Knowledge Transfer @ CERN

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Knowledge Transfer Group - IPT Department

22.07.2019

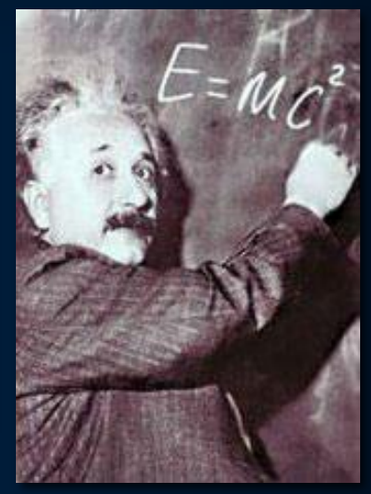
Setting the scene

Innovation
Education
CERN
uniting people
Research

The Mission of CERN

- **Push back** the frontiers of knowledge

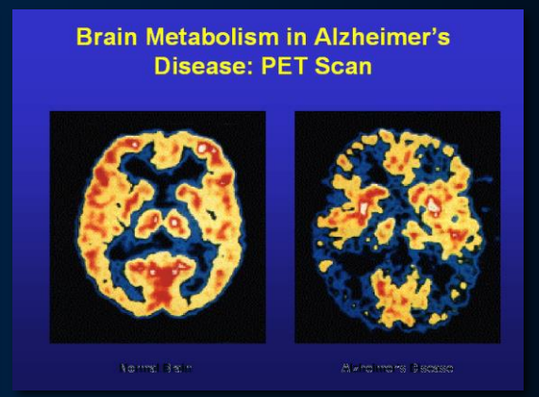
  E.g. the secrets of the Big Bang …what was the matter like within the first moments of the Universe's existence?



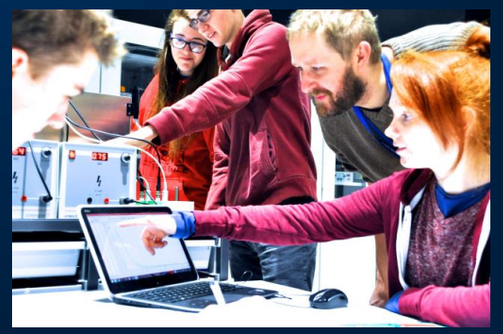
- **Develop** new technologies for accelerators and detectors

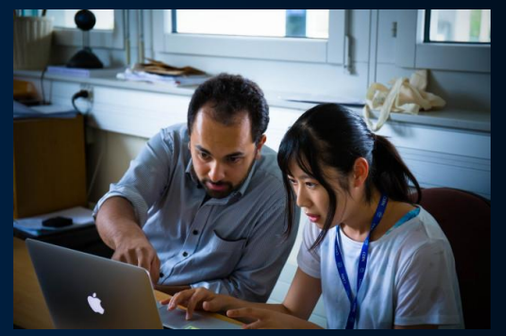
  Information technology - the Web and the GRID

  Medicine - diagnosis and therapy



- **Train** scientists and engineers of tomorrow





- **Unite** people from different countries and cultures

CERN

CERN: founded in 1954: 12 European States

“Science for Peace”

Today: 23 Member States

~ 2600 staff
~ 1800 other paid personnel
~ 14000 scientific users

Budget (2019) ~ 1200 MCHF

Member States: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Sweden, Switzerland and United Kingdom

Associate Members in the Pre-Stage to Membership: Cyprus, Slovenia

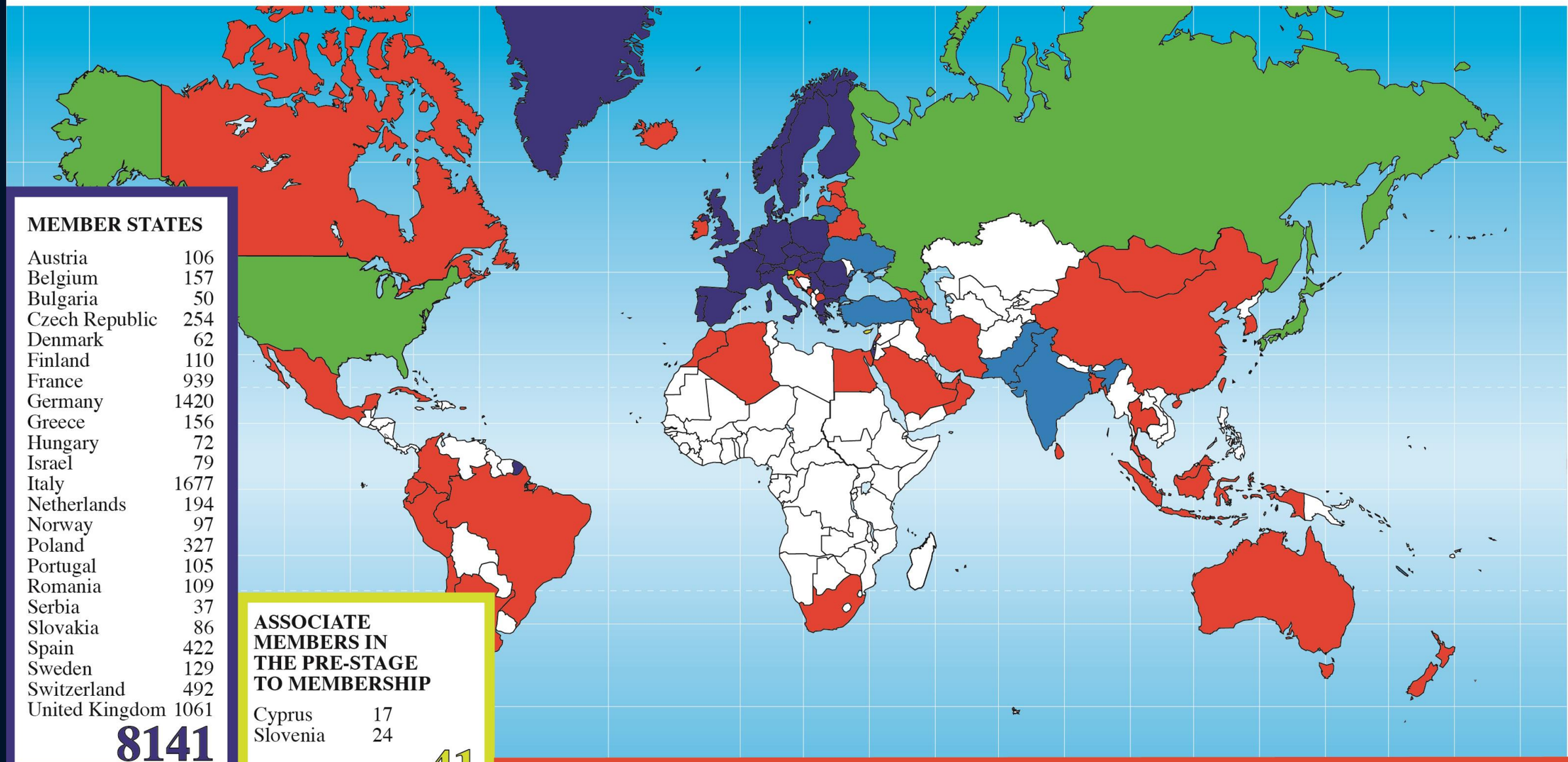
Associate Member States: India, Lithuania, Pakistan, Turkey, Ukraine

Applications for Membership or Associate Membership:
Brazil, Croatia, Estonia

Observers to Council: Japan, Russia, United States of America;
European Union, JINR and UNESCO

Science is getting more and more global

Distribution of All CERN Users by Location of Institute as of mid-April 2019



MEMBER STATES

Austria	106
Belgium	157
Bulgaria	50
Czech Republic	254
Denmark	62
Finland	110
France	939
Germany	1420
Greece	156
Hungary	72
Israel	79
Italy	1677
Netherlands	194
Norway	97
Poland	327
Portugal	105
Romania	109
Serbia	37
Slovakia	86
Spain	422
Sweden	129
Switzerland	492
United Kingdom	1061

