When infinitely large meets infinitely small

Giovanni Porcellana
Nuclear Engineer

- Conference will start shortly
- Switch off your microphone
- Open the *chat* tool (down-right)

Your virtual conference

Format

- Presentation (40 minutes in total)
- Questions and answers (20 minutes in total)

During presentation

- Ask questions using the chat
- Use microphone only if needed

After presentation

- Material and links available on Indico page

POLITECNICO DI TORINO

KTH VETENSKAP OCH KONST

DE LA RECHERCHE À L'INDUSTRIE cea

TERA Fondazione per Adroterapia Oncologica

CERN

Knowledge Transfer
Accelerating Innovation

An Italian Nuclear Engineer at CERN? Tell me more…

CERN
What is it?

What does *CERN* stand for?

Conseil Européen pour la Recherche Nucléaire

European Council for Nuclear Research

1953

What does *CERN* stand for?

Organisation
Européenne pour la
Recherche
Nucléaire

European
Organization for
Nuclear
Research

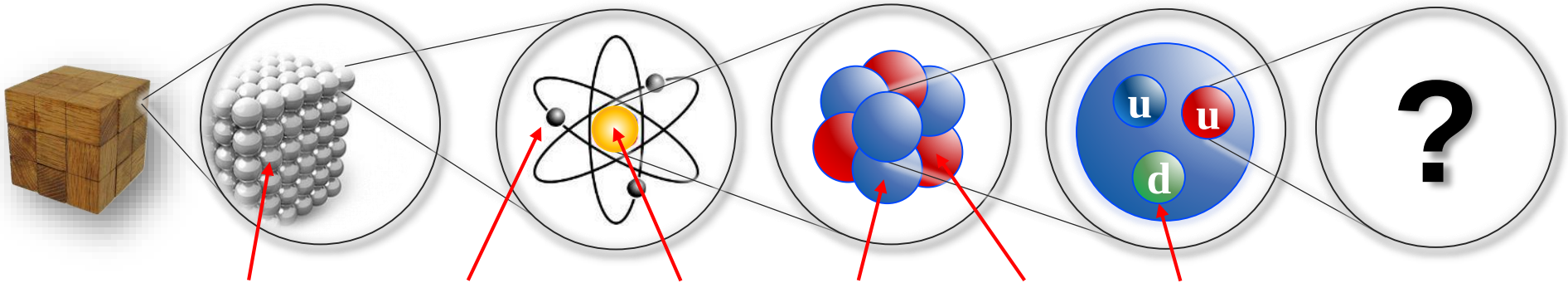
1954

SCIENCE
TECHNOLOGY
TRAINING
COOPERATION

CERN
Science and Technology

Fundamental research

What is the matter made of



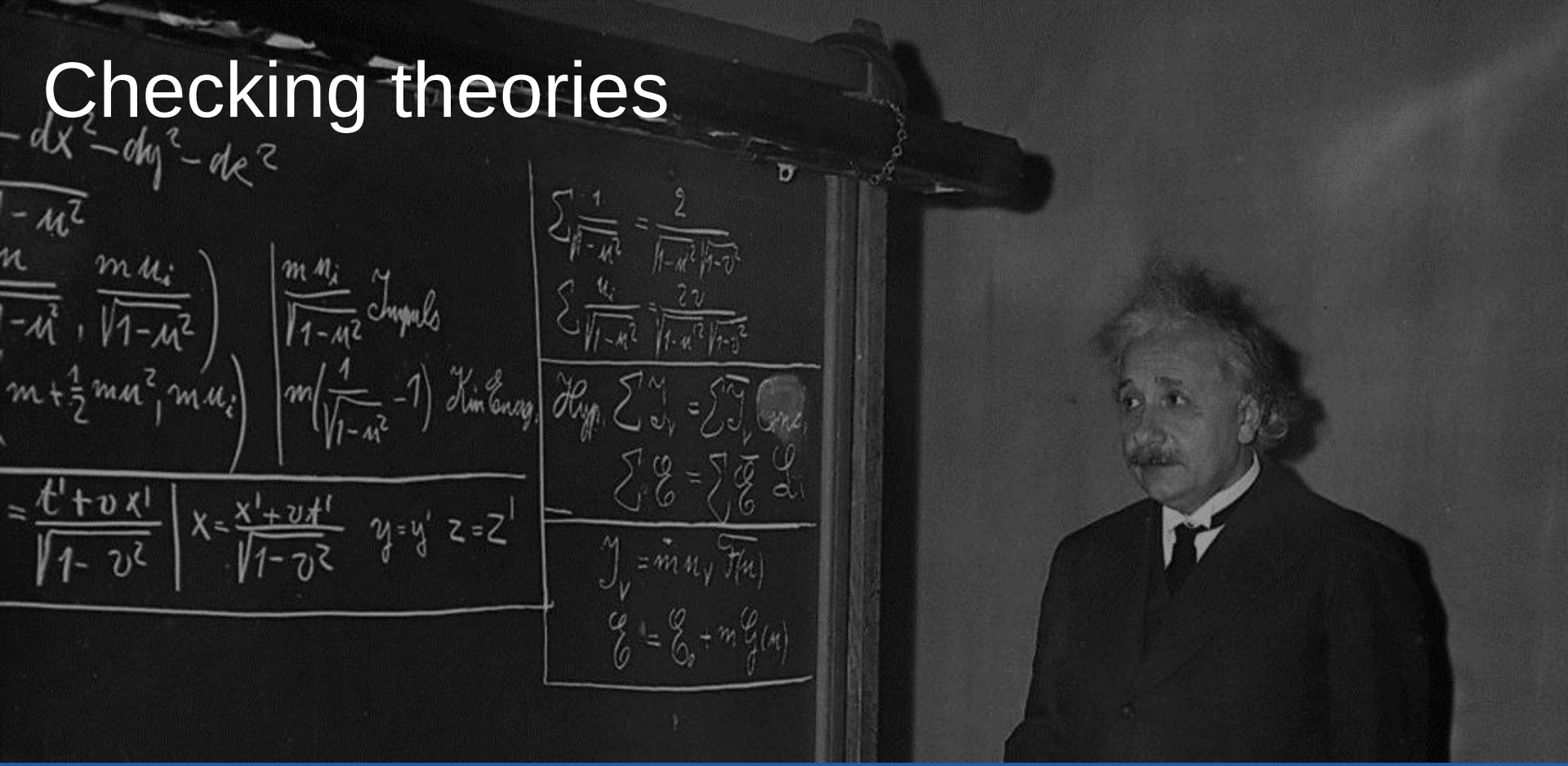
atom — 4th - 5th BCE

electron — nucleus — End of 19th century

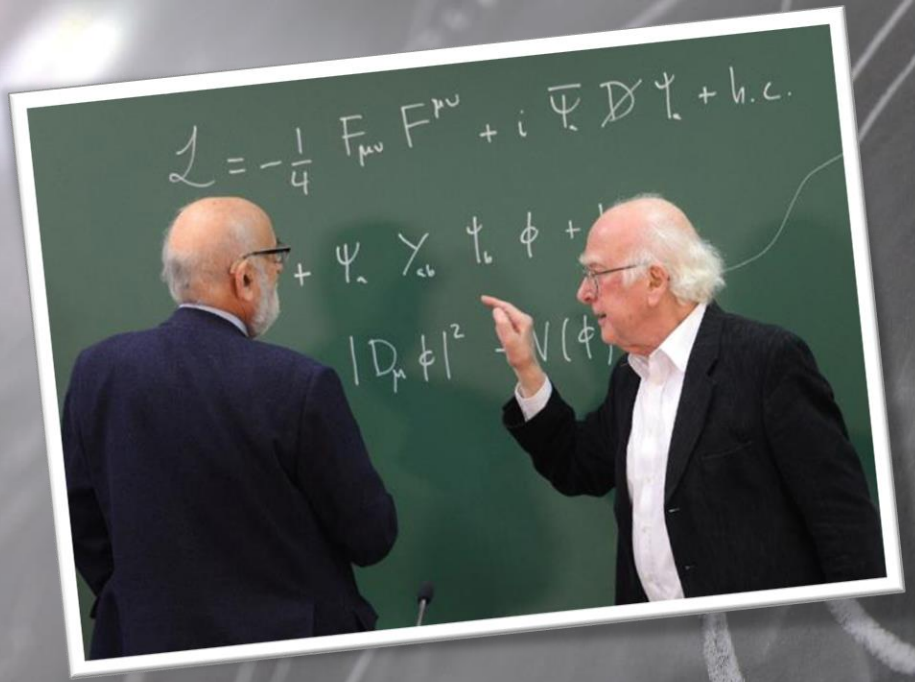
proton — neutron — Begining of 20th century

quark — 1960s

Checking theories



Answering questions…



Higgs?

