

Knowledge Transfer at CERN

Giovanni Porcellana

Medical Applications Officer, KT



Who?

- Nuclear Engineer
- Global Shaper
- From Turin, Italy
- 30 years young



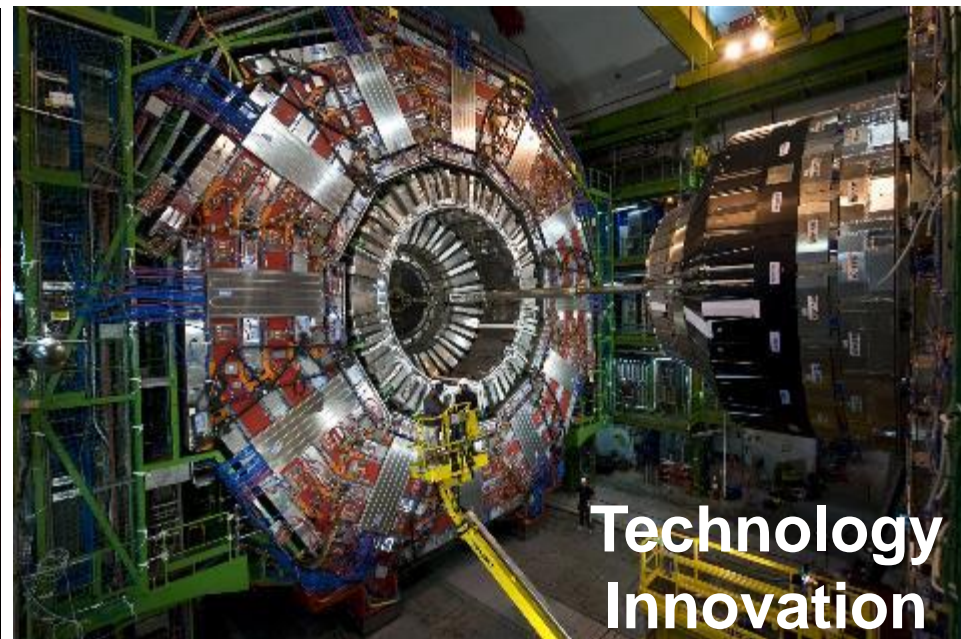
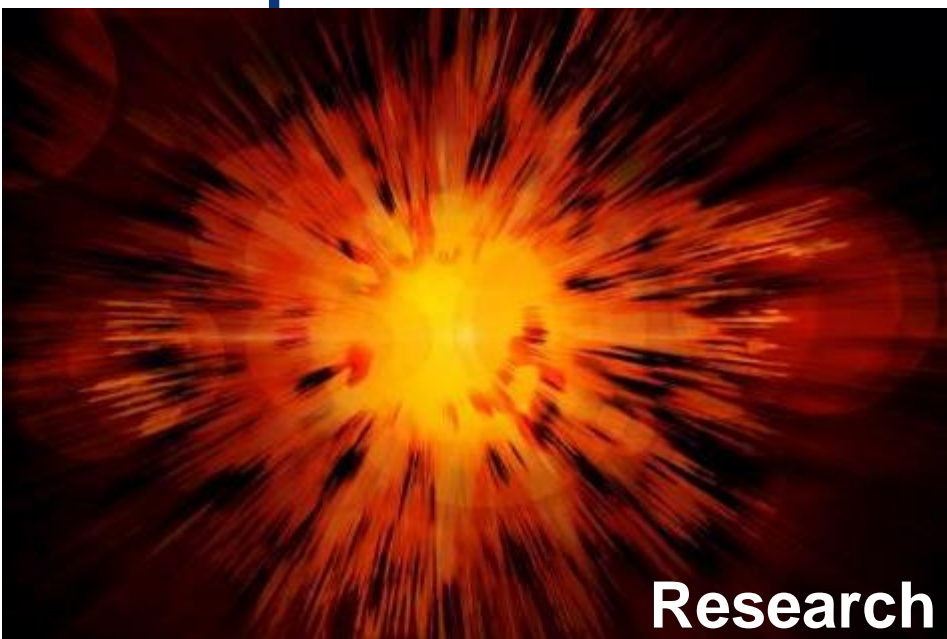
What (and where)?

TERA Foundation (before) and CERN (now)



- Medical Applications
- Accelerators for hadrontherapy
- Outreach
- ...