8141

ASSOCIATE MEMBERS IN THE PRE-STAGE TO MEMBERSHIP

Cyprus	17
Slovenia	24

41

ASSOCIATE MEMBERS 440

India	212
Lithuania	25
Pakistan	43
Turkey	126
Ukraine	34

OBSERVERS

Japan	277
Russia	1125
USA	2073

3475

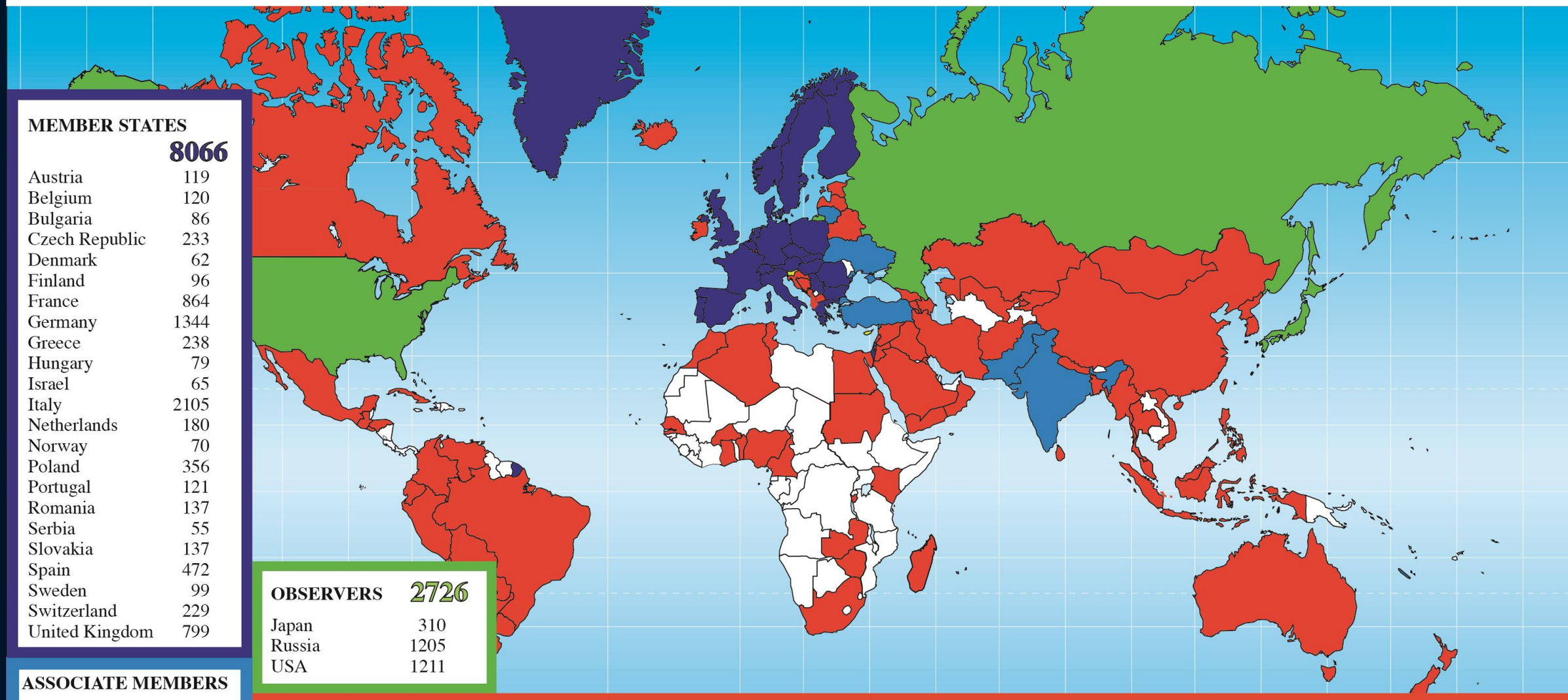
OTHERS

Algeria	3	Canada	213	Hong Kong	20	Mexico	59	Singapore	5
Argentina	19	Chile	19	Iceland	3	Mongolia	2	South Africa	84
Armenia	16	China	341	Indonesia	6	Montenegro	7	Sri Lanka	8
Australia	30	Colombia	27	Iran	21	Morocco	15	Taiwan	62
Azerbaijan	5	Croatia	39	Ireland	11	New Zealand	8	Thailand	19
Bahrain	1	Cuba	4	Korea	170	North Macedonia	1	U.A.E.	2
Bangladesh	2	Ecuador	4	Latvia	2	Oman	4		
Belarus	21	Egypt	17	Lebanon	17	Peru	3		
Brazil	122	Estonia	18	Malaysia	13	Puerto Rico	1		
		Georgia	33	Malta	8	Saudi Arabia	1		

1486

Science is getting more and more global

Distribution of All CERN Users by Nationality as of mid-April 2019



MEMBER STATES **8066**

Austria	119
Belgium	120
Bulgaria	86
Czech Republic	233
Denmark	62
Finland	96
France	864
Germany	1344
Greece	238
Hungary	79
Israel	65
Italy	2105
Netherlands	180
Norway	70
Poland	356
Portugal	121
Romania	137
Serbia	55
Slovakia	137
Spain	472
Sweden	99
Switzerland	229
United Kingdom	799

OBSERVERS **2726**

Japan	310
Russia	1205
USA	1211

ASSOCIATE MEMBERS **778**

India	387
Lithuania	39
Pakistan	71
Turkey	165
Ukraine	116

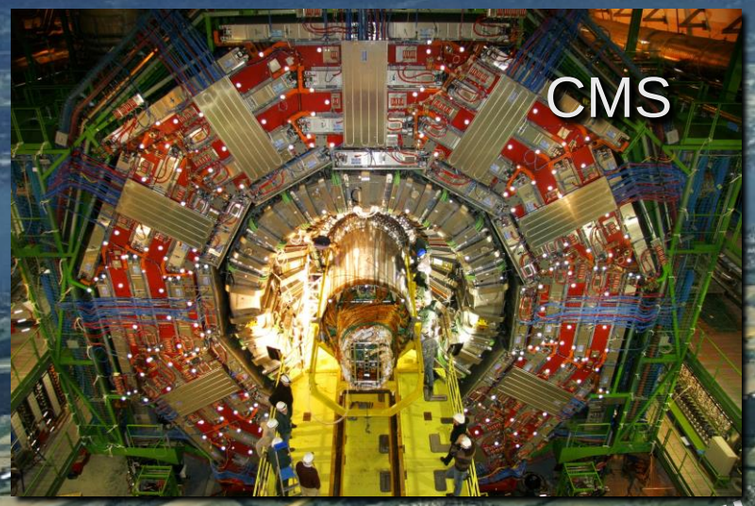
ASSOCIATE MEMBERS IN THE PRE-STAGE TO MEMBERSHIP **59**

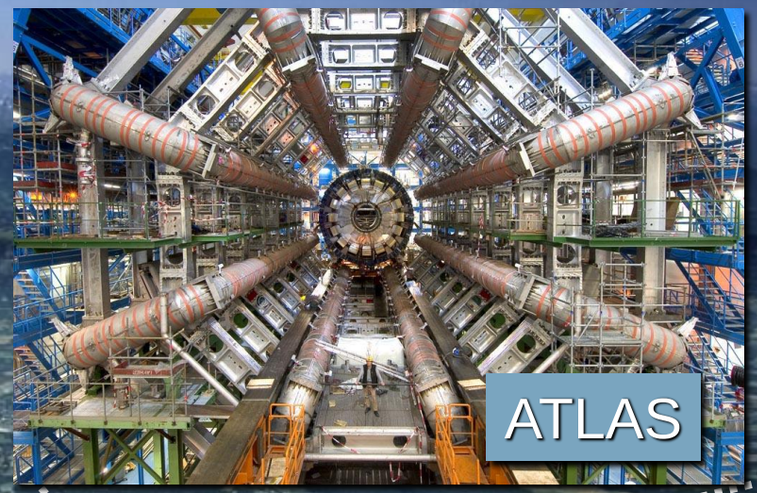
Cyprus	26
Slovenia	33

OTHERS **1999**

Albania	4	Bolivia	3	Ecuador	10	Iraq	1	Malta	9	Palestine	7	Sudan	1
Algeria	14	Bosnia & Herzegovina	3	Egypt	27	Ireland	13	Mexico	85	Paraguay	1	Syria	1
Argentina	26	Brazil	127	El Salvador	1	Jordan	2	Mongolia	2	Peru	6	Taiwan	56
Armenia	22	Burkina Faso	1	Estonia	15	Kazakhstan	10	Montenegro	11	Philippines	3	Thailand	26
Australia	36	Burundi	1	Georgia	51	Kenya	1	Morocco	24	Saint Kitts and Nevis	1	Tunisia	4
Azerbaijan	10	Cameroon	1	Ghana	1	Korea	183	Myanmar	2	San Marino	1	Uruguay	1
Bahrain	1	Canada	170	Guatemala	1	Kyrgyzstan	1	Nepal	7	Saudi Arabia	4	Uzbekistan	3
Bangladesh	8	Chile	21	Hong Kong	1	Latvia	4	New Zealand	5	Senegal	1	Venezuela	9
Belarus	45	China	576	Honduras	1	Lebanon	27	Nigeria	4	Singapore	5	Viet Nam	11
Benin	1	Colombia	44	Iceland	4	Luxembourg	4	North Korea	4	South Africa	56	Zambia	1
		Croatia	50	Indonesia	11	Madagascar	1	North Macedonia	3	Sri Lanka	10	Zimbabwe	2
		Cuba	16	Iran	58	Malaysia	22	Oman	3				

2010: a New Era in Fundamental Science





Exploration of a new energy frontier
in p-p and Pb-Pb collisions

Discovery 2012, Nobel Prize in Physics 2013

The Nobel Prize in Physics 2013 was awarded jointly to François Englert and Peter W. Higgs *"for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN's Large Hadron Collider".*

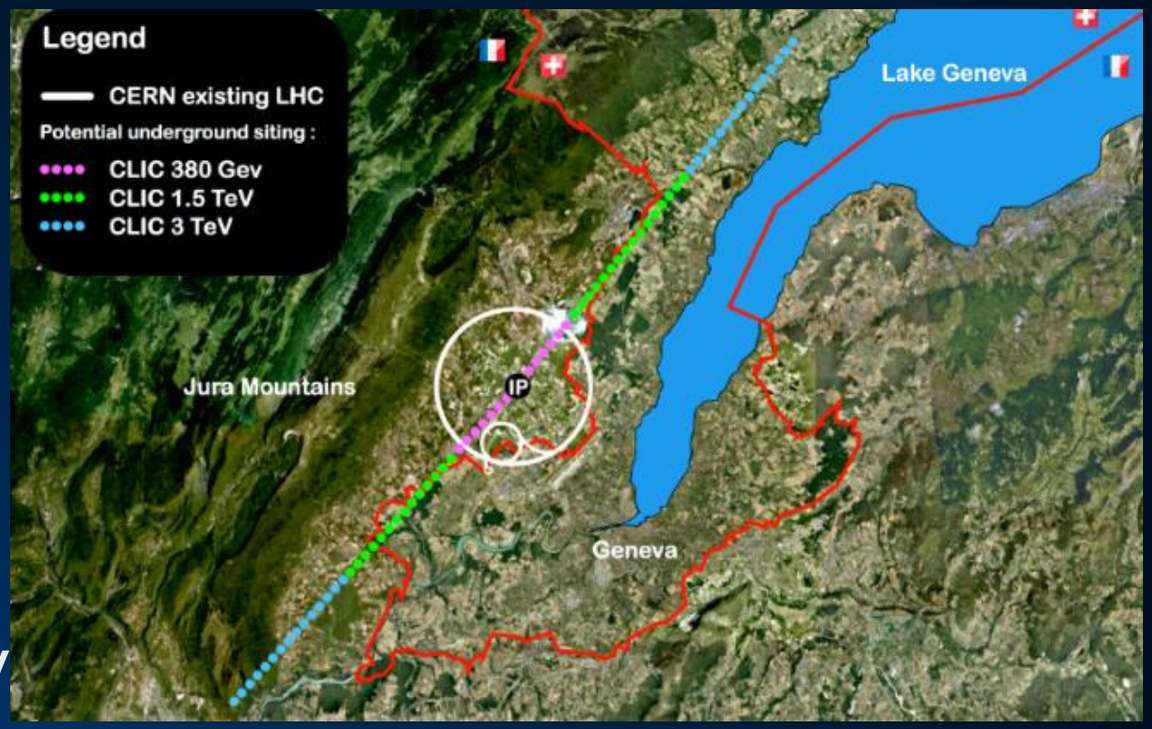
Future of particle physics

High Luminosity LHC until 2035

- Ten times more collisions than the original design

Studies in progress:
Compact Linear Collider (CLIC)