Answering questions…

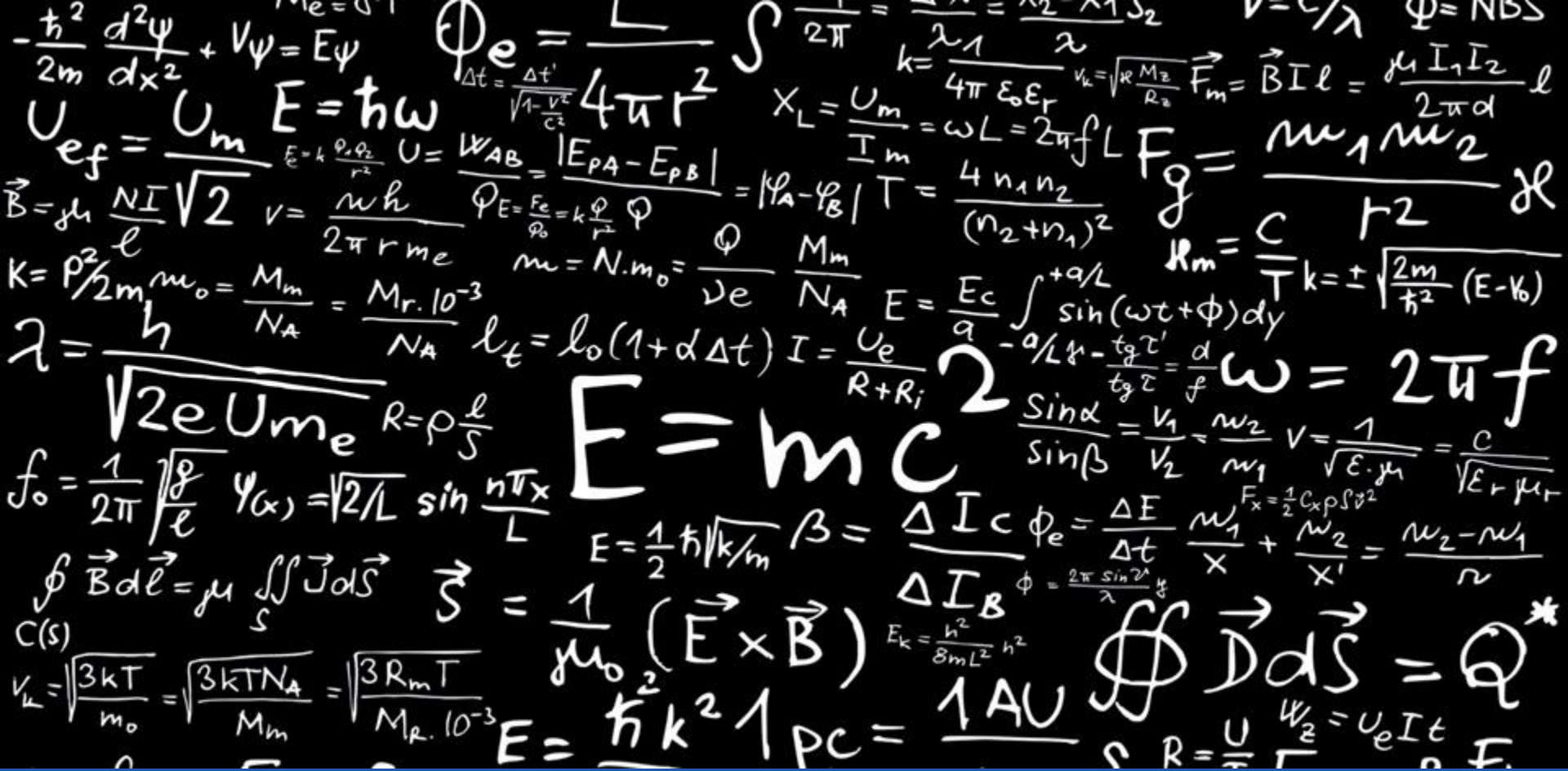
Antimatter?

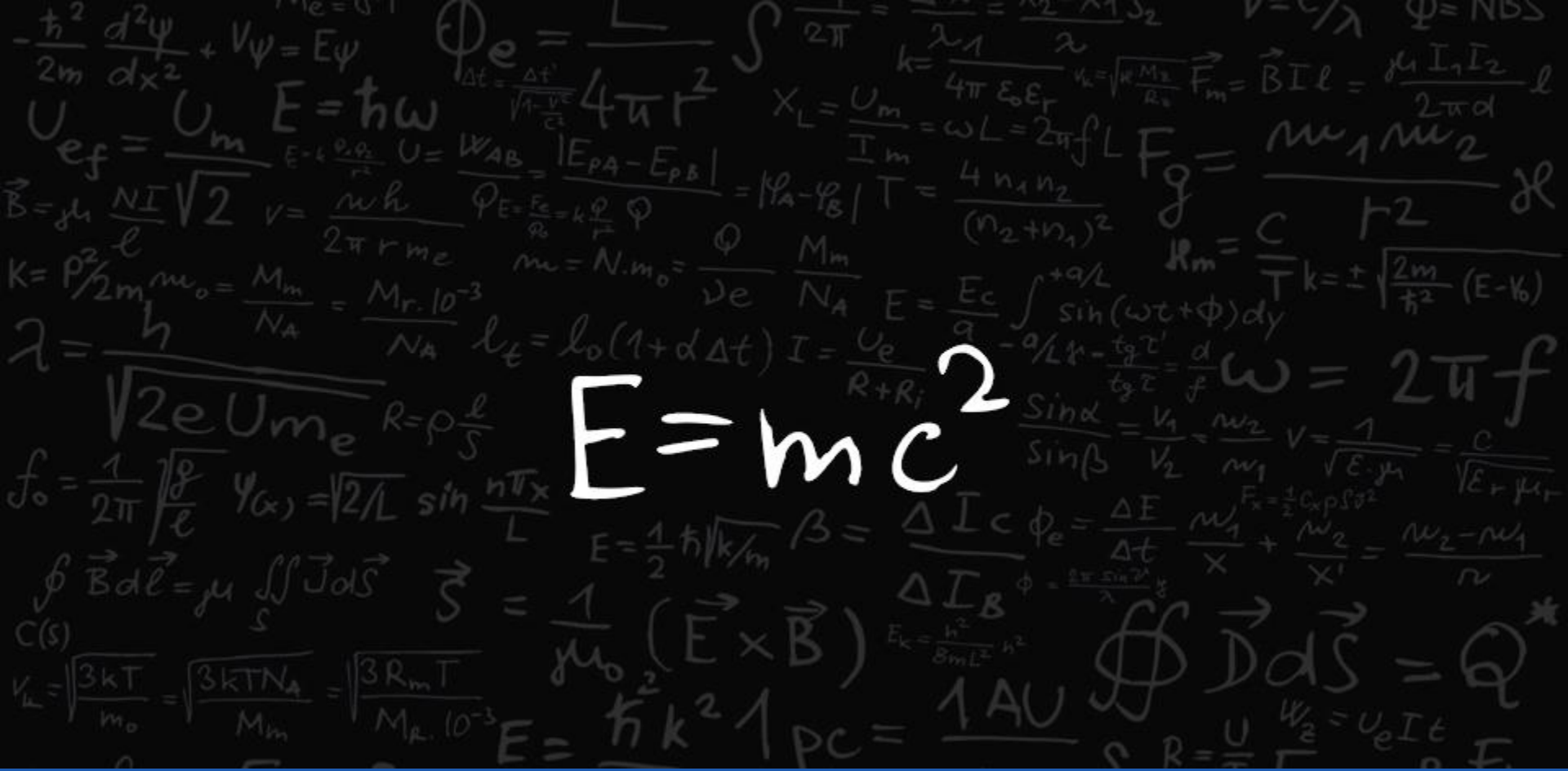
Answering questions…

Dark matter?

CERN

How does it work?


E = mc²
E = ħω
ω = 2πf
Φ = NBS
F_g = m₁m₂/r² ϰ
ϕ_e = ΔE/Δt
ϕ = 2π sin ϑ/λ y
E_k = h²/8mL² n²
1 pc = 1 AU
W_z = U_e I t