KT: part of CERN mission



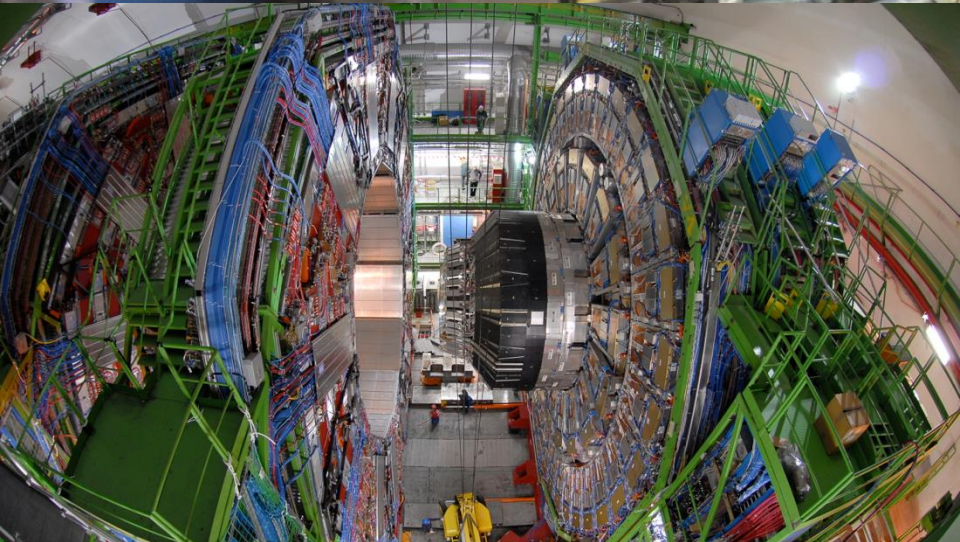
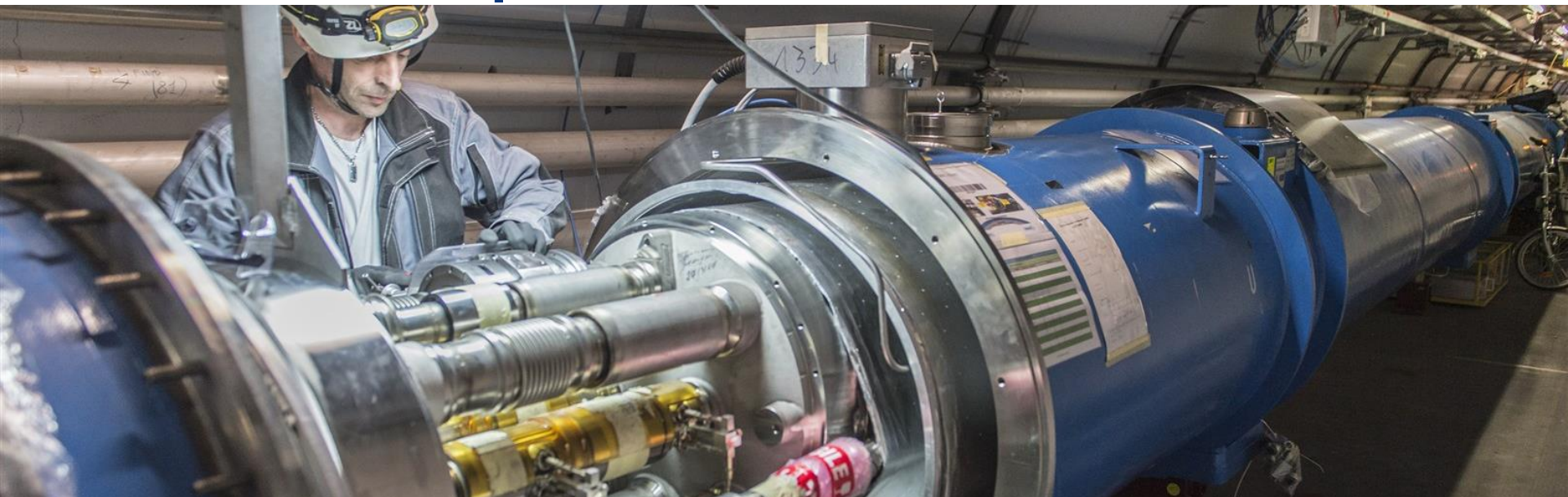
KT in everyday life



Example of KT



The three pillars



From Physics to...

Medicine



Safety



Aerospace

Global
Communities



The KT mission at CERN

<https://pixabay.com/en/hand-keep-globe-earth-continent-1030565/>



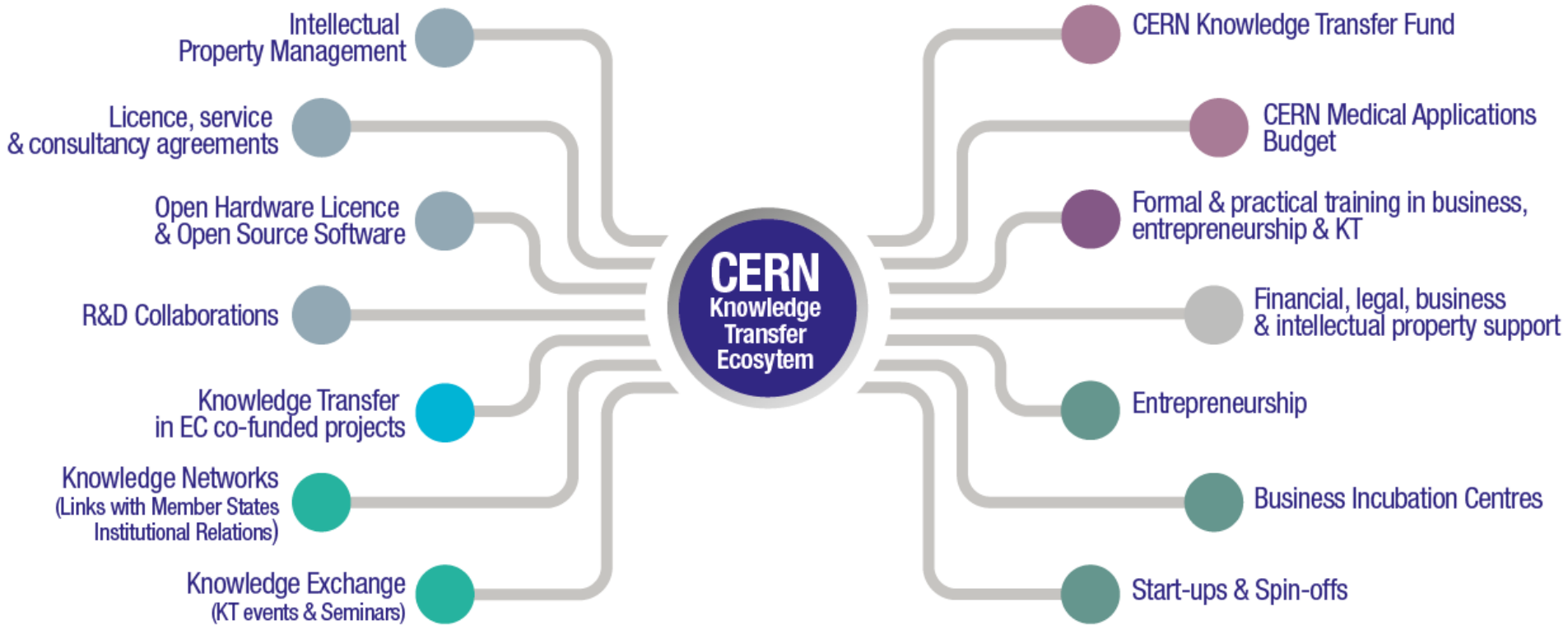
Maximize the return to Society of our technologies and knowledge, especially in the Member States