- Linear e^+e^- collider $\sqrt{s}$ up to 3 TeV

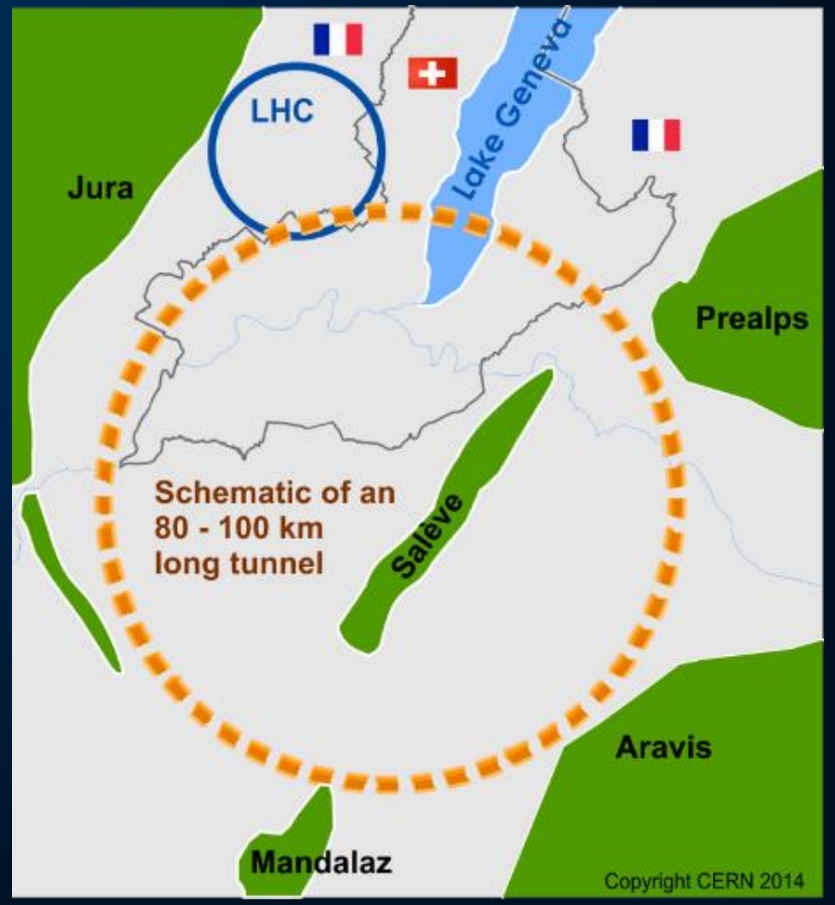


Future Circular Collider (FCC)

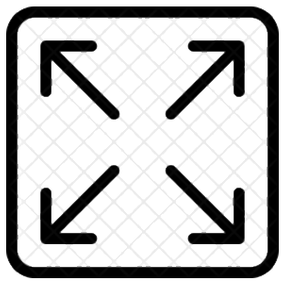
- New technology magnets → 100 TeV pp collisions in 100km ring
- e^+e^- collider (FCC-ee) as 1st step?

European Strategy for Particle Physics

- Preparing next update in 2020



KT Mission



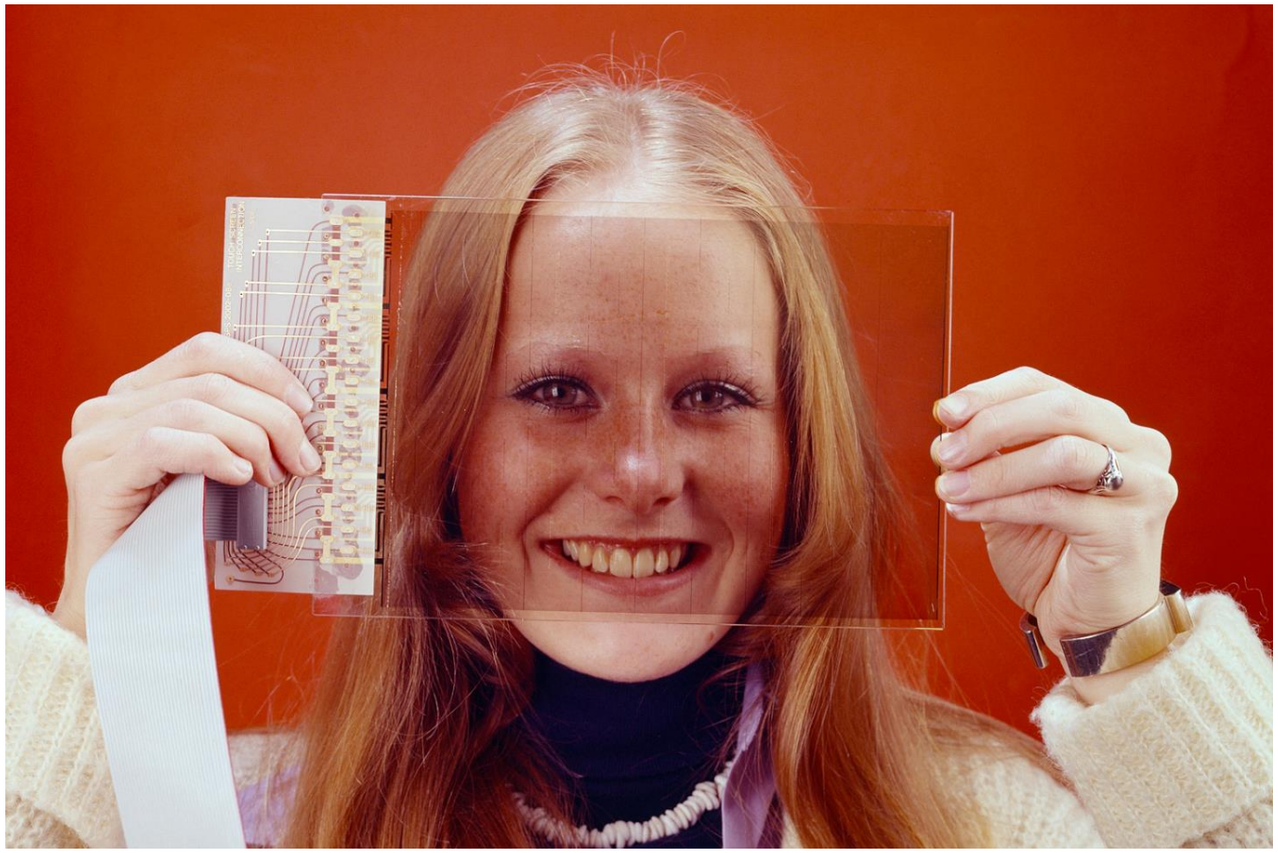
Maximise the technological and knowledge return to society in particular through Member States industry

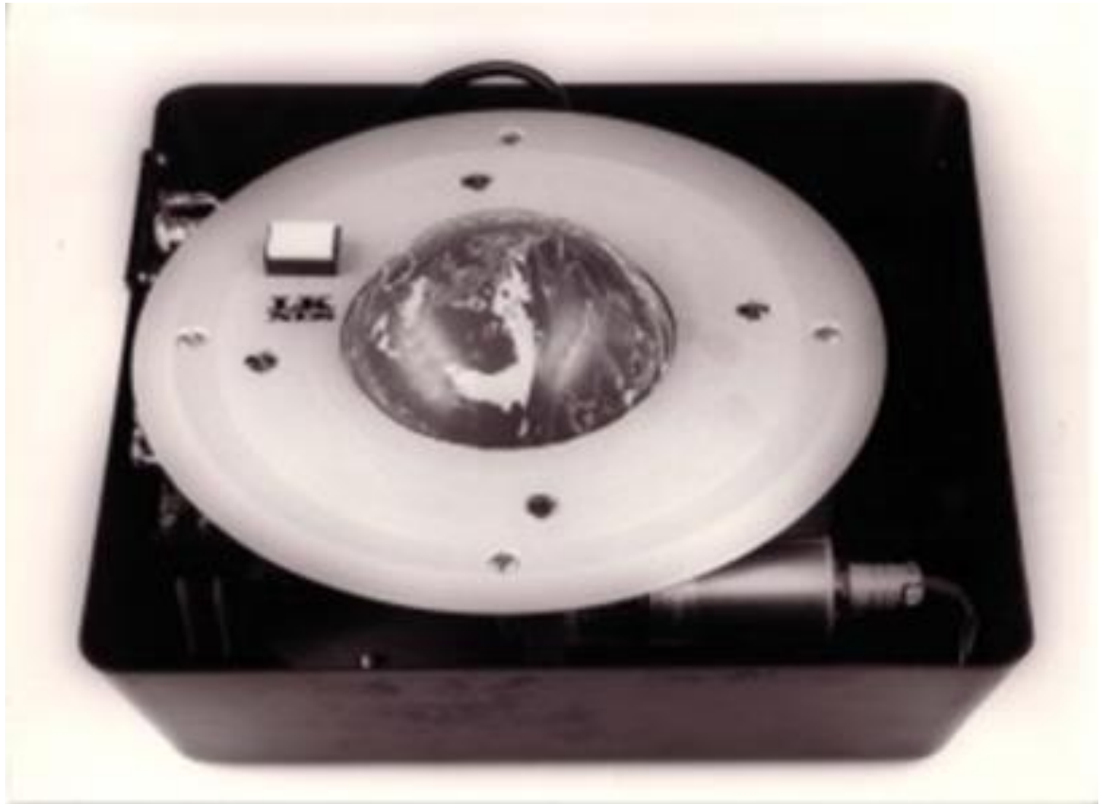
Promote CERN as a centre of excellence for technology and innovation

Demonstrate the importance and impact of fundamental research investments

Key concepts: Dissemination and Impact

Did you know?