E=mc²

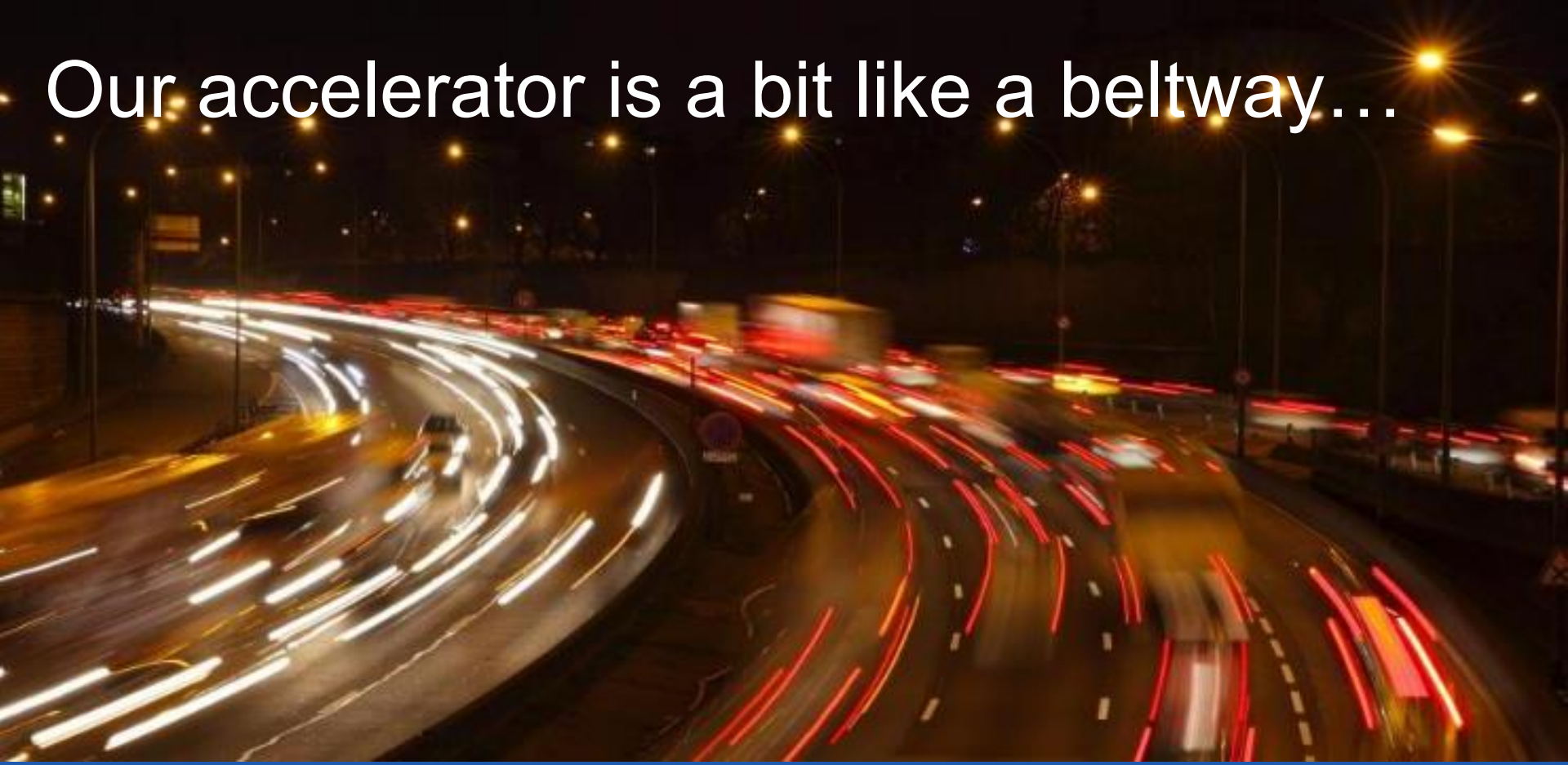
Accelerating and colliding

Incredible levels of energy

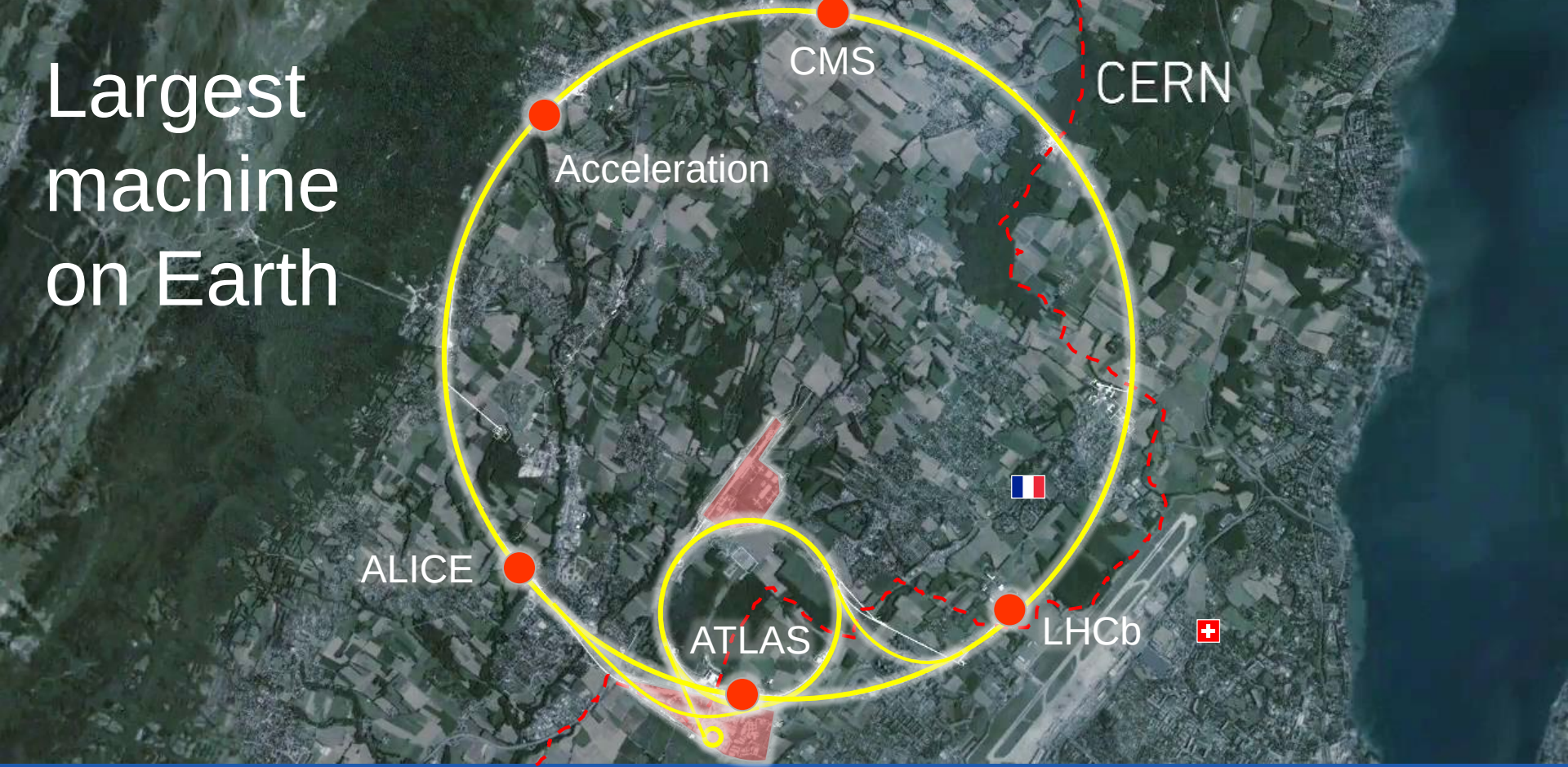
7 TeV

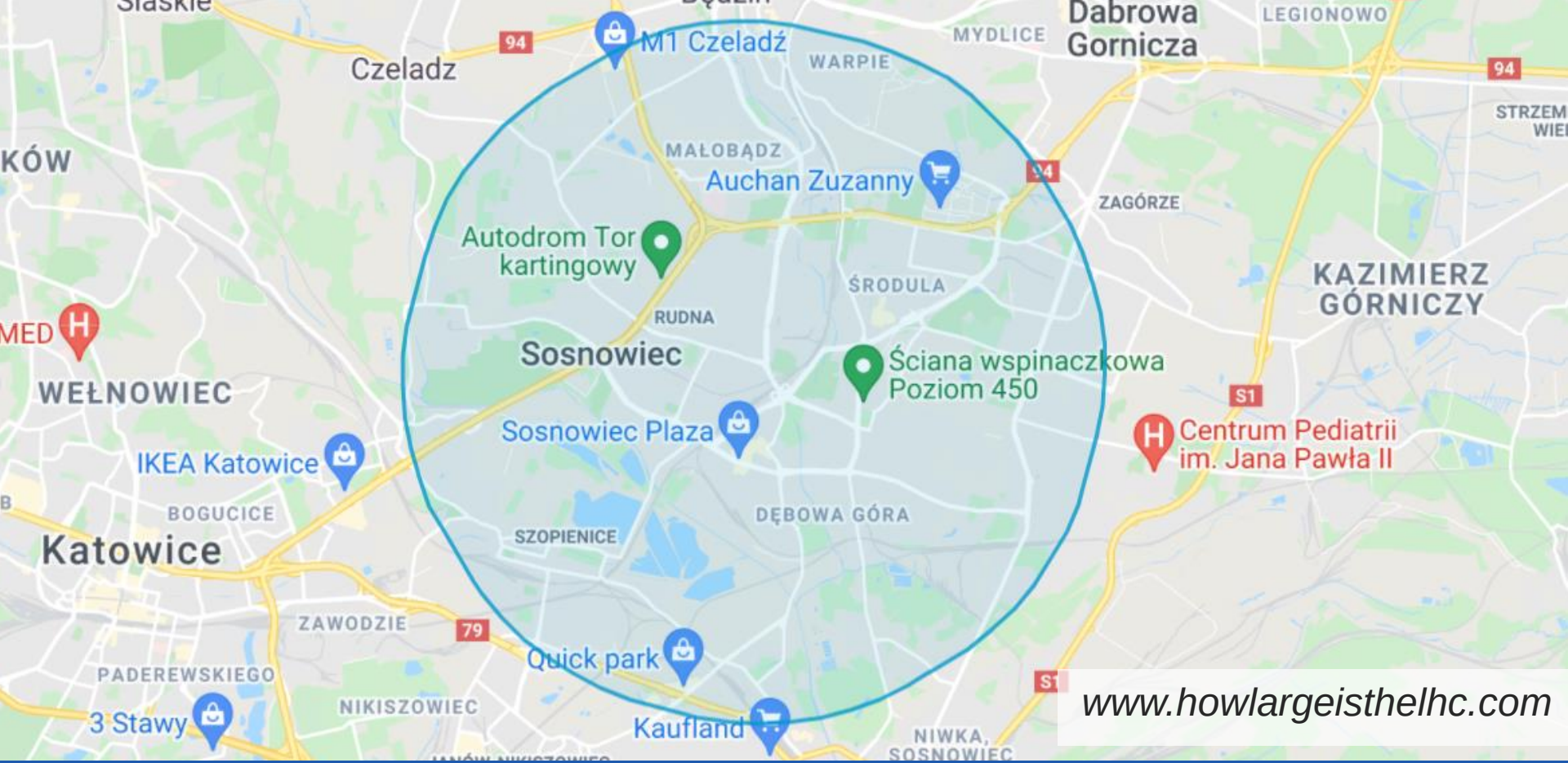
The equivalent energy of
100’000’000’000’000’000’000’000 protons
into one of them