Promote CERN's image as a centre of excellence for technology

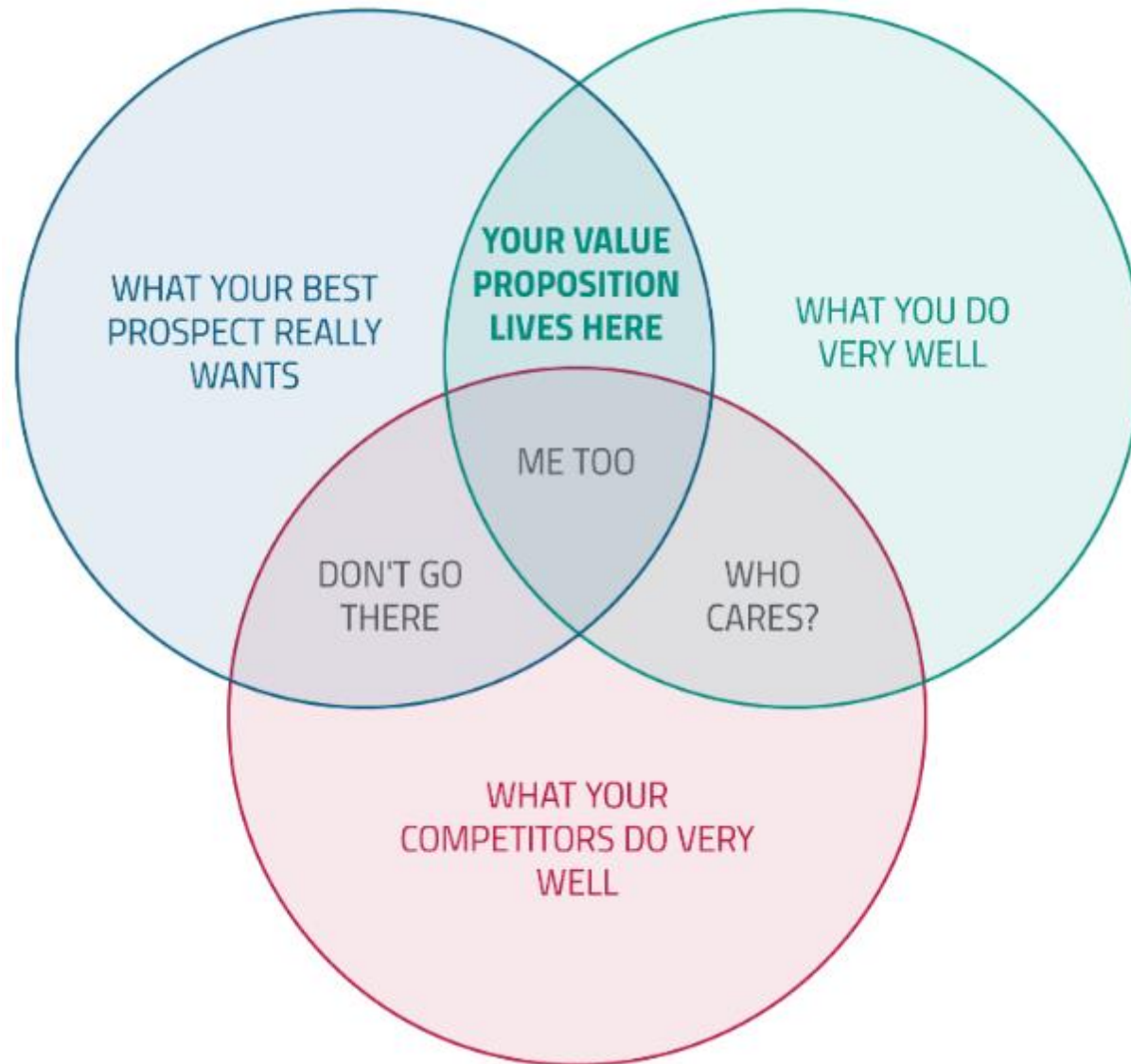
***Key words:
Dissemination and
Impact!***



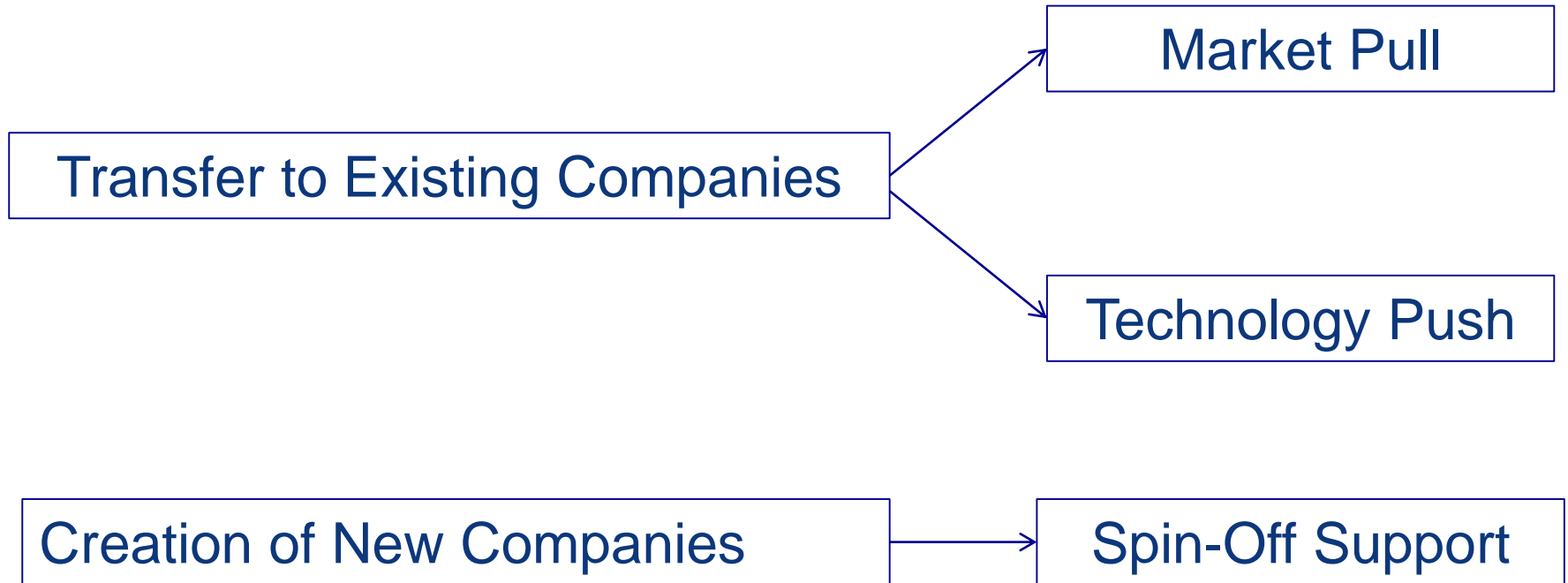
Accelerating Innovation



Value Proposition



KT implementation ways



The Business Incubation Centres (BIC) in the Member States



The BICs of CERN technologies help new entrepreneurs and SME to transform innovative ideas into commercial realities