The impacts of CERN

First and foremost: the scientific results

Geopolitical impact

Direct economic impact

Technological know-how and innovation (knowledge transfer)

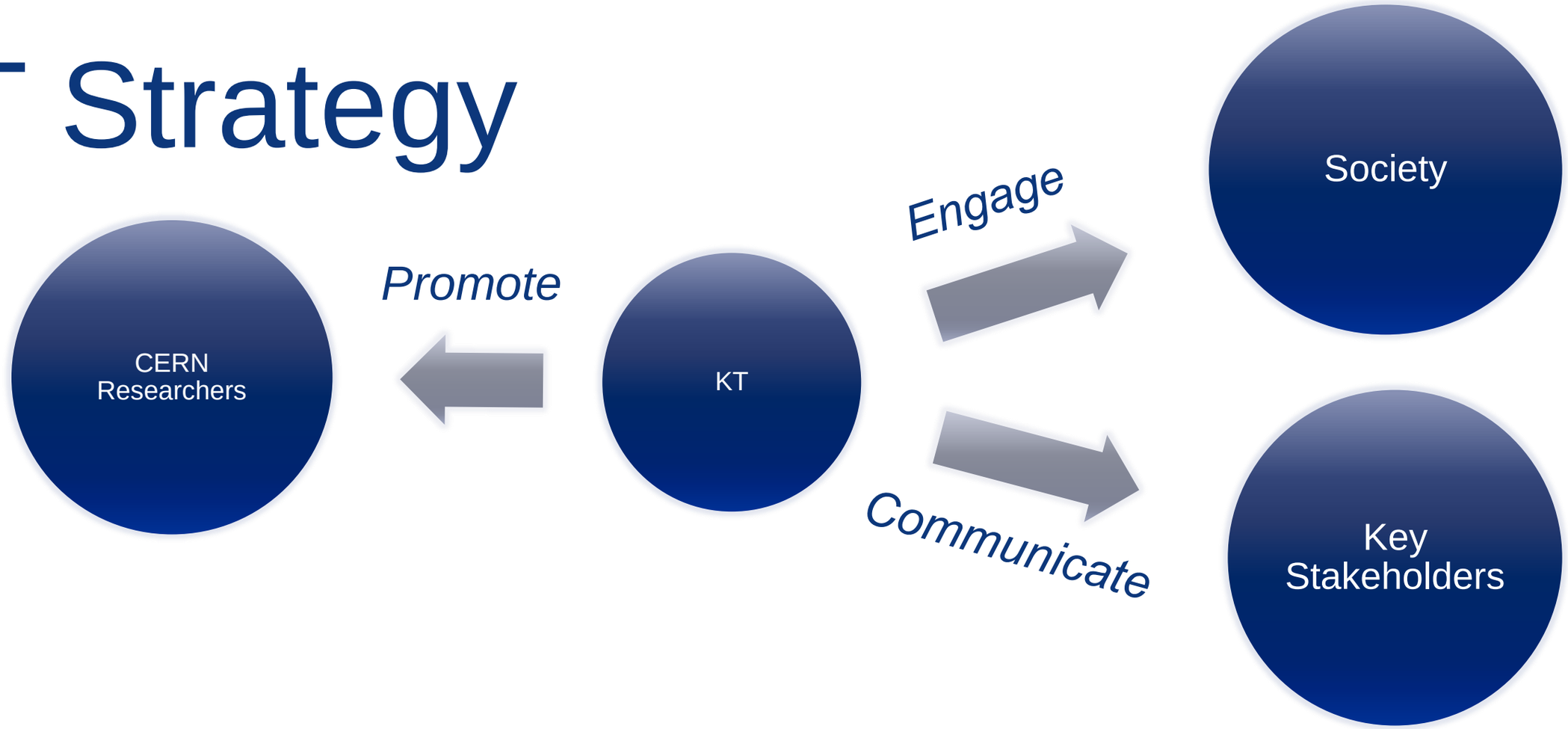
Knowledge Transfer Channels

Through dedicated actions to foster the transfer of CERN's technologies to other fields than HEP (very often with the involvement of industry in the CERN Member States)

Through technology intensive procurement contracts

Through people (very hard to quantify but extremely impactful for CERN)

KT Strategy

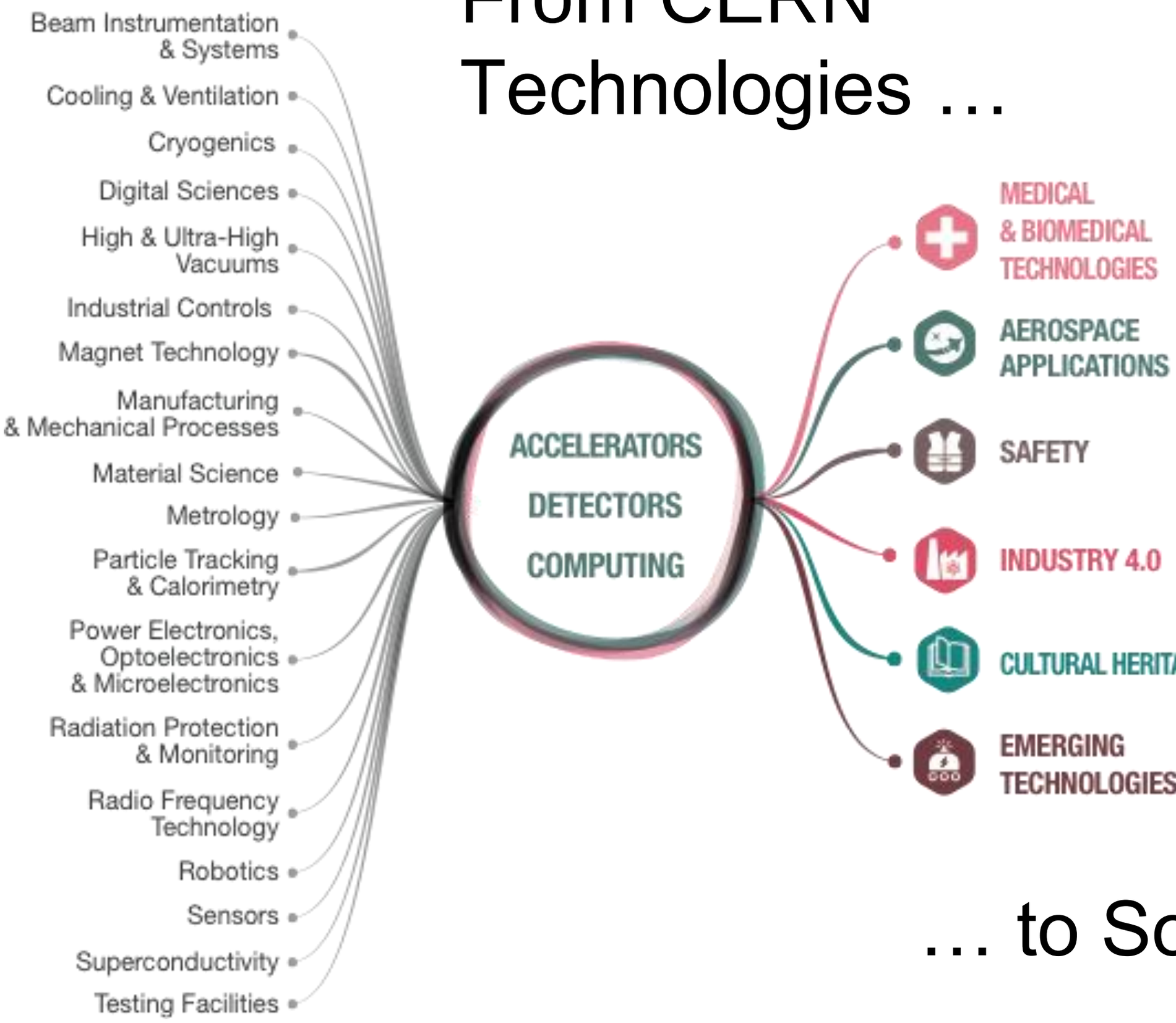


Engage with the outside world (in particular member states industry, institutes and KT representatives) to disseminate and maximize the impact of CERN's knowledge on society

Promote to CERN's researchers the benefits of KT for the Organization, identify new opportunities and provide a high quality and timely service

Communicate on CERN's KT activities to key stakeholders (in particular to decision makers in CERN's Member states)

