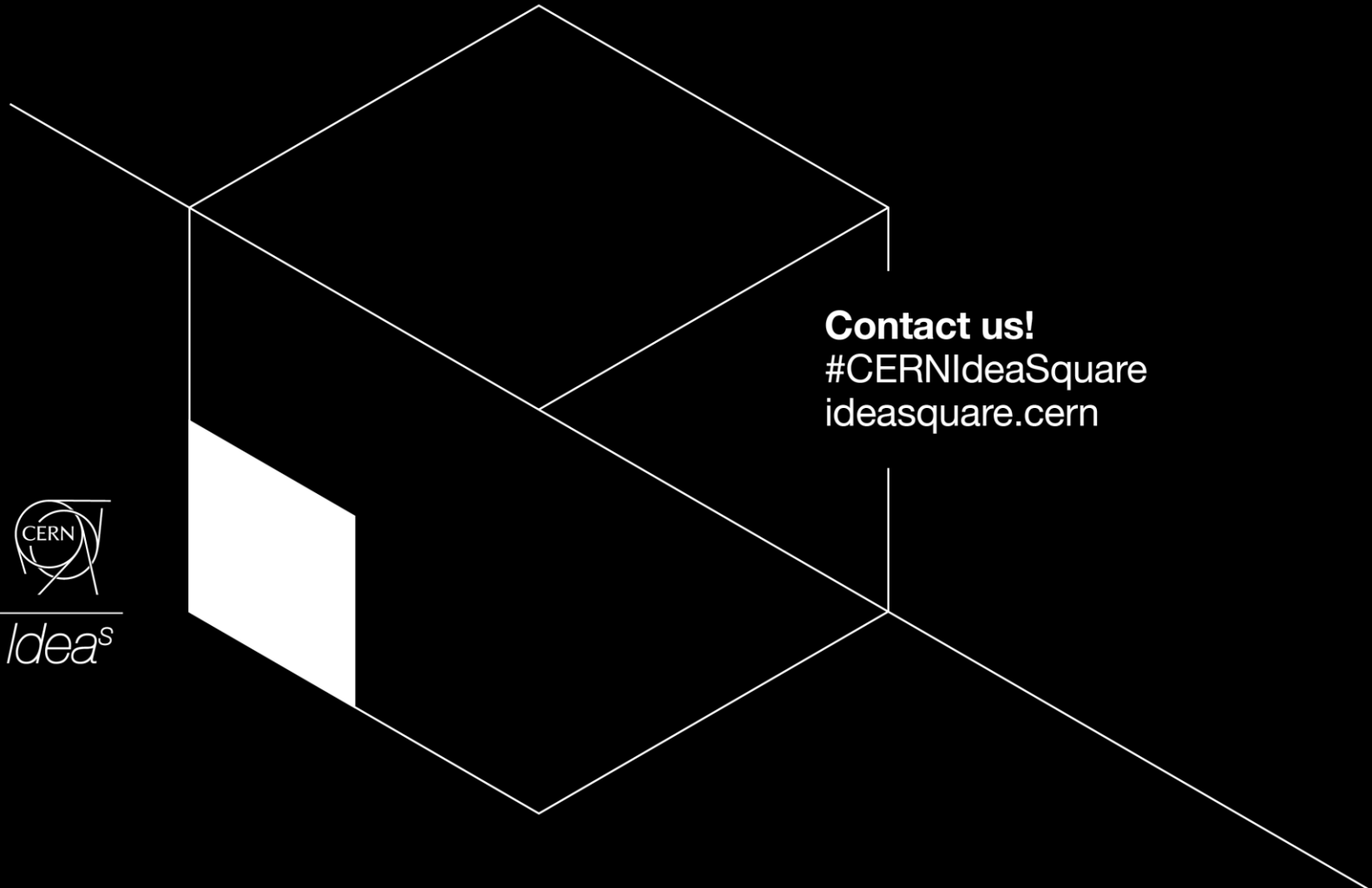
Ideas should be disruptive, without:

- Breaking the laws of physics;
- Causing more harm than good.



A place where people have the licence to dream!

Join our
Alumni group!



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