How the BICs work

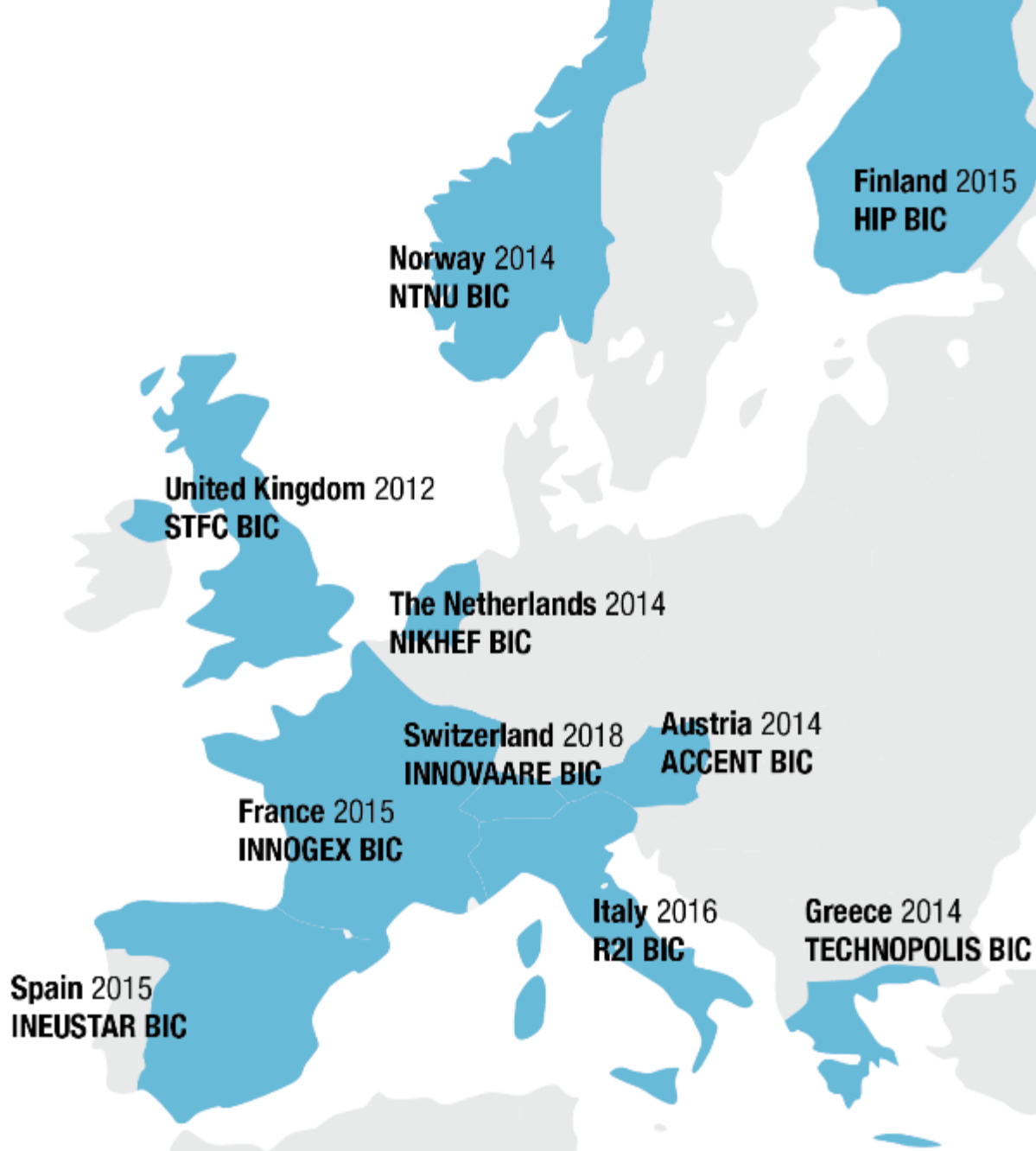
CERN

- Technical visits to the Lab
- Contacts with the BICs
- Licences at favourable conditions