Our accelerator is a bit like a beltway…



Largest machine on Earth



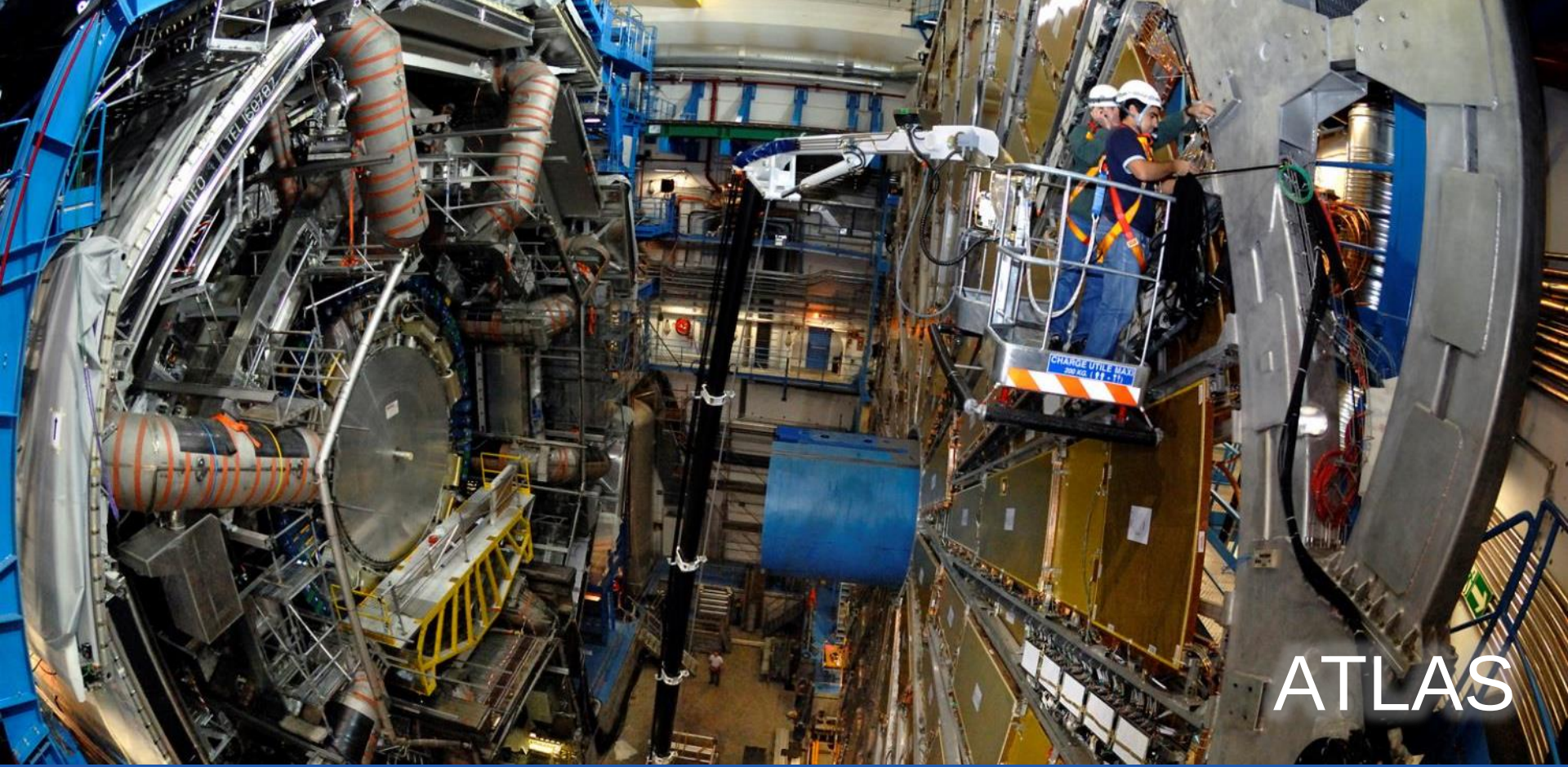


www.howlargeisthelhc.com

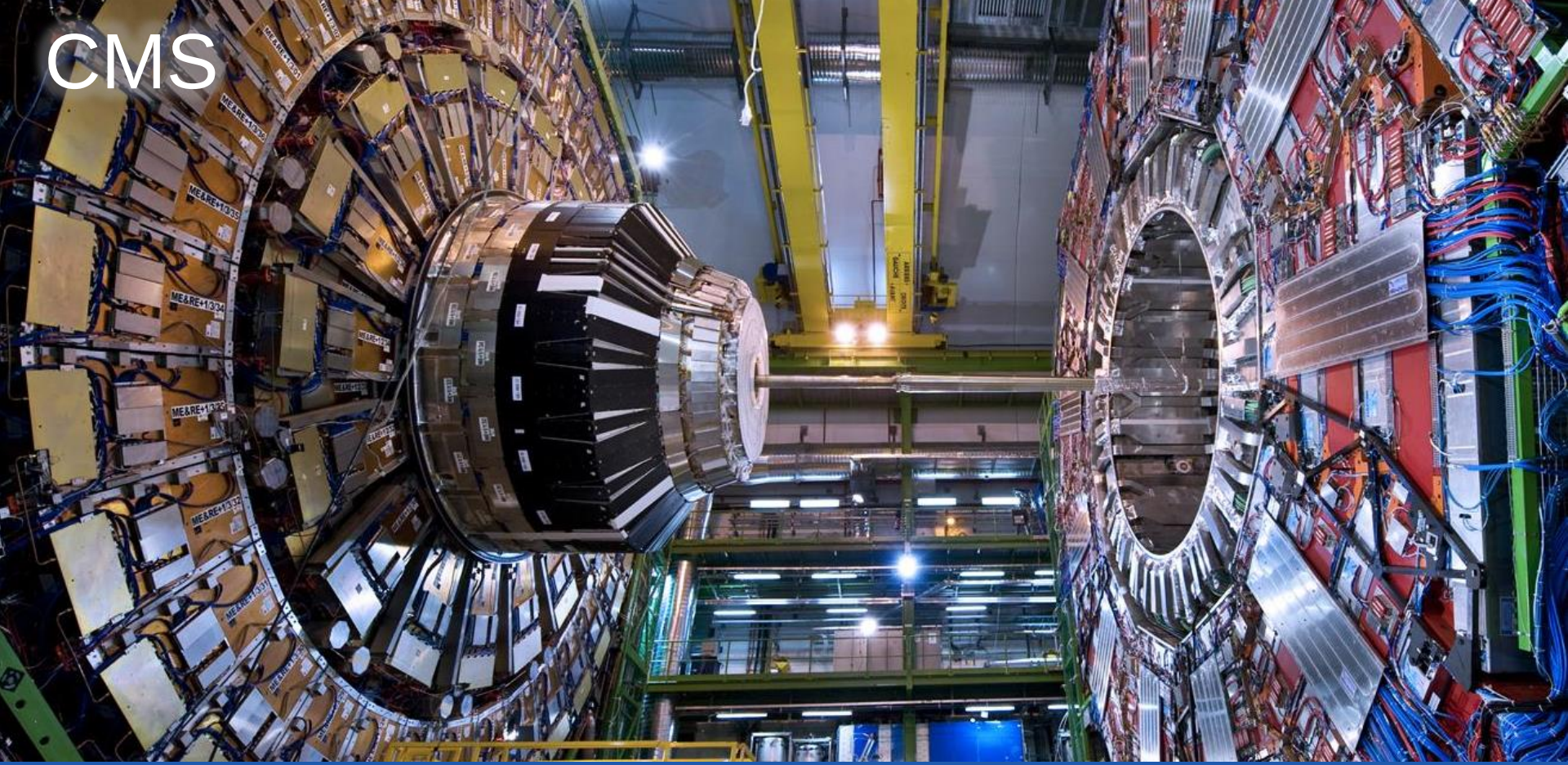
The most powerful magnets

The coldest temperatures

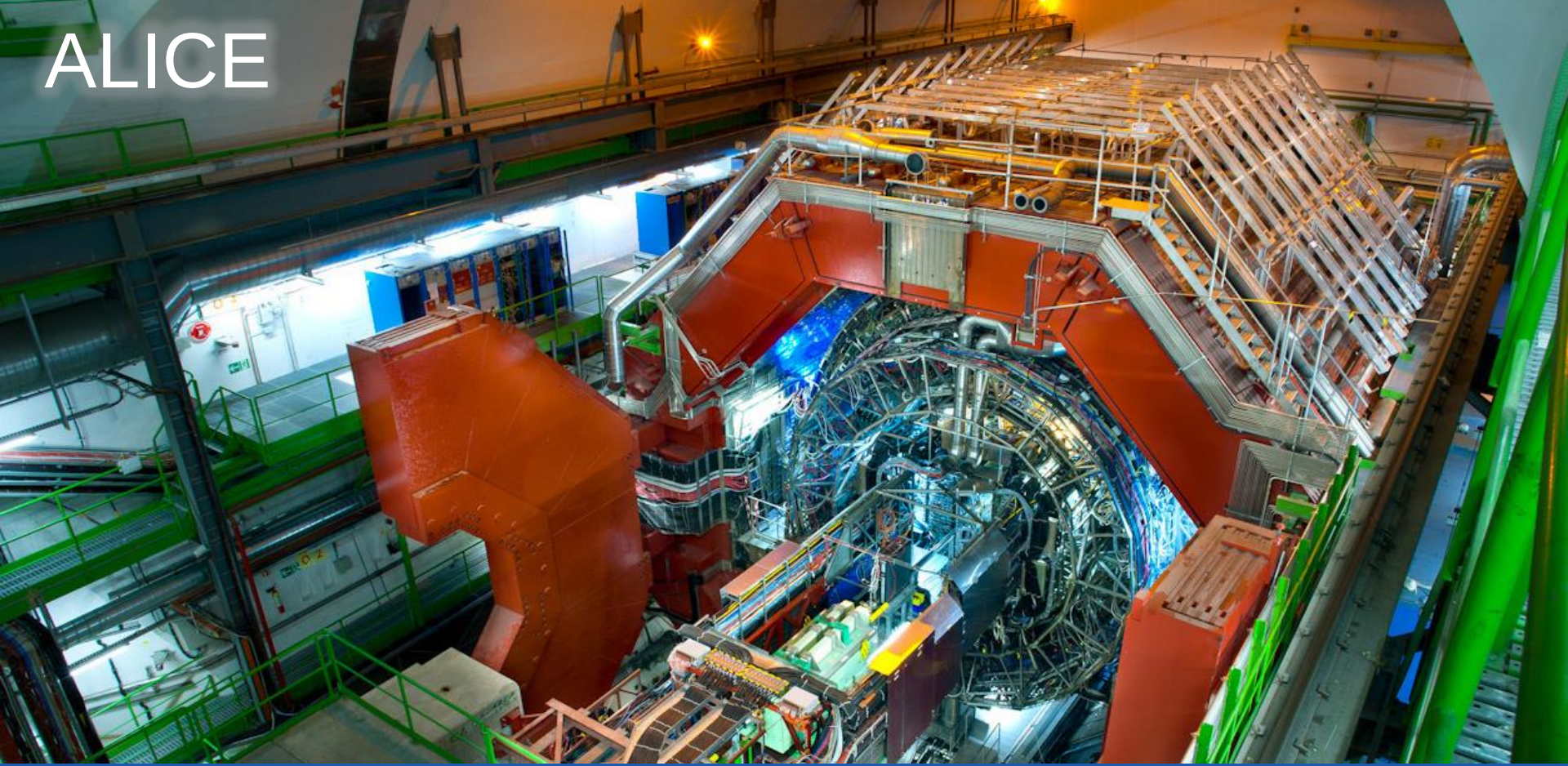
The highest vacuum


ATLAS

CMS

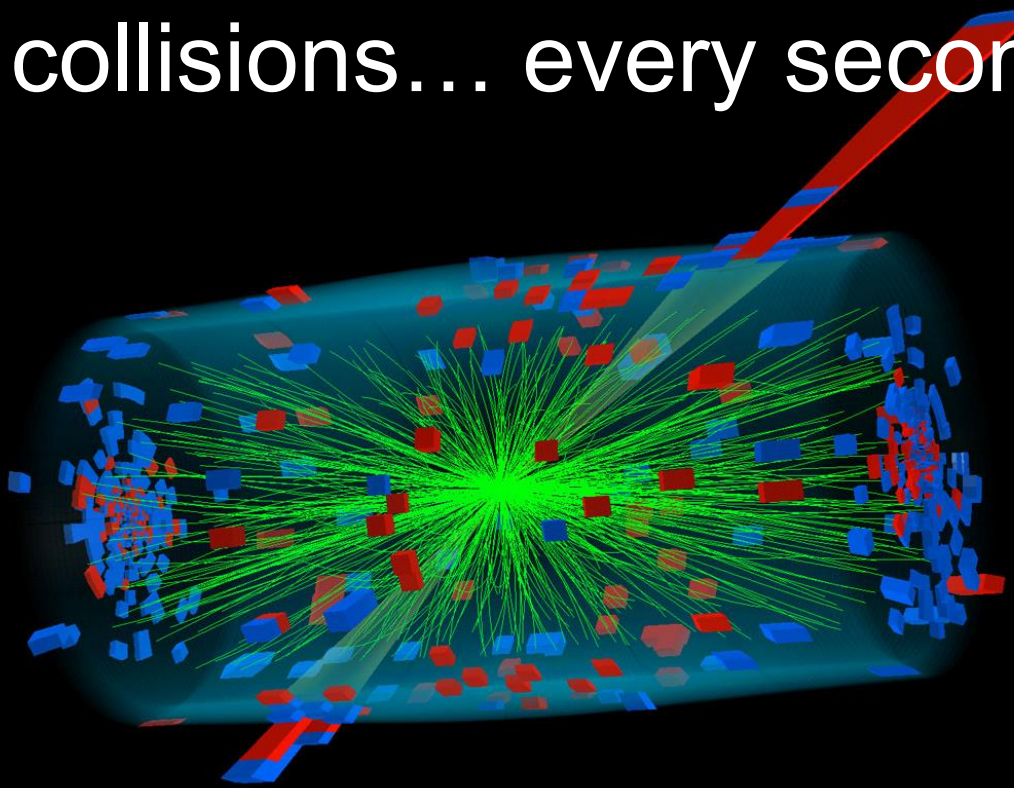