From CERN Technologies …



… to Society

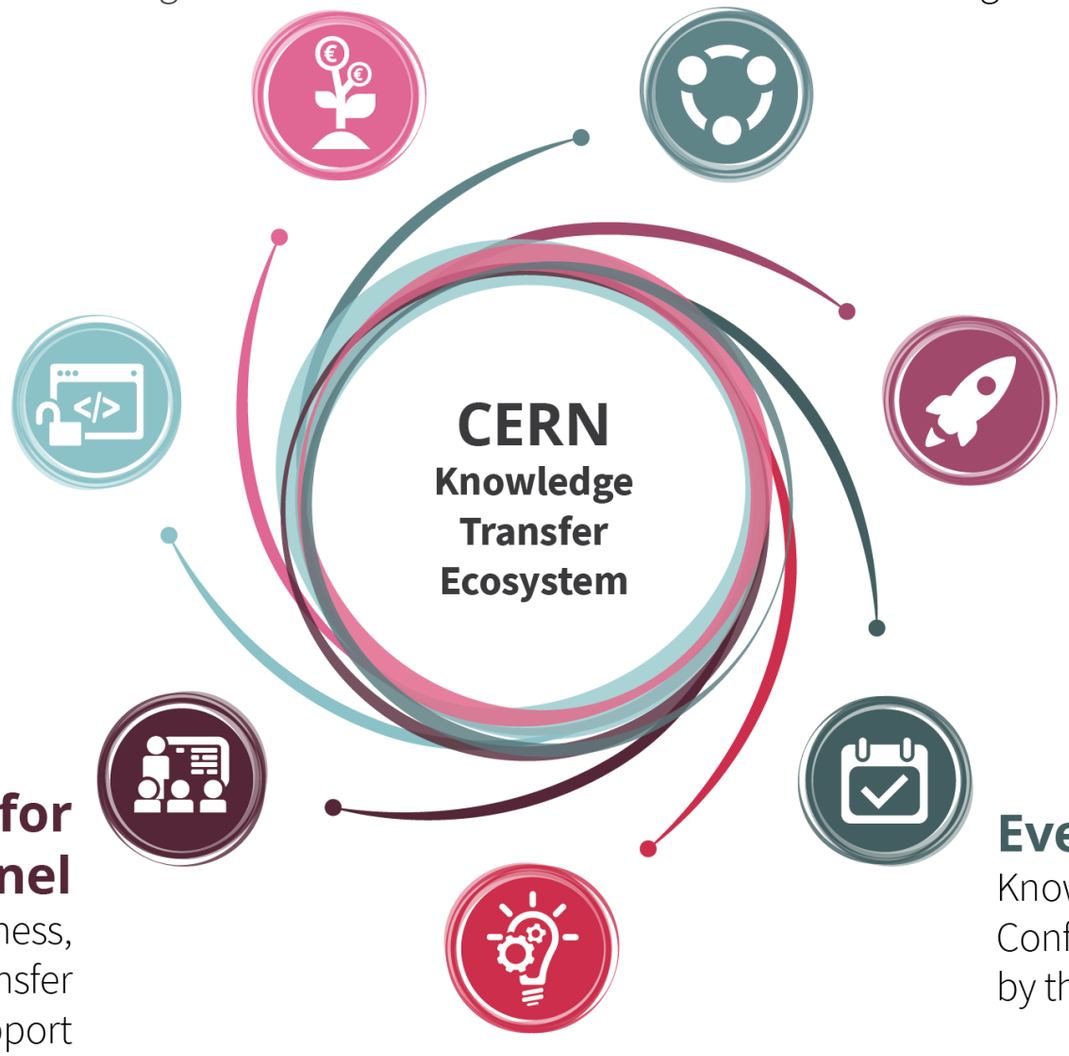
How do we do KT at CERN

Funding Opportunities for CERN Projects

CERN Knowledge Transfer Fund
CERN Medical Applications Budget

Collaborations and Networks

Knowledge transfer networks
Strengthening links with Member States (KT Forum)
Relations with International Organisations
Knowledge transfer in EC co-funded projects



Open Source

Open Source Software
Open Hardware Licence

Entrepreneurship

Start-ups & Spin-offs
Entrepreneurship Meet-Ups
Business Incubation Centres
Entrepreneurship Programmes

Support for CERN Personnel

Formal and practical training in business, entrepreneurship & knowledge transfer
Legal, business & intellectual property support

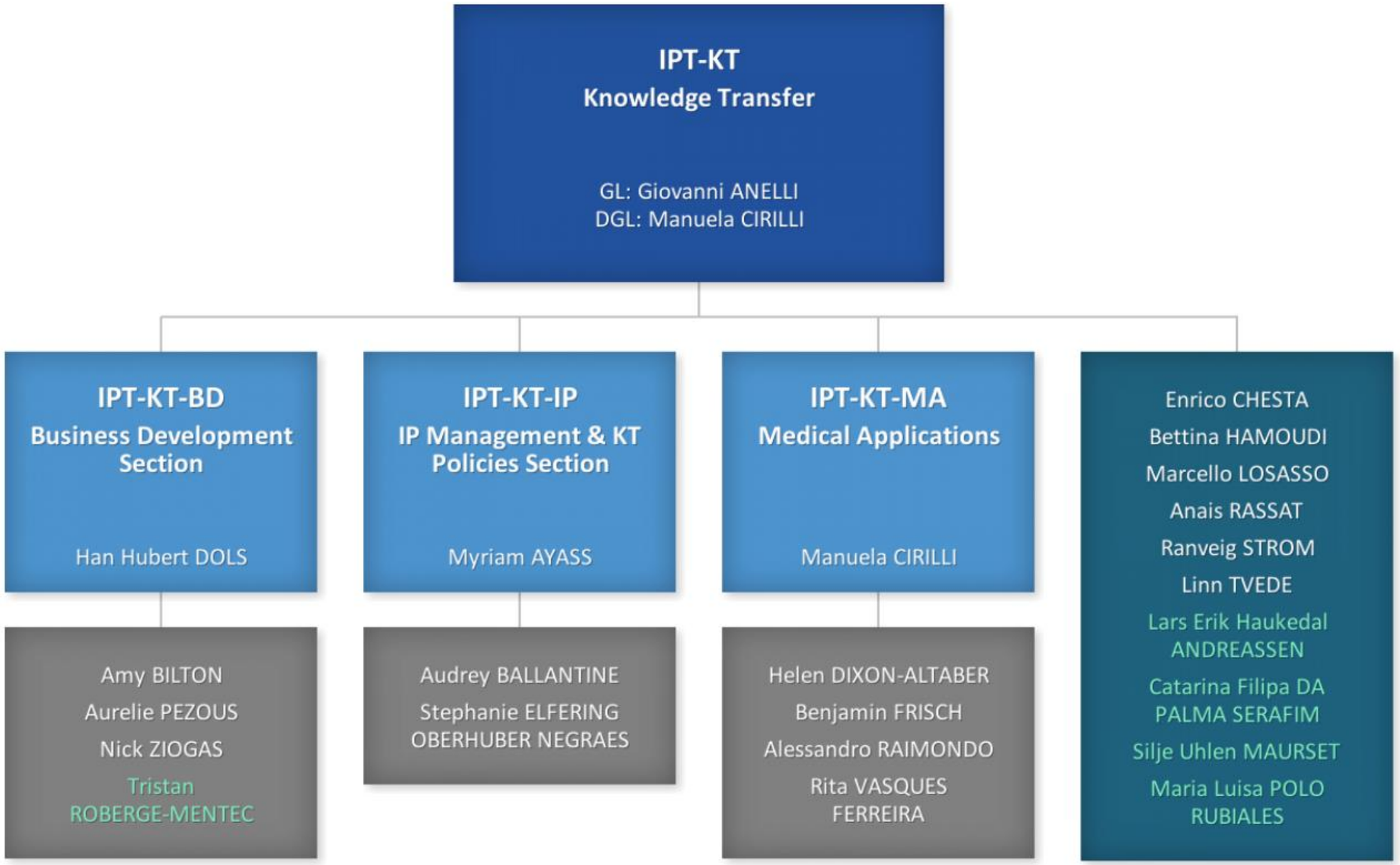
Events

Knowledge Transfer Seminars
Conferences with a significant contribution by the Knowledge Transfer group

Intellectual Property Management

R&D collaborations
Patent portfolio
Licence, service & consultancy agreements

Who is who in KT



Communication & Marketing

+ 45% New subscribers to the KT newsletter in 2018

+ 147% Increase in unique visitors to KT website since 2016

> 80k Unique views of CERN's article "First 3D colour X-ray of a human using CERN technology."

Sign up at kt.cern/newsletter


Knowledge Transfer
2017
CERN


INTERNATIONAL JOURNAL OF HIGH-ENERGY PHYSICS
CERNCOURIER
VOLUME 57 NUMBER 8 OCTOBER 2017
TIMEPIX3 CHIPBOARD
CERN knowledge meets business
HL-LHC
LHC Injectors Upgrade project proceeds apace p32
NEUTRINOS
Generators model neutrino-nucleus interactions p23
FOCUS ON SOUTH ASIA
CERN instrumentation workshop engages region p28

kt.cern

KNOWLEDGE TRANSFER SEMINARS on industry 4.0

—

BIG : DATA : TRUST

New Ideas for Secure Identity Management inspired by Quantum Mechanics

—

Manfred Paeschke
Chief Visionary Officer, Bundesdruckerei GmbH

21st January 16:00
room 3-R-002

https://indico.cern.ch/e/bigdatatrust

Knowledge Transfer
Accelerating Innovation

KNOWLEDGE TRANSFER SEMINARS on entrepreneurship

—

THE JOURNEY OF A SERIAL ENTREPRENEUR

—

Patrick Delarive
Founder and President, Delarive Group

11th February 16:00, Council Chamber
Join us for coffee at 15.30

https://indico.cern.ch/e/entrepreneur

KNOWLEDGE TRANSFER SEMINARS on medical applications

—

Light and matter at the nanoscale: new technological opportunities for medical imaging

—

Stefan Enoch

KNOWLEDGE TRANSFER SEMINARS on innovation

KNOWLEDGE TRANSFER SEMINARS on medical applications

Séminaires transfert de connaissances sur les applications médicales

—

Conférence publique MEDICIS-Promed

—

PHYSIQUE ET MÉDECINE :
La théranostique actuelle et du futur

ing the interplay
growth
entre la science, la technologie

KNOWLEDGE TRANSFER SEMINARS on aerospace applications

CERN colloquium

—

JUICE SPACE MISSION TO JUPITER

—

Giuseppe Sarri
European Space Agency
Project Manager of the JUICE mission

26th April 2018
16:00
Main Auditorium
www.cern.ch/juice2018

KNOWLEDGE TRANSFER SEMINARS on medical applications

Séminaires transfert de connaissances sur les applications médicales

—

Translational imaging mass spectrometry: From CERN to the surgeon

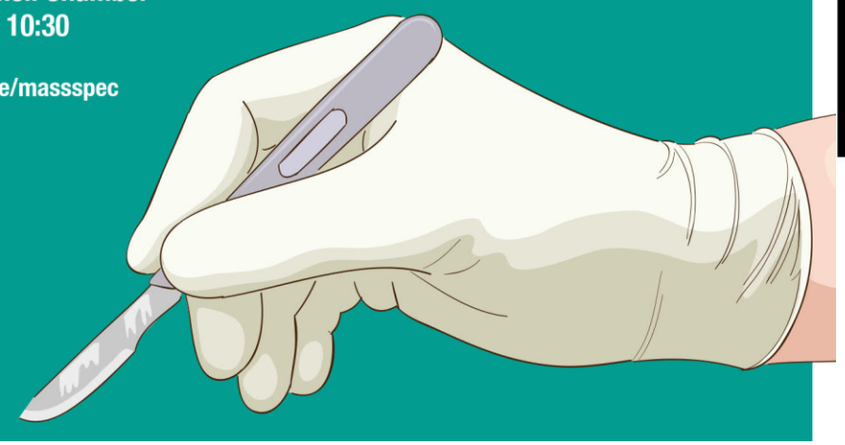
Imagerie par spectrométrie de masse : du CERN au chirurgien