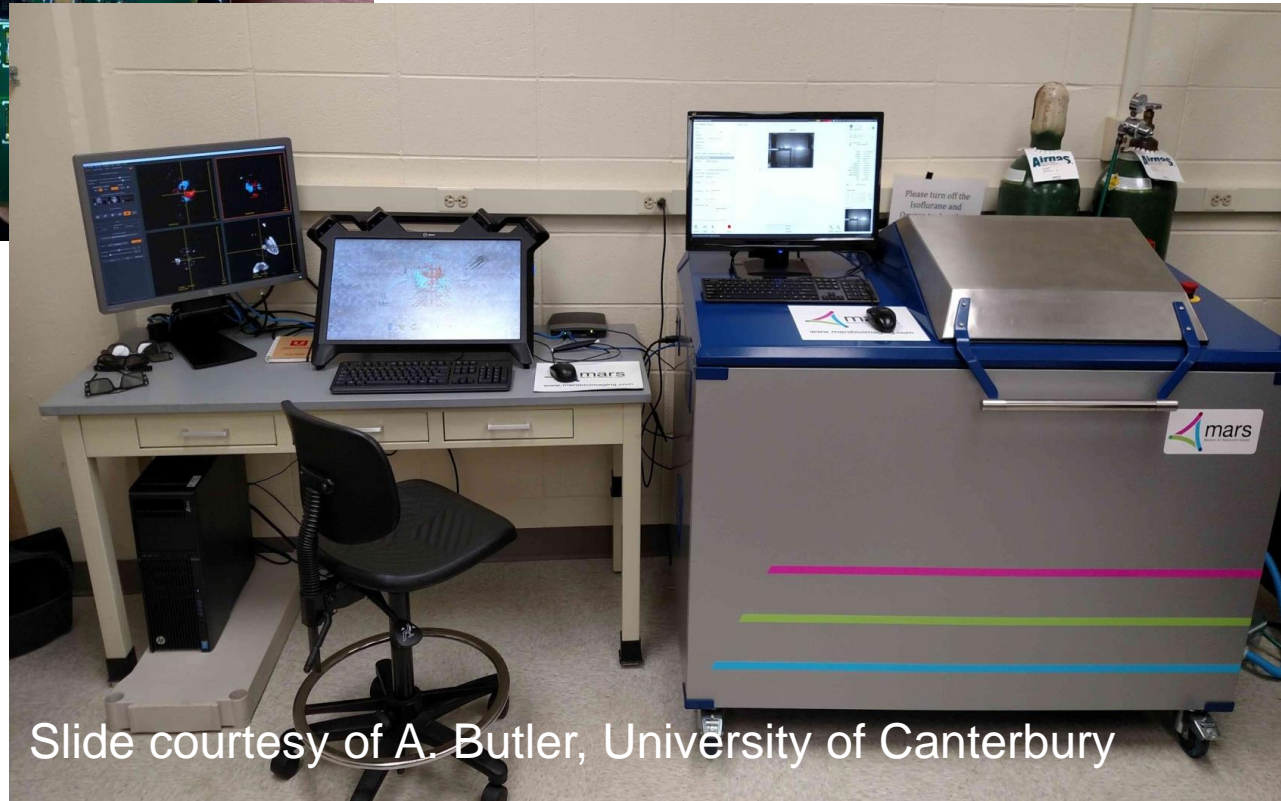
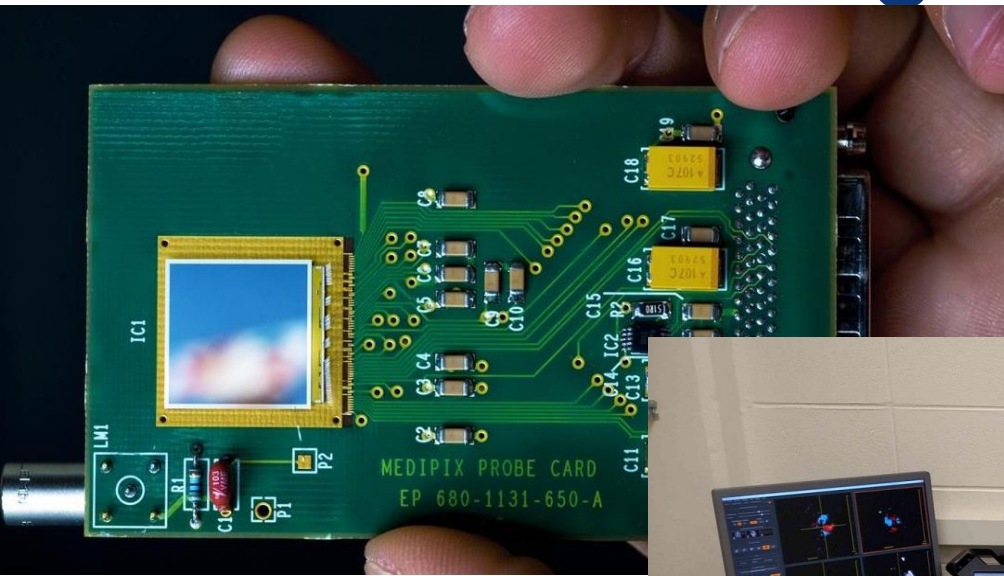
The BIC

- Office spaces
- Expertise in companies creation
- Support in networking
- Financing strategies





MARS Bioimaging



Slide courtesy of A. Butler, University of Canterbury



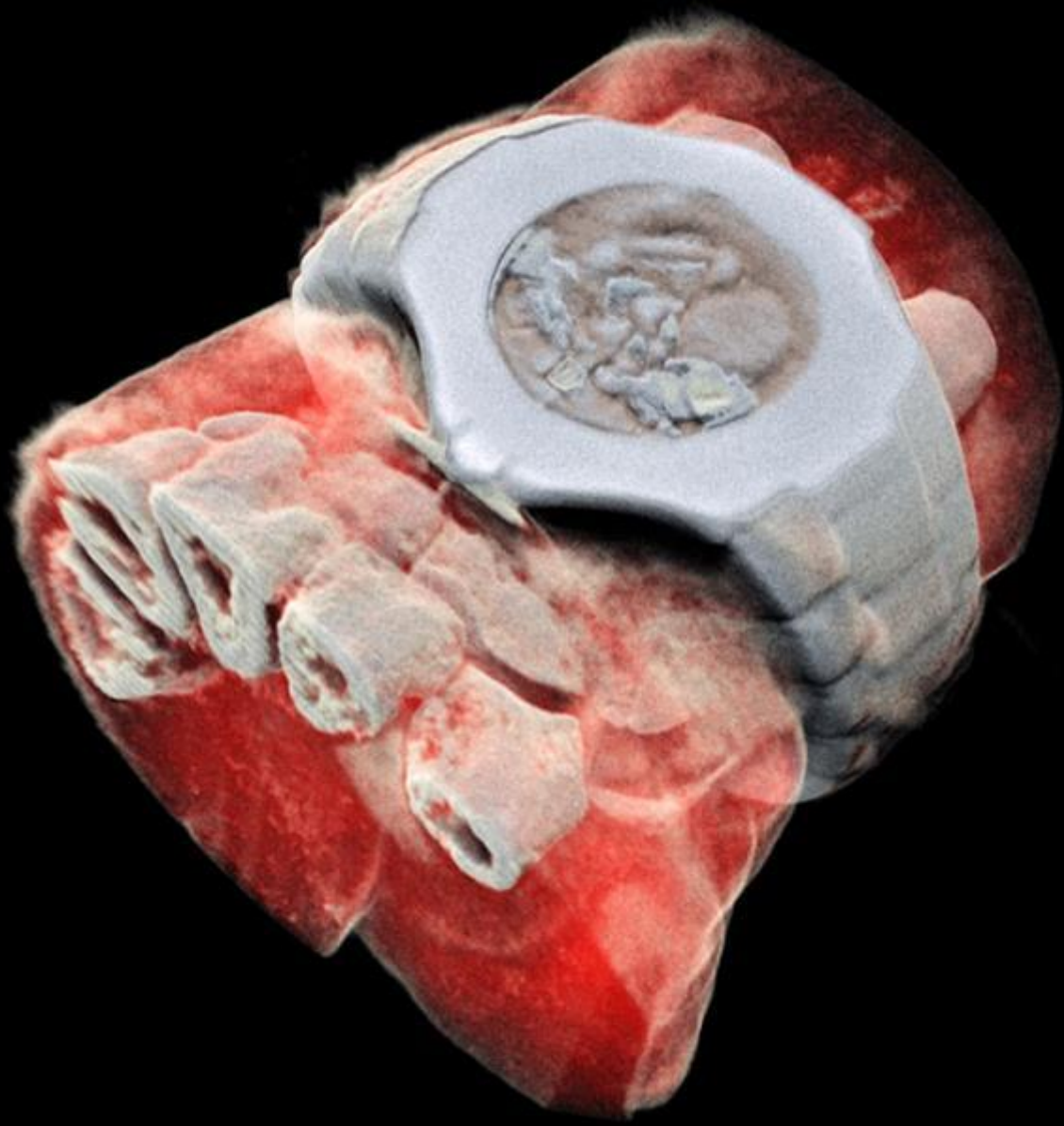


Photo: MARS Bioimaging

SRB Energy



TeraBee



Norway: TIND

MANAGE, SHOWCASE AND PRESERVE
ALL DIGITAL ASSETS.