ALICE

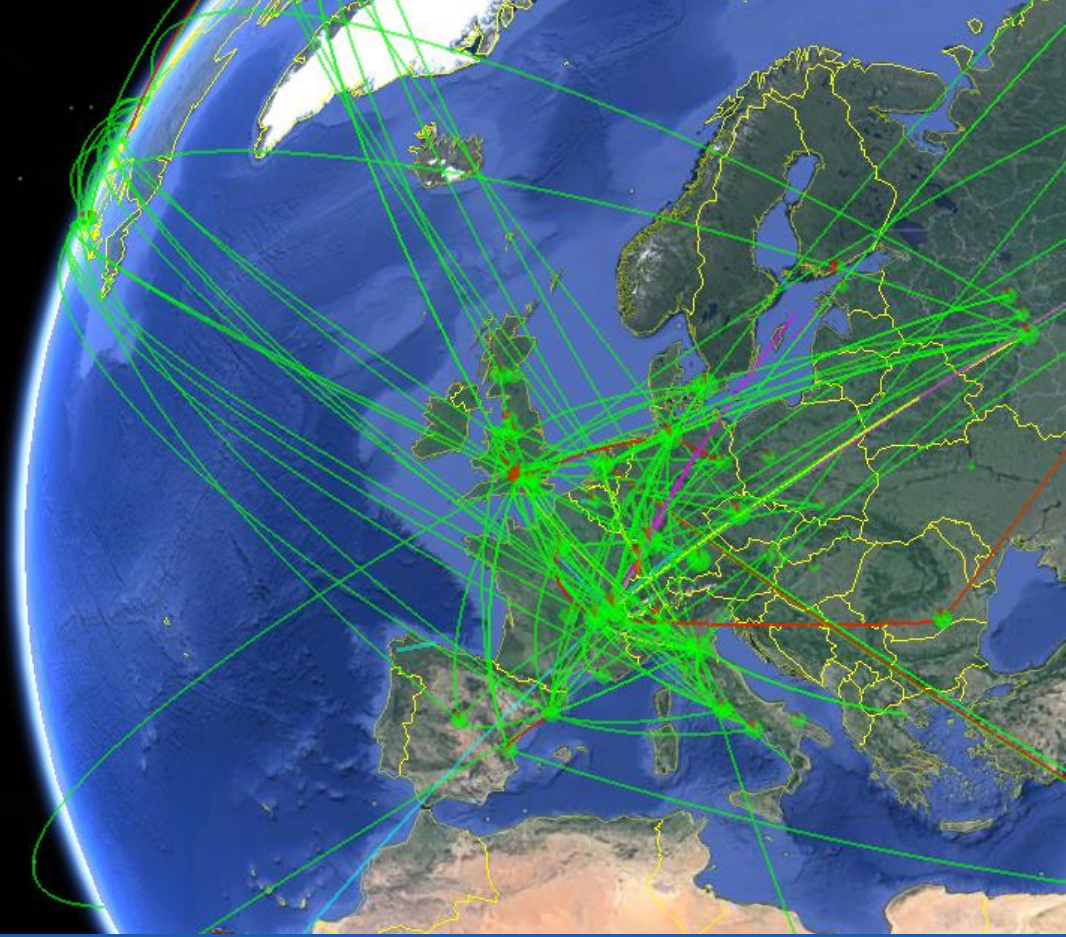


LHCb

Million of collisions… every second!



The largest computing grid



CERN

Training of the scientists and engineers of tomorrow, and not only!

MED TECH HACK

AN INNOVATION COMPETITION WHERE TEAMS CAN SOLVE MEDTECH PROBLEMS PITCHED BY HEALTHCARE ORGANISATIONS AND INDUSTRY.