—

Prof. Ron Heeren
Director M4I
Maastricht University

29th May 11:00 Council Chamber
Join us for coffee at 10:30

https://indico.cern.ch/e/massspec



KNOWLEDGE TRANSFER SEMINARS on cultural heritage

Séminaires transfert de connaissances sur la préservation culturelle

—

Smart*Light: A table-top synchrotron for the investigation of art objects

Smart*Light : Un synchrotron de table pour étudier les oeuvres d'art

—

Prof. Joris Dik
Delft University of Technology

29th June 14:30 Main Auditorium
Join us for coffee at 14:00

https://indico.cern.ch/e/smartlight

Knowledge Transfer
Accelerating Innovation

MAIN AUDITORIUM

KNOWLEDGE TRANSFER SEMINARS on medical applications

—

GaToroid: A Novel Superconducting Compact and Lightweight Gantry for Hadron Therapy

—

Luca Bottura

kt.cern/events

Knowledge Transfer
Accelerating Innovation

EN Engineering Department

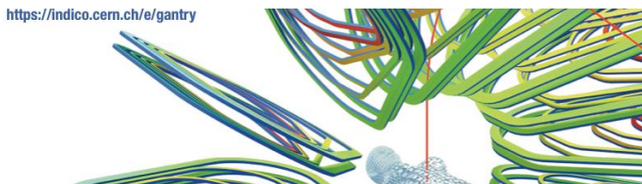
CERN MAIN AUDITORIUM

Knowledge Transfer
Accelerating Innovation

medipix collaboration

COUNCIL CHAMBER

https://indico.cern.ch/e/gantry



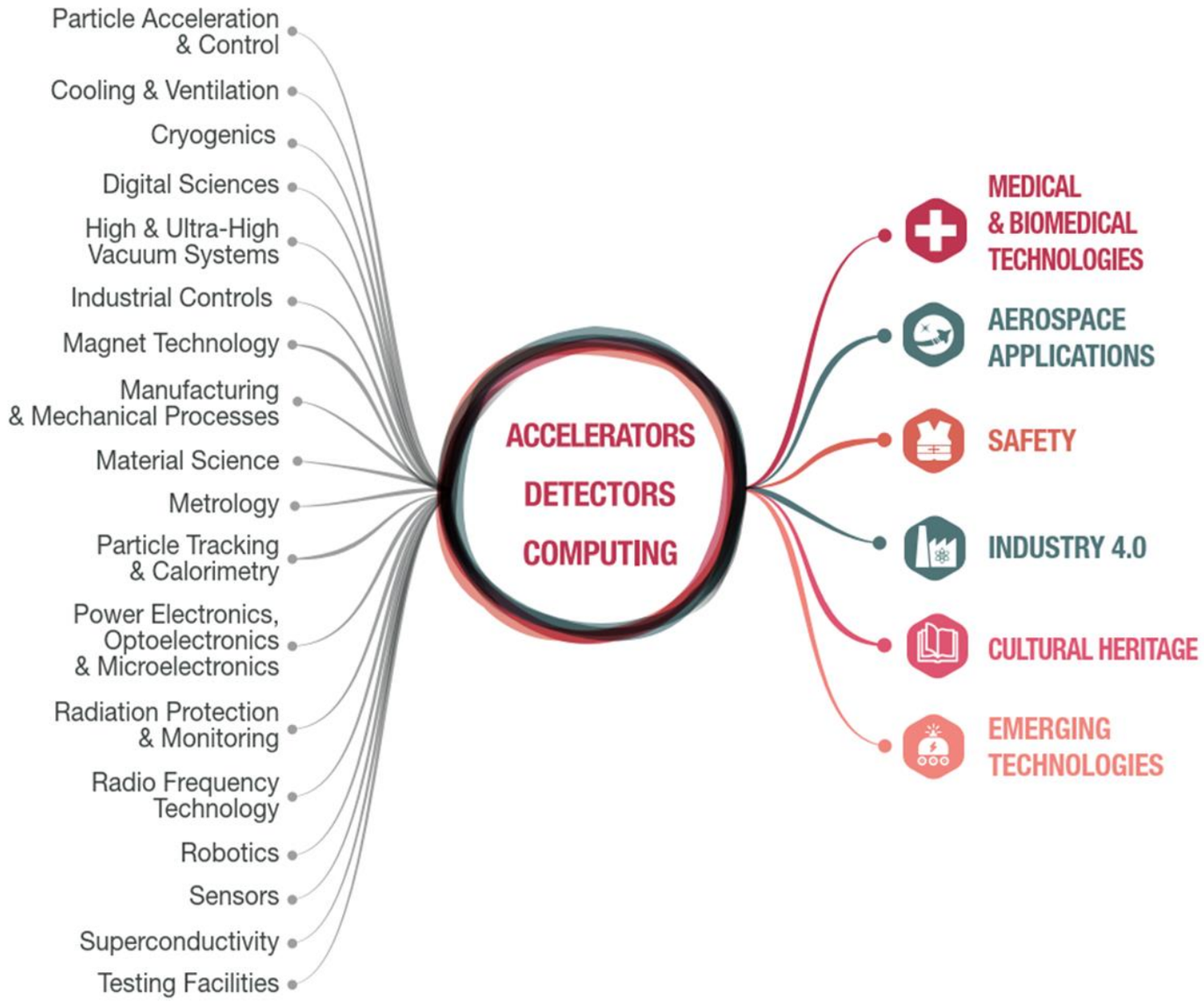
Business Development

Discovery Days @ CERN

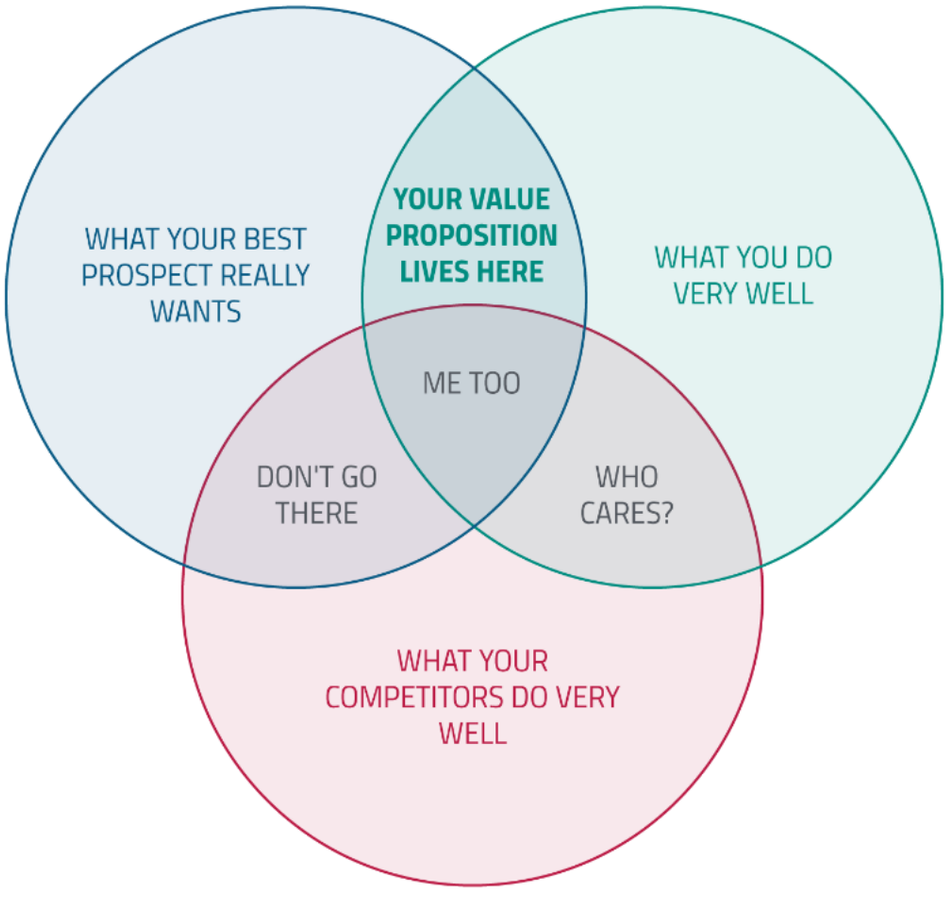
A programme dedicated to leading innovative companies within CERN Member States, which aims at identifying areas of potential scientific collaboration to support strategic innovation ambitions.

Value propositions

What are the CERN competences that can be of value for companies in our Member States and which can not be easily found elsewhere?



What exactly do we have which is interesting for industry and other partners?