RESEARCH OUTPUT

Publications, Presentations,
Reports and more.



RESEARCH DATA

Data sets of any size
and format.



MULTIMEDIA

Videos, Pictures
and Audio.



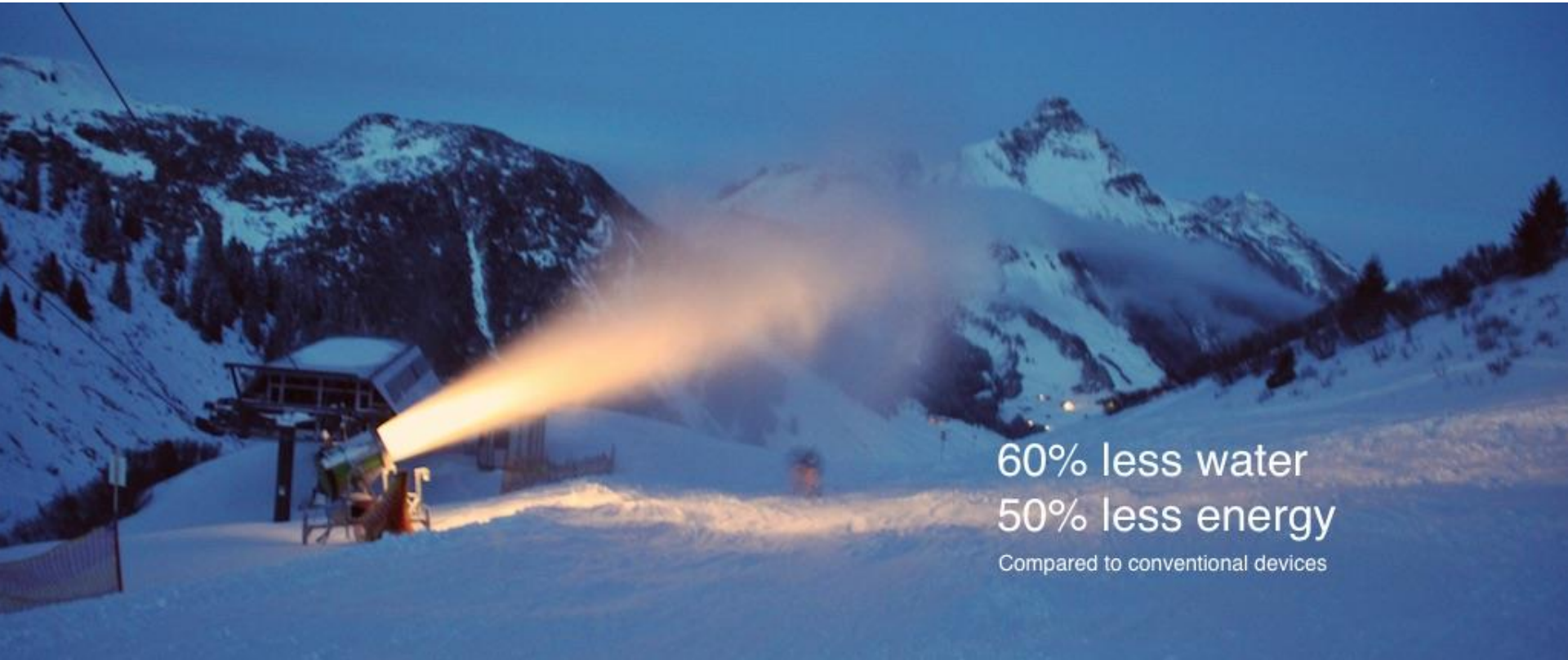
LIBRARY MANAGEMENT

Electronic and Print
Resources.

CERN open source software provided as a
professional cloud service.



Austria: Neuschnee



60% less water
50% less energy
Compared to conventional devices



SME Network

KT newsletter twice per year

Creation of an internal database of SMEs, but also bigger companies, research centers, universities...

From November 2015, more than 100 subscribed, among them 50 SMEs



The human capital



Fostering the entrepreneurial spirit

Activities and events

Entrepreneurship meet-up

Global Entrepreneurship Week

CERN-NTNU Screening Week

Support to THE Port Hackathon et IdeaSquare Challenge Based Innovation programmes

Material and documentation for CERN scientists and engineers

Adapted and *ad hoc* business plans

“User Friendly” financial tables for start-ups



M—E—D



T—E—C—H



H—A—C—K

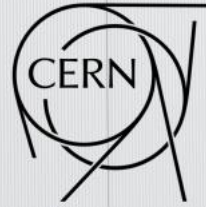
AN INNOVATION COMPETITION WHERE TEAMS CAN SOLVE MEDTECH PROBLEMS PITCHED BY HEALTHCARE ORGANISATIONS AND INDUSTRY.

#CERNMEDTECHHACK

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



M-E-D
|| || ||
T-E-C-H
|| || ||
H-A-C-K



Idea^s
THINK. DO. COLLABORATE.