#CERNMEDTECHHACK

AWARD FEST, FIND OUT MORE AT:
INDICO.CERN.CH/E/MEDTECHHACK18

CERN

CERN

MED TECH HACK

CERN Ideas

THINK. DO. COLLABORATE.

CERN

International Collaboration

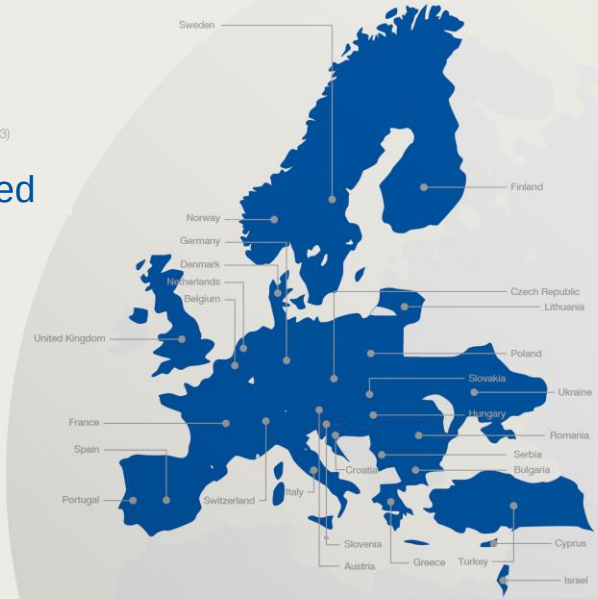
23 Member States

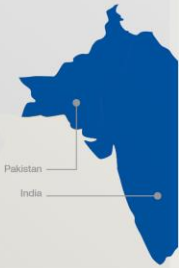
Budget (2020)
1.168 billion CHF
1.10 billion EURO
0.970 billion GBP

- Austria (1959)
- Belgium (1953)
- Bulgaria (1999)
- Czech Republic (1993)
- Denmark (1953)
- Finland (1991)
- France (1953)
- Germany (1953)
- Greece (1953)
- Hungary (1992)
- Israel (2014)
- Italy (1953)
- Netherlands (1953)
- Norway (1953)
- Poland (1991)
- Portugal (1986)
- Romania (2016)
- Serbia (2019)
- Slovakia (1993)
- Spain (1961-1968, 1983-)
- Sweden (1953)
- Switzerland (1953)
- United Kingdom (1953)

8 Associated

- Croatia (2019)
- Cyprus (2016)
- India (2017)
- Lithuania (2018)
- Pakistan (2015)
- Slovenia (2017)
- Turkey (2015)
- Ukraine (2016)





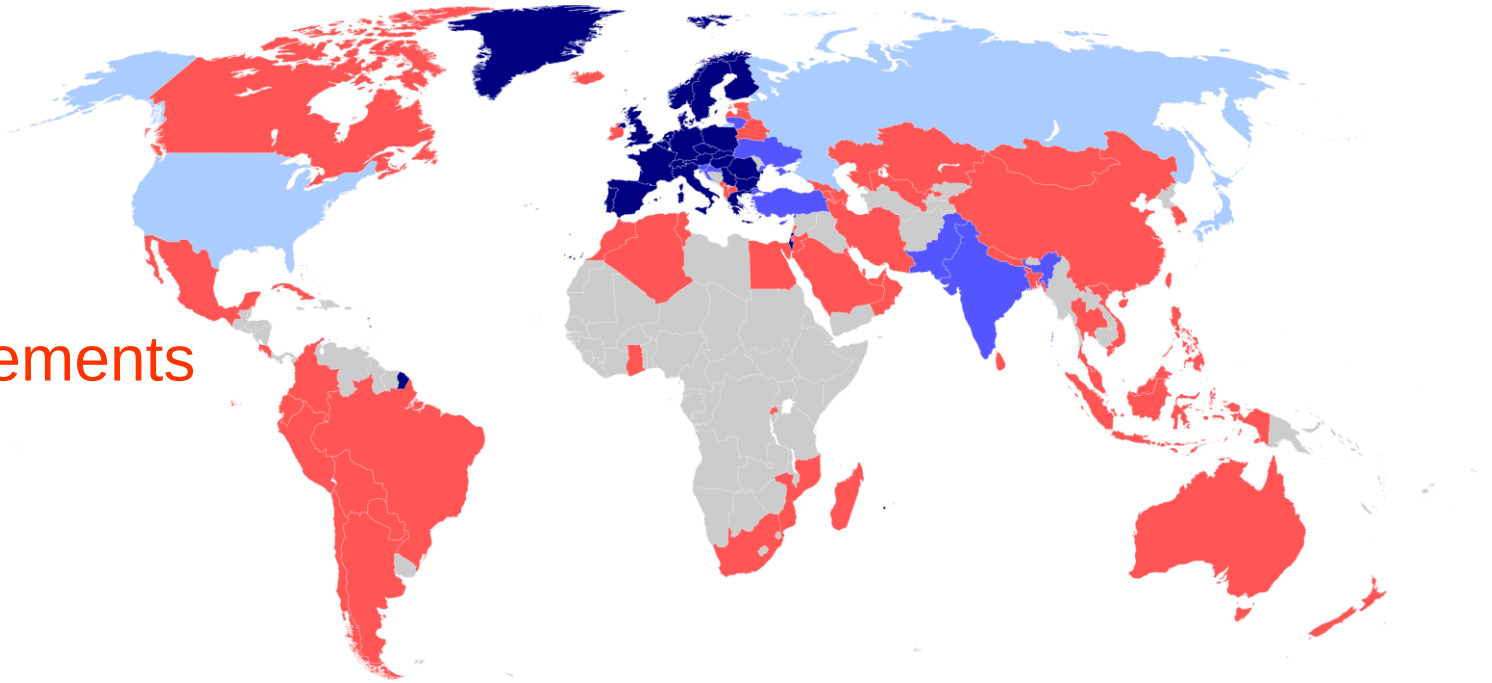
A world collaboration

23 members

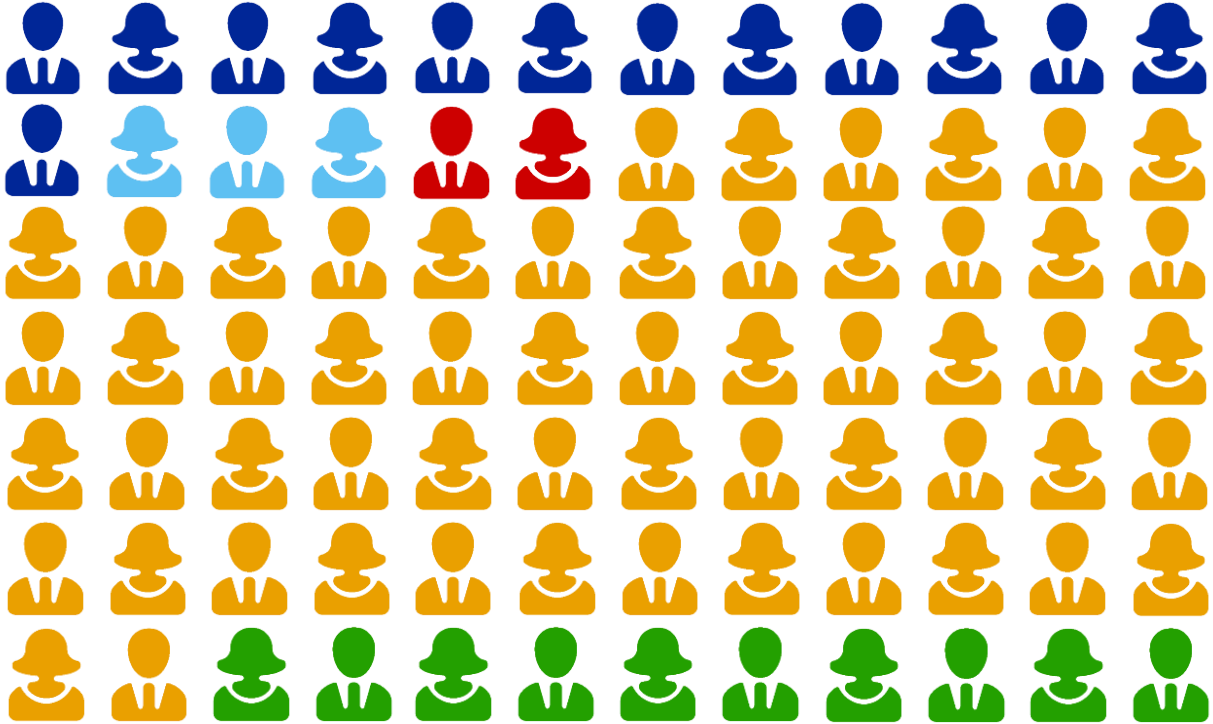
8 associated

3 observers

61 with agreements



How many persons?



20 000!