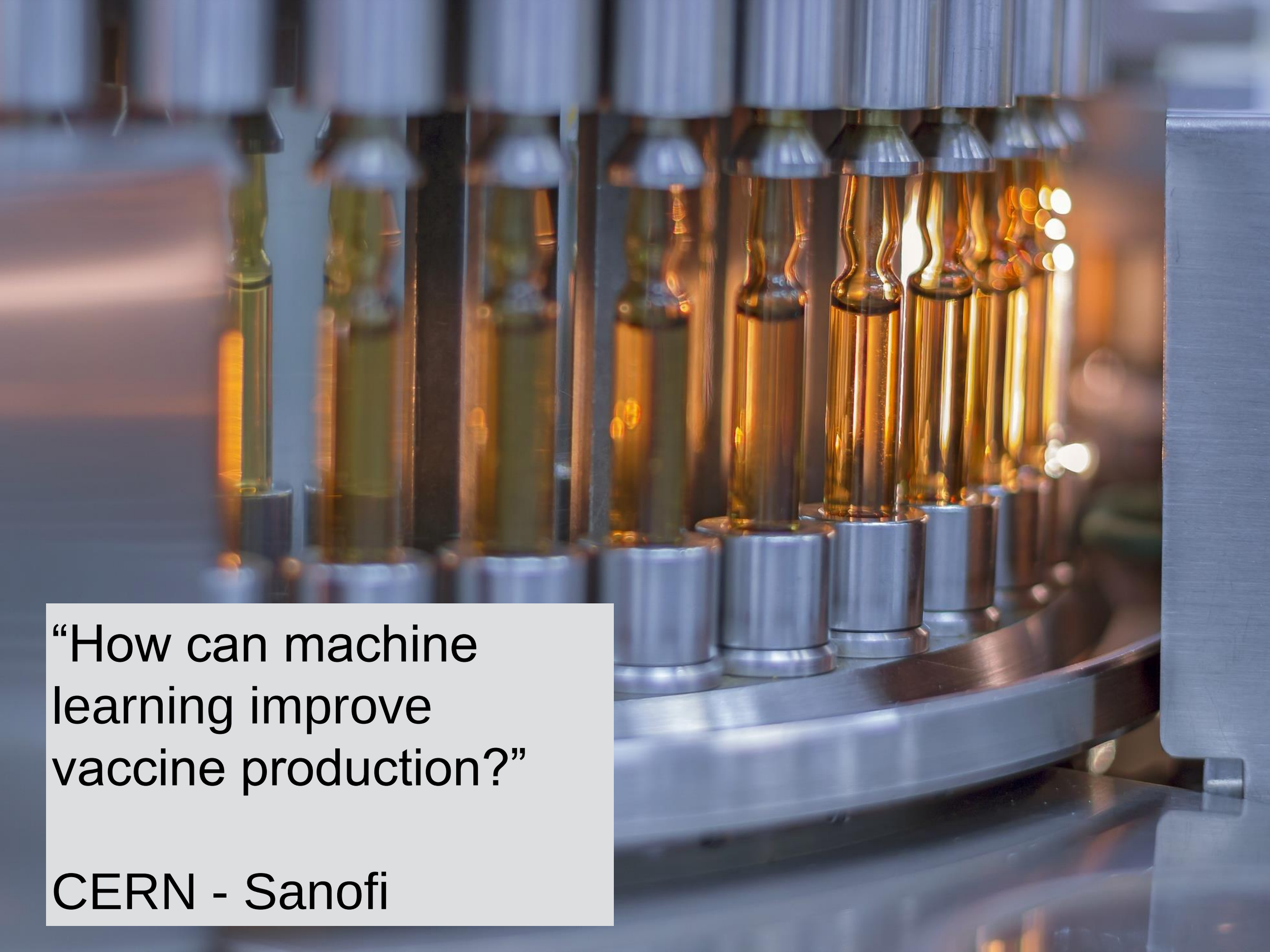


In 2018 we have developed a set of slides for each one of CERN's main fields of competence.

These have been presented and discussed with the KT Forum and can be found here:

Value Propositions

How does success looks like (for us)?



“How can machine learning improve vaccine production?”