CERN Entrepreneurship Student Programme (CESP)



<http://cdsweb.cern.ch/record/2638107?ln=ca>

<https://indico.cern.ch/event/707301/>



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Contacts

General enquiries: KT@cern.ch

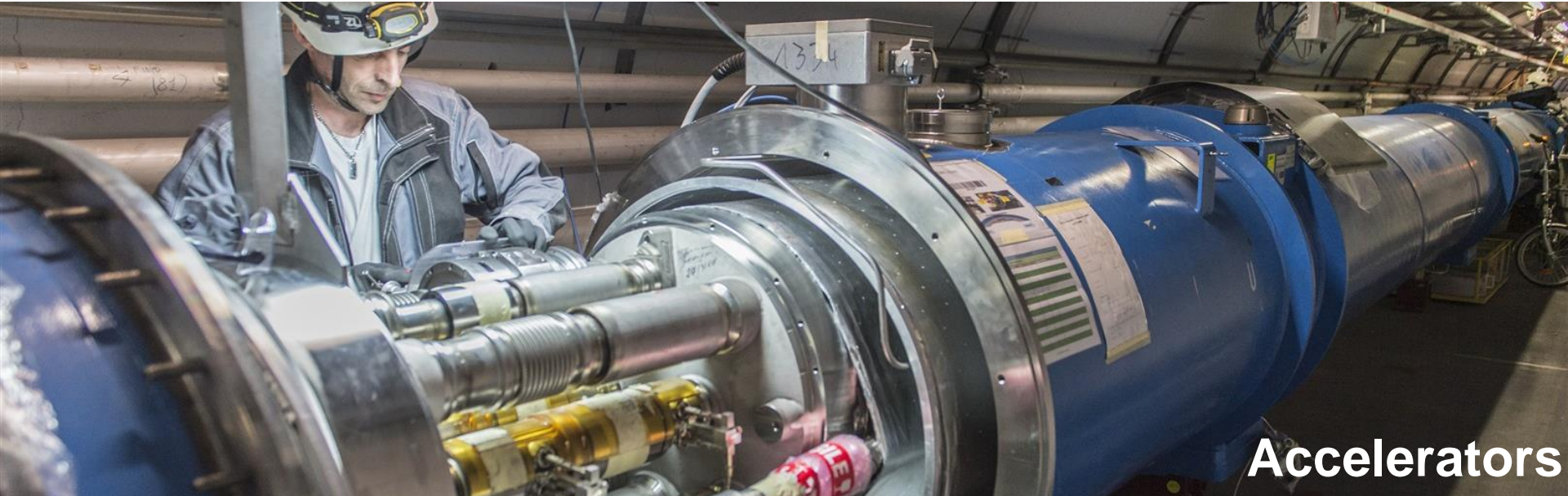
KT Group Leader: Giovanni.Anelli@cern.ch

Medical Applications: Manuela.Cirilli@cern.ch

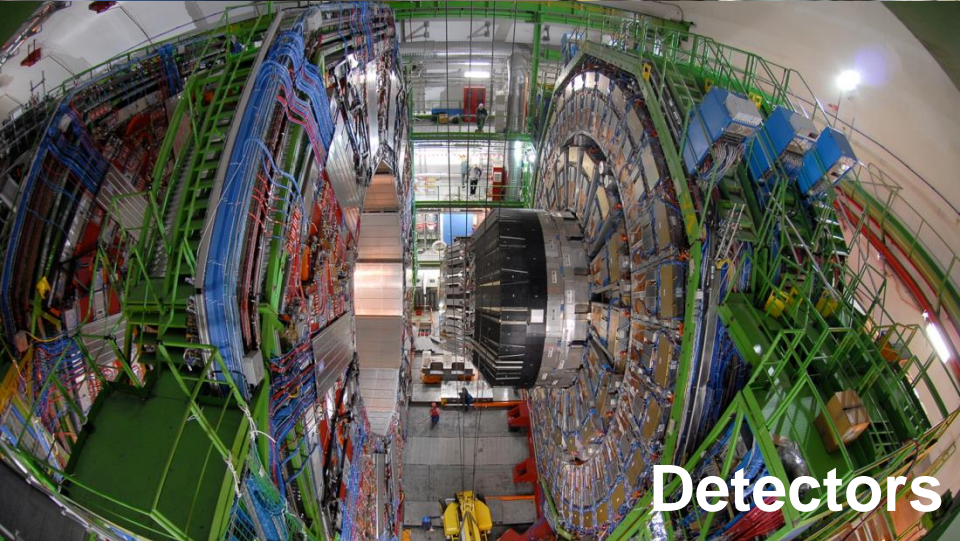
Aerospace Applications: Enrico.Chesta@cern.ch



The three pillars



Accelerators



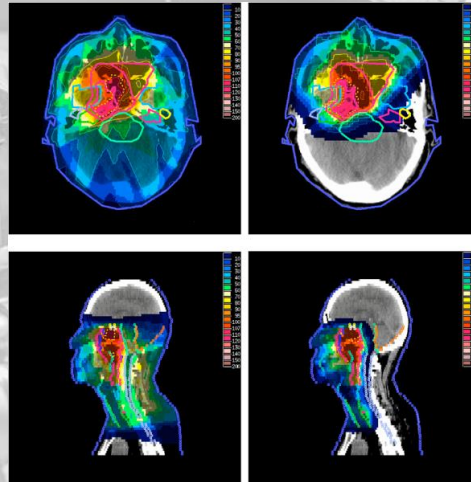
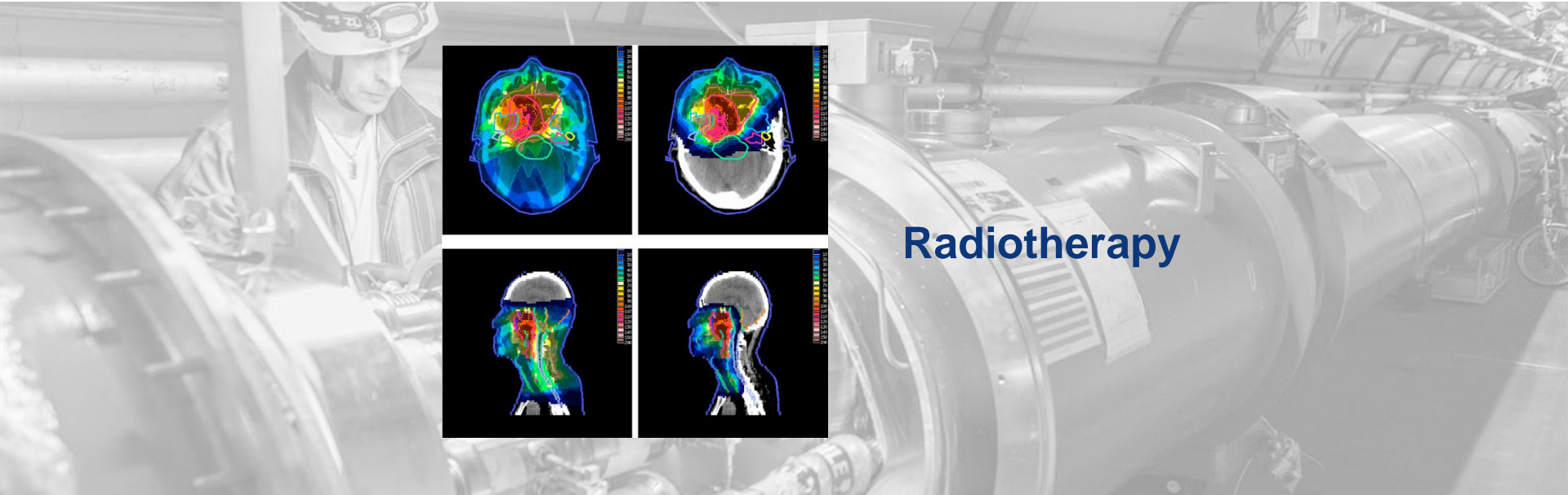
Detectors



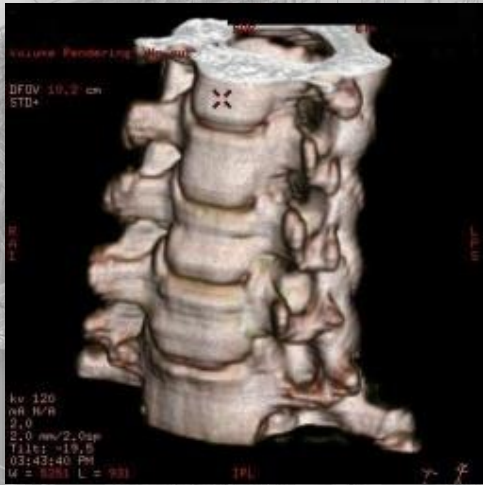
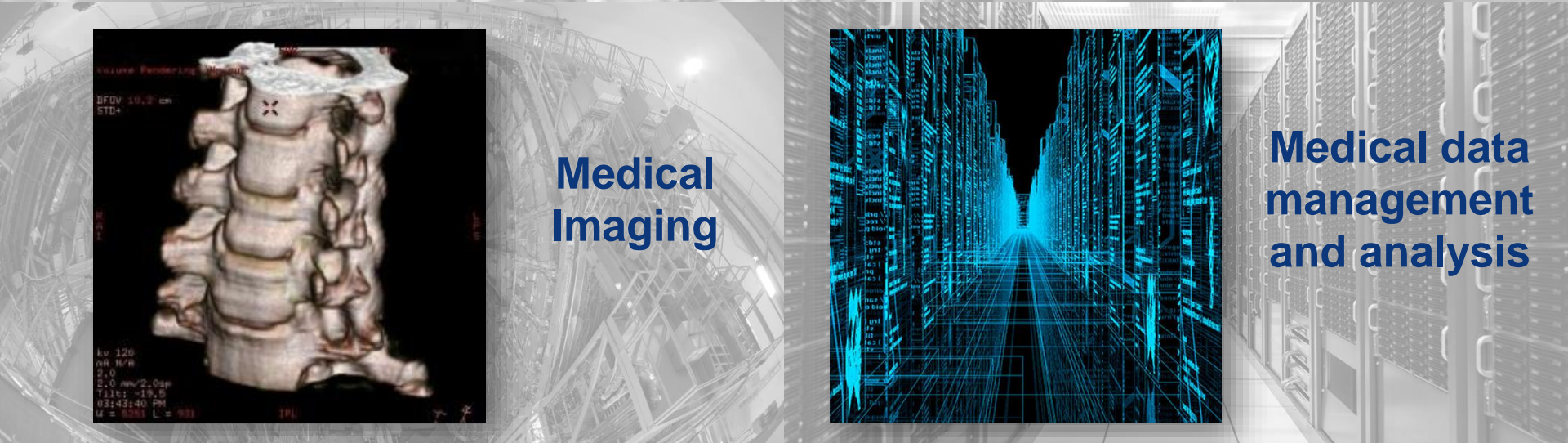
Computing



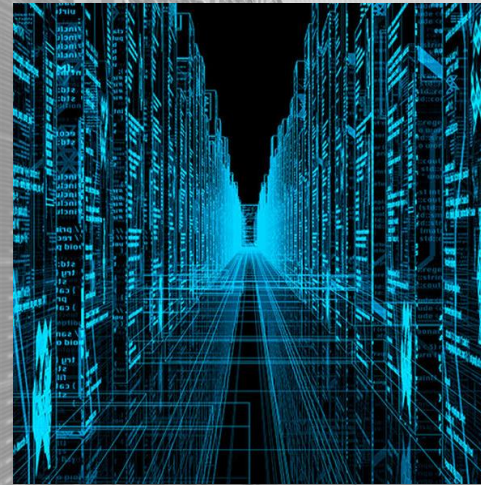
The three pillars



Radiotherapy



Medical Imaging



Medical data management and analysis



Medical Imaging



X-rays



Wilhelm Röntgen
(1845–1923)

1901: Nobel prize

8 November
1895:
X-rays discovery

22 December
1895:
first radiography

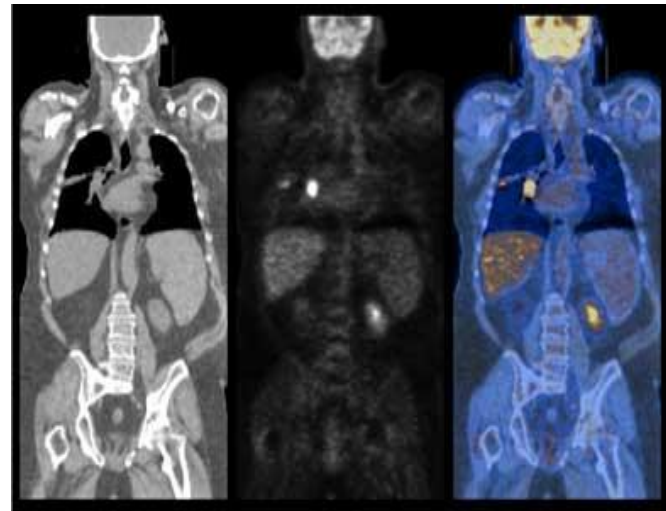