2 600 staff

800 fellows
apprentices

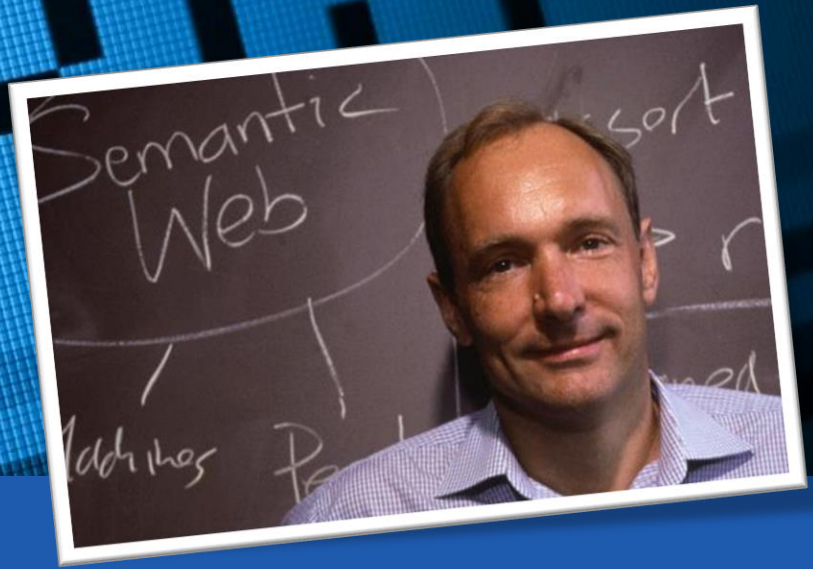
550 students

15 000 users

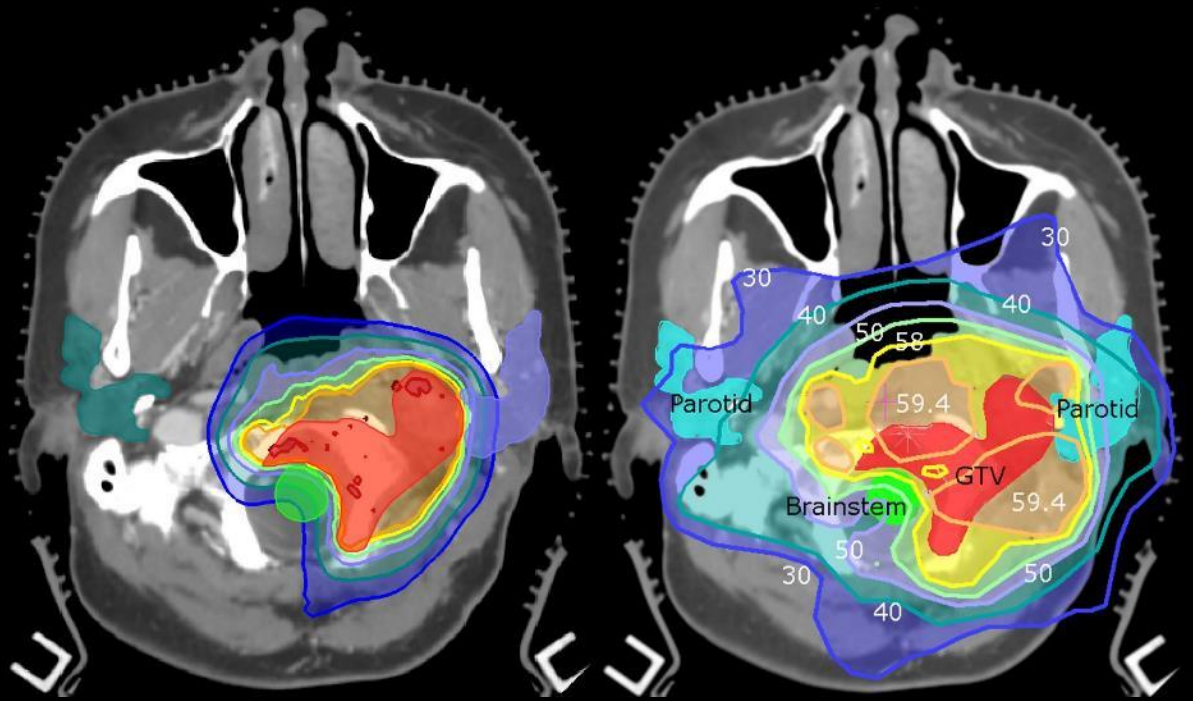
2 000 external
companies

CERN
So what?

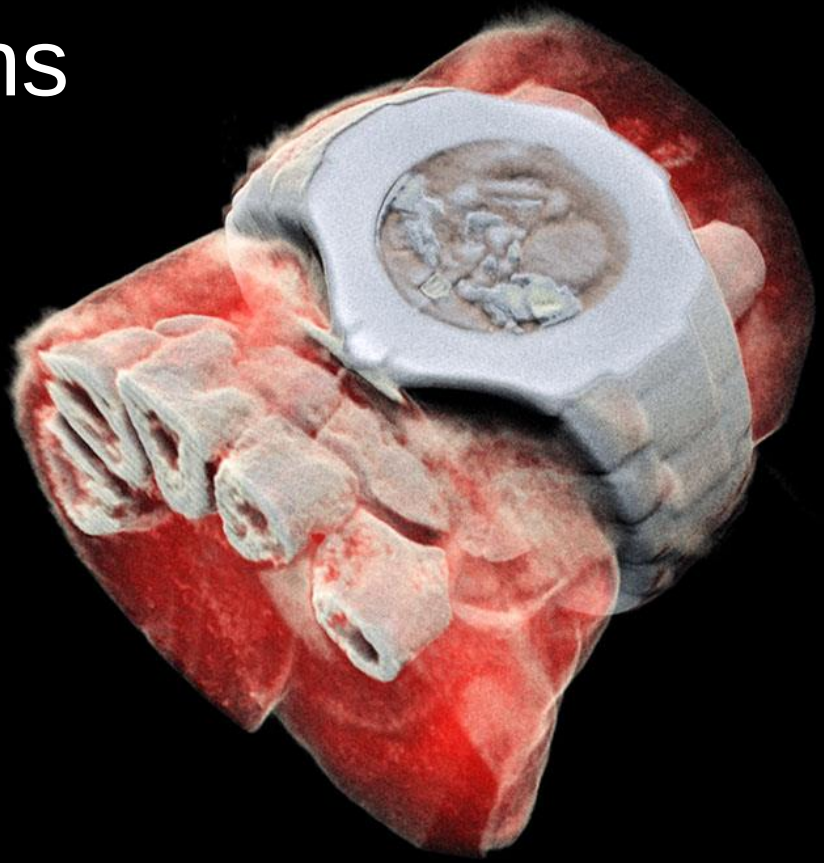
World Wide Web

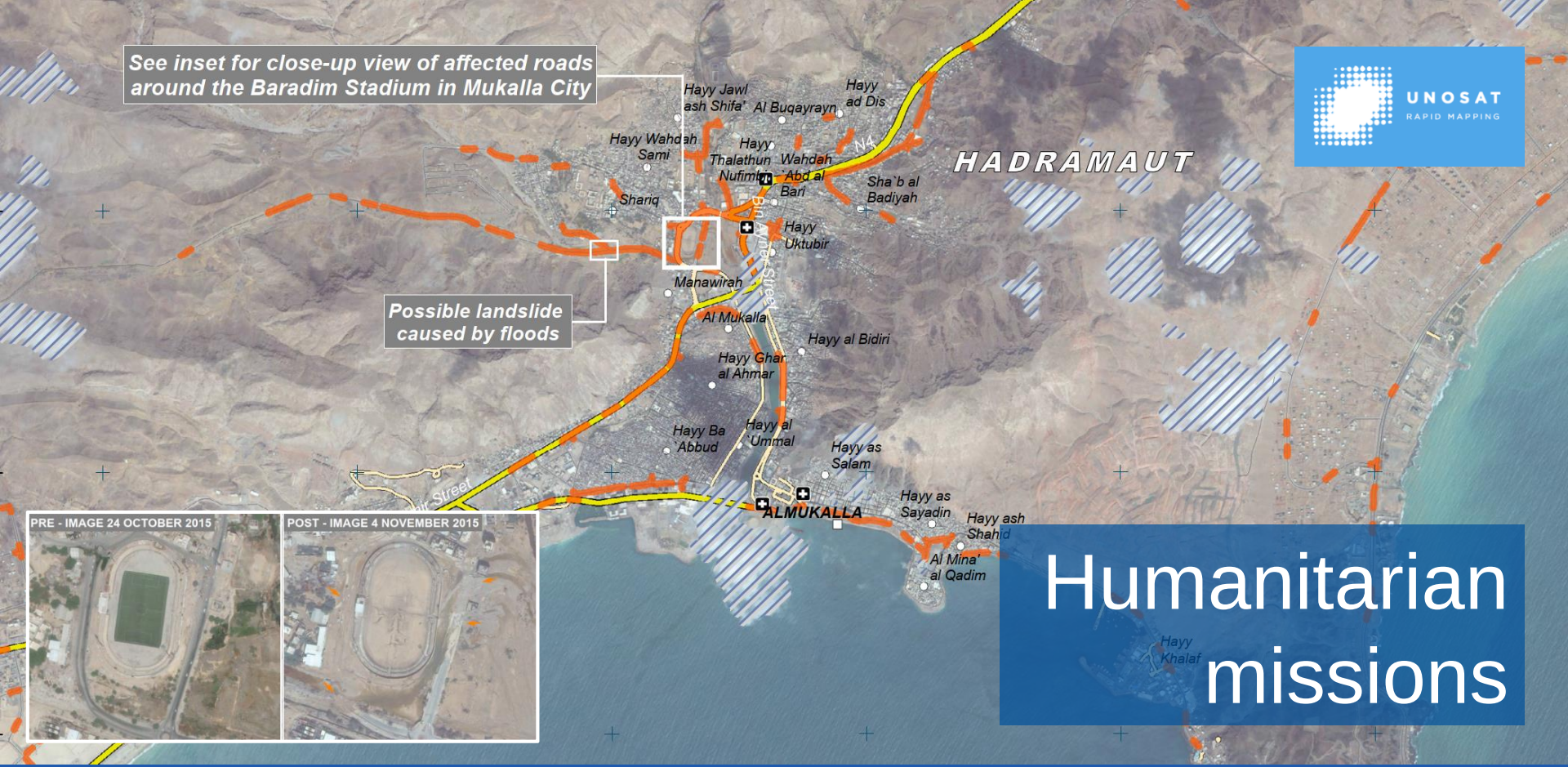


Medical applications



Medical applications





Humanitarian missions

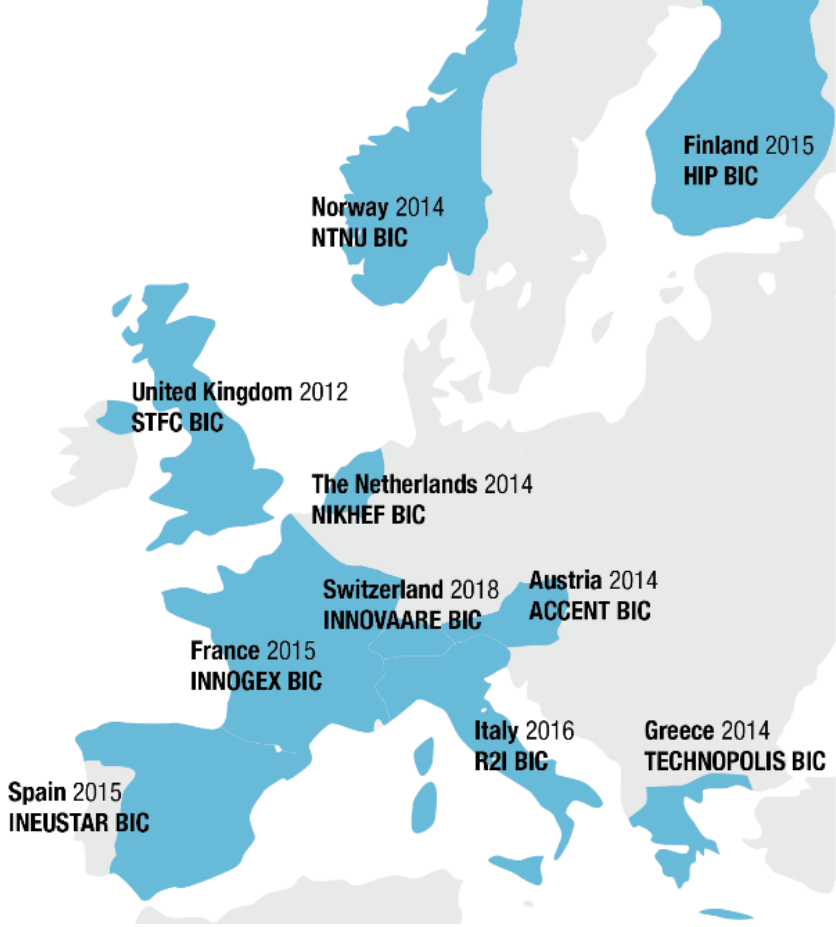
CERN

Entrepreneurship

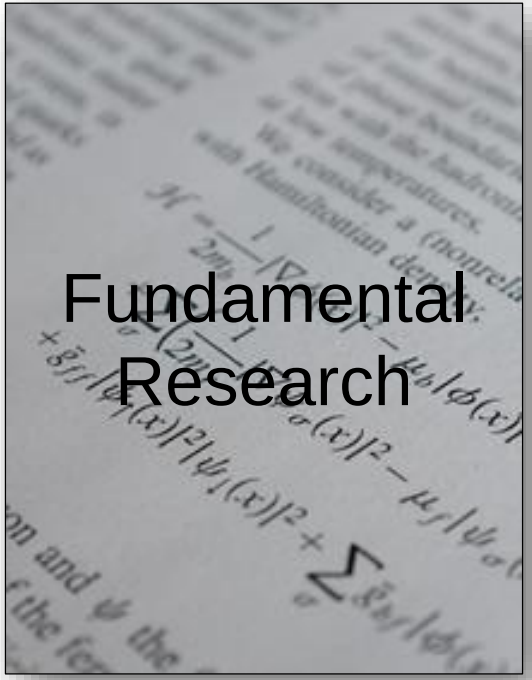
Support to CERN spin-offs and start-ups in the Member States with dedicated programmes.

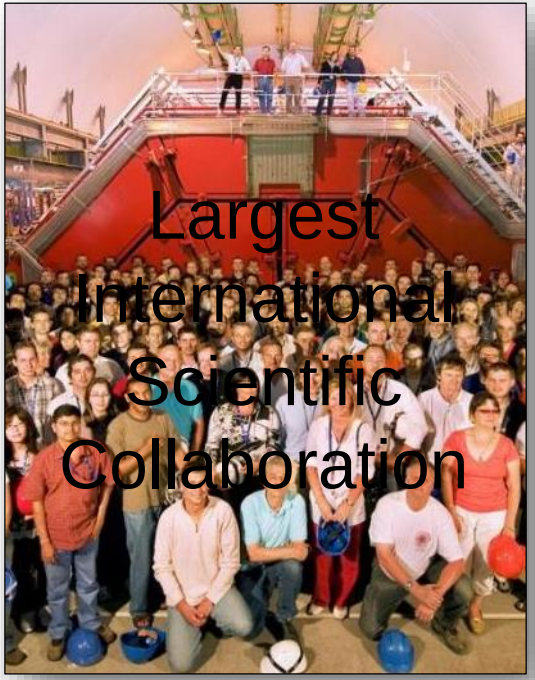
And much more!

Visit: kt.cern/entrepreneurship



In a nutshell…

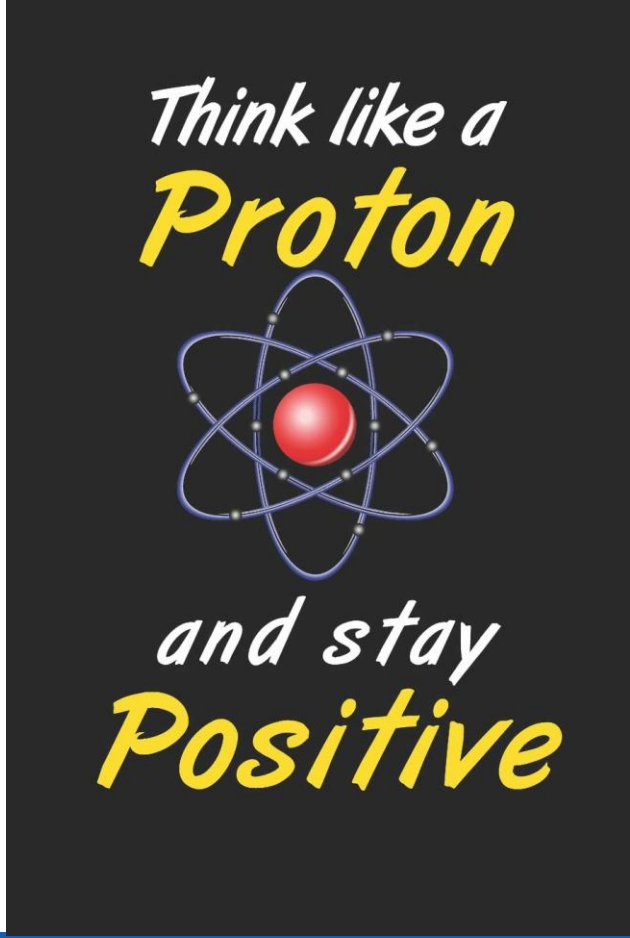




Thanks for your attention!

To learn further:

- home.cern
- visit.cern
- careers.cern
- giovanni.porcellana@cern.ch



And to learn even further (1/3):

- Discover CERN online: https://visit.cern/discover-cern-online
- Voyage in the world of atoms: https://www.youtube.com/watch?v=7WhRJV_bAiE
- The Standard Model explained simply: https://iopscience.iop.org/article/10.1088/1361-6552/aa5b25
- Little quiz: which particle are you? https://scoollab.web.cern.ch/sites/scoollab.web.cern.ch/files/ParticleGame/
- The Higgs Discovery Explained: https://www.youtube.com/watch?v=so2nCu2Jkbc

And to learn even further (2/3):

- LHC: the path of the protons: https://www.youtube.com/watch?v=pQhbhpU9Wrg
- Accelerators: https://home.cern/science/accelerators
- Superconductivity: https://home.cern/science/engineering/superconductivity
- Little game on detecting particle: connecting the dots: https://connectdots.web.cern.ch/
- The Worldwide LHC Computing Grid: https://wlcg-public.web.cern.ch/
- CERN Summer Student Programme: https://home.cern/summer-student-programme
- CERN Teachers Programme: https://teacher-programmes.web.cern.ch/home

And to learn even further (3/3):

- Students Opportunities at CERN: https://careers.cern/students
- Knowledge Transfer at CERN: http://kt.cern/
- Medical Applications: https://kt.cern/medtech
- UNOSAT at CERN: https://unitar.org/unosat