CERN - Sanofi

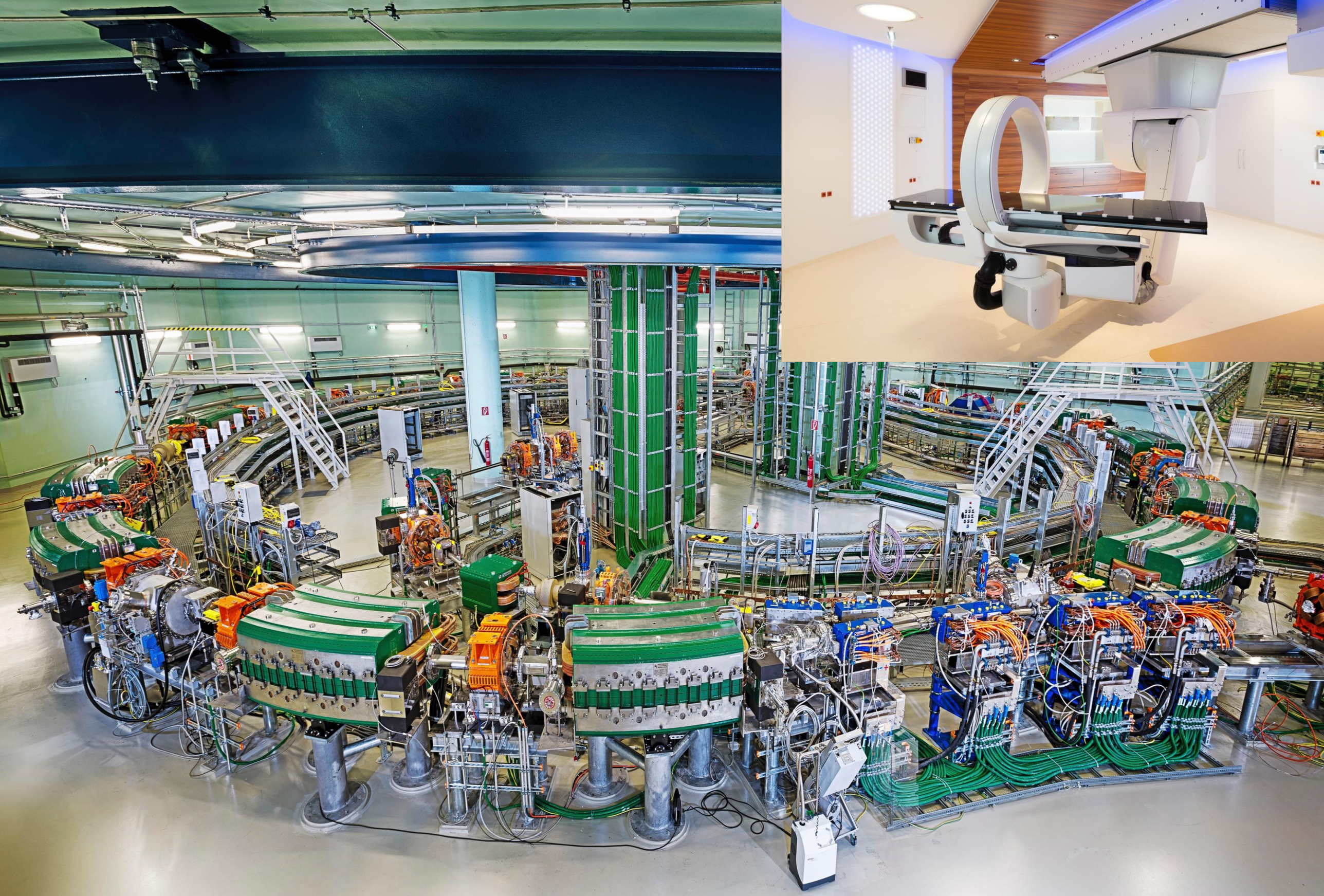
le dauphiné libéré

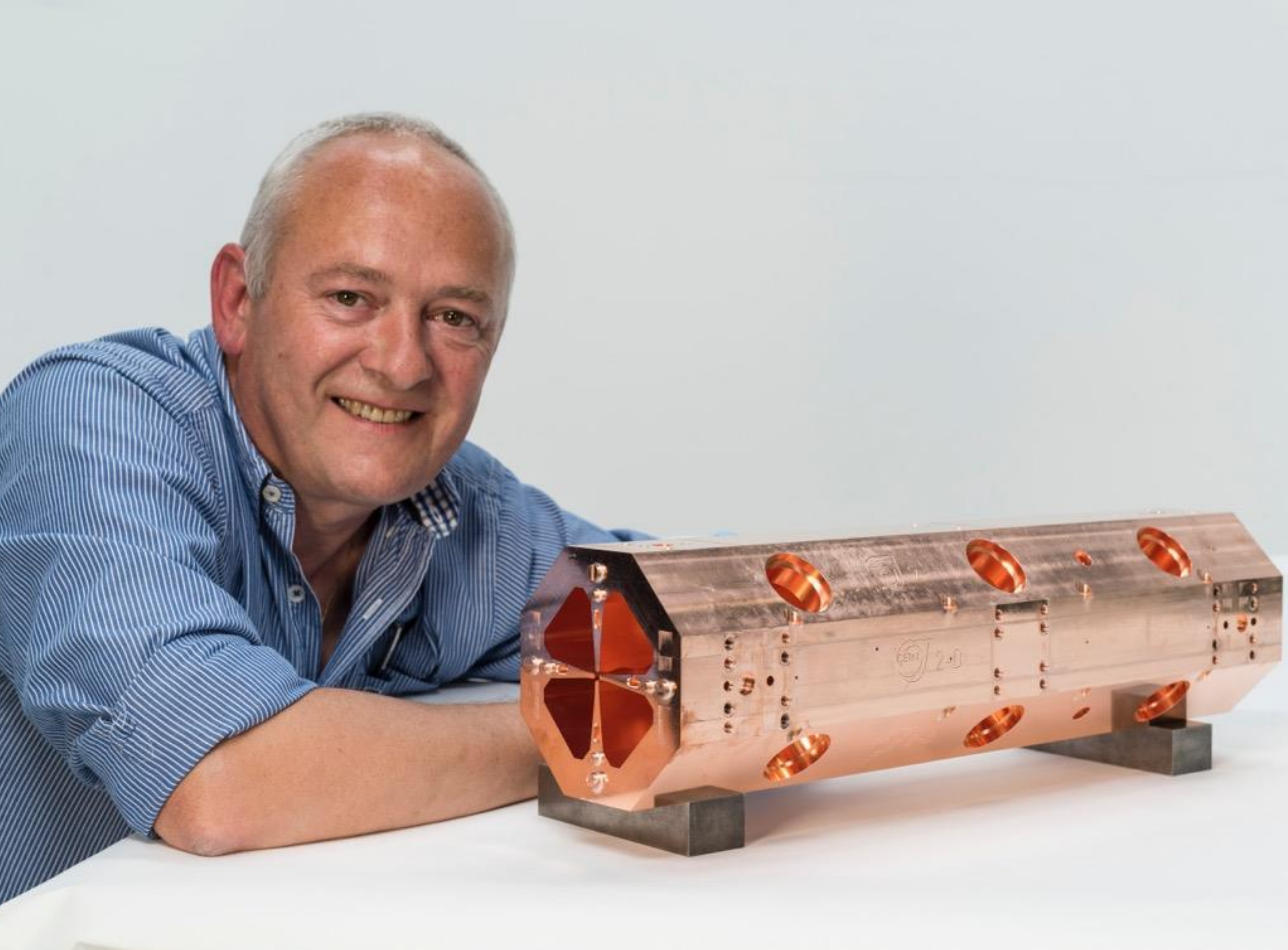
1,00€ - 1,50 FS | JEUDI 30 NOVEMBRE 2017 | G 01 BELLEGARDE & PAYS DE GEX

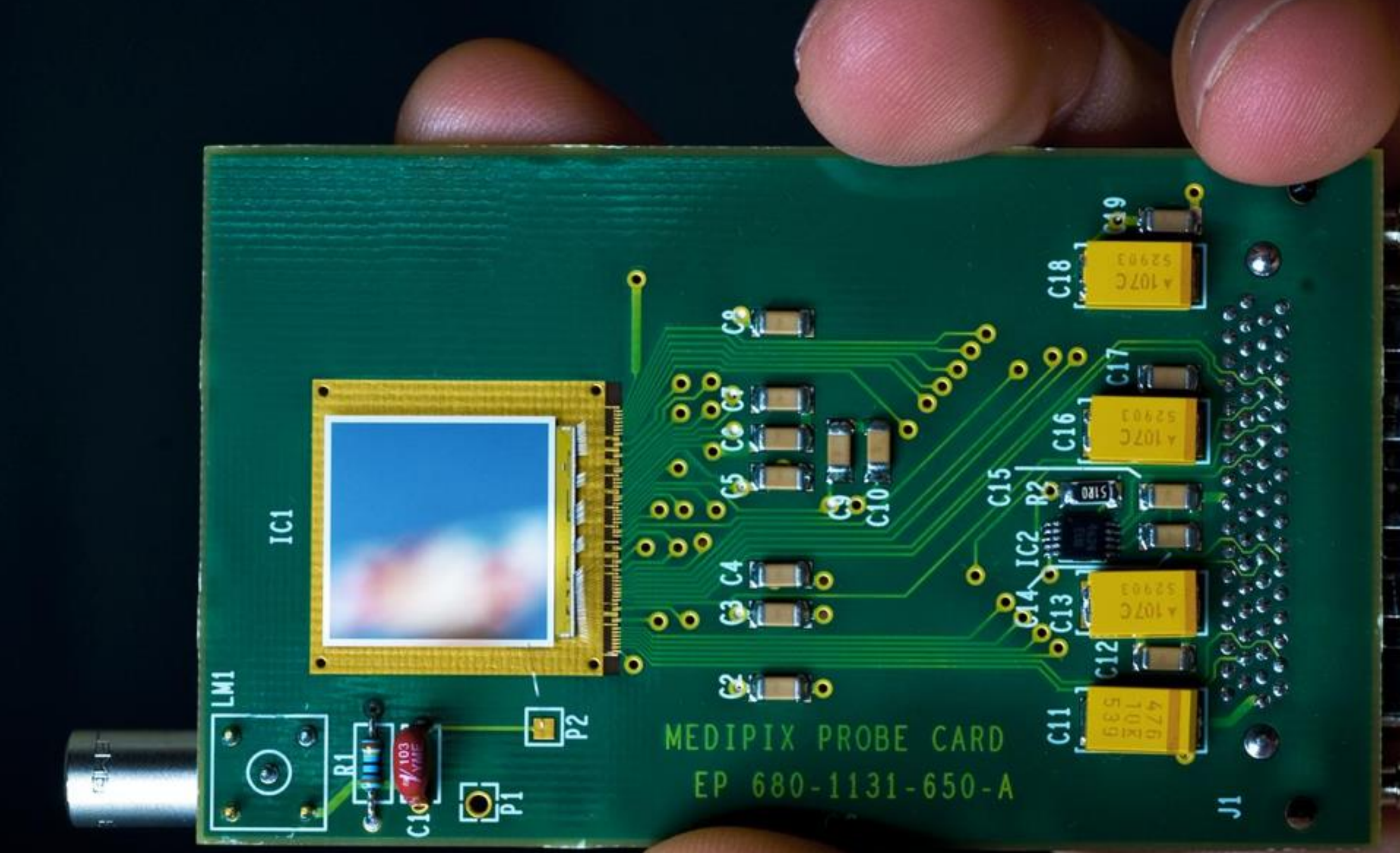
GENEVOIS LE SAVOIR DES PHYSICIENS AU SERVICE DE LA MÉDECINE DE DEMAIN

La lutte anti-cancer se prépare au Cern

CERN-MEDICIS
First medical isotopes produced






IC1
LM1
R1
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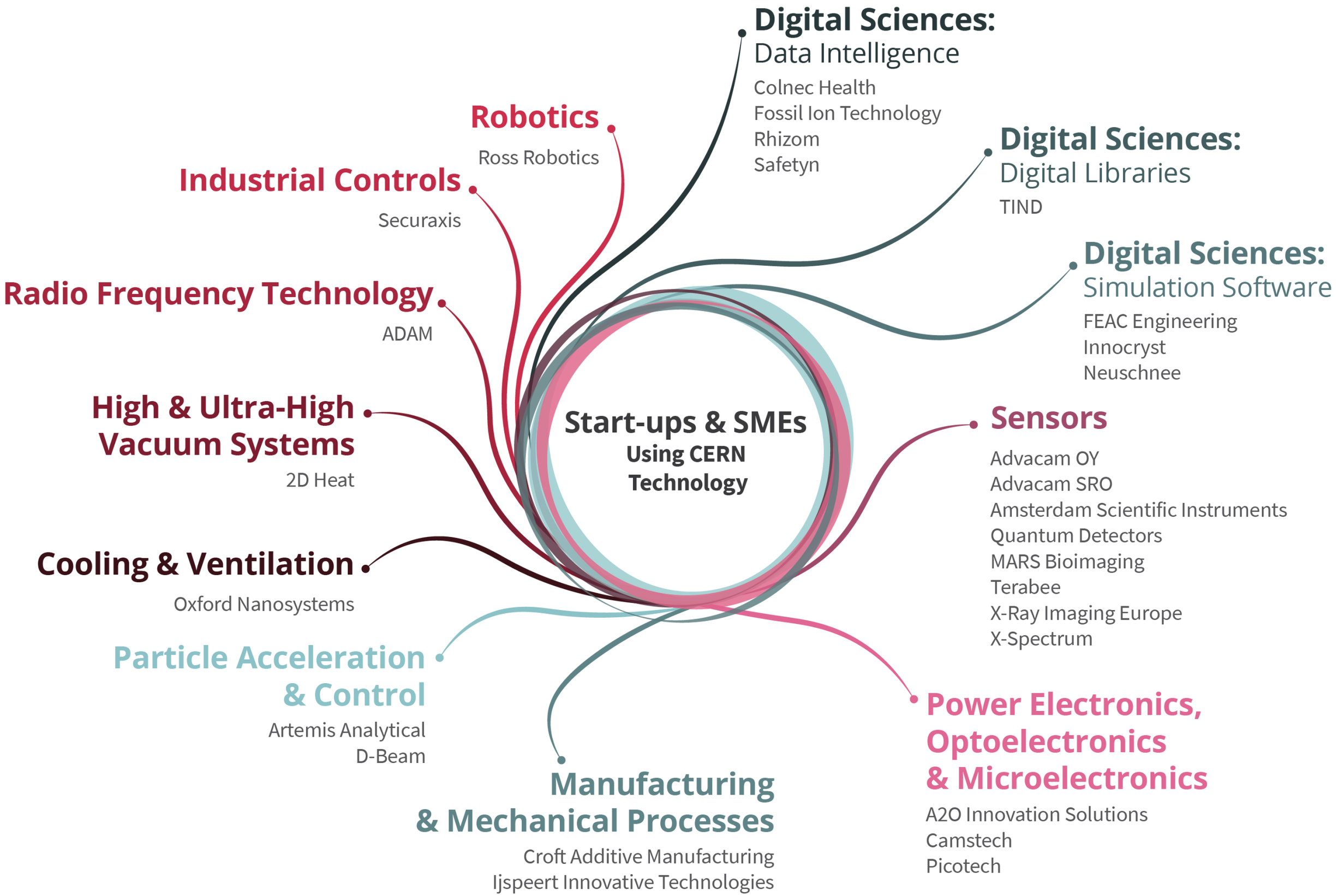
IC2
C14
C13
C12
C11
C18
C19
C17
C16
MEDIPIX PROBE CARD
EP 680-1131-650-A
J1


PIXcel
A Medipix2 collaboration
CERN
PANalytical

#EuropeForCulture

X-ray eyes for cultural heritage - Medipix chip

(courtesy of MARS Bioimaging Ltd)


Start-ups & SMEs
Using CERN Technology
Digital Sciences:
Data Intelligence
Colnec Health
Fossil Ion Technology
Rhizom
Safetyn
Digital Sciences:
Digital Libraries
TIND
Digital Sciences:
Simulation Software
FEAC Engineering
Innocryst
Neuschnee
Robotics
Ross Robotics
Industrial Controls
Securaxis
Radio Frequency Technology
ADAM
High & Ultra-High Vacuum Systems
2D Heat
Cooling & Ventilation
Oxford Nanosystems
Particle Acceleration & Control
Artemis Analytical
D-Beam
Manufacturing & Mechanical Processes
Croft Additive Manufacturing
Ijspeert Innovative Technologies
Sensors
Advacam OY
Advacam SRO
Amsterdam Scientific Instruments
Quantum Detectors
MARS Bioimaging
Terabee
X-Ray Imaging Europe
X-Spectrum
Power Electronics, Optoelectronics & Microelectronics
A2O Innovation Solutions
Camstech
Picotech

Many thanks for your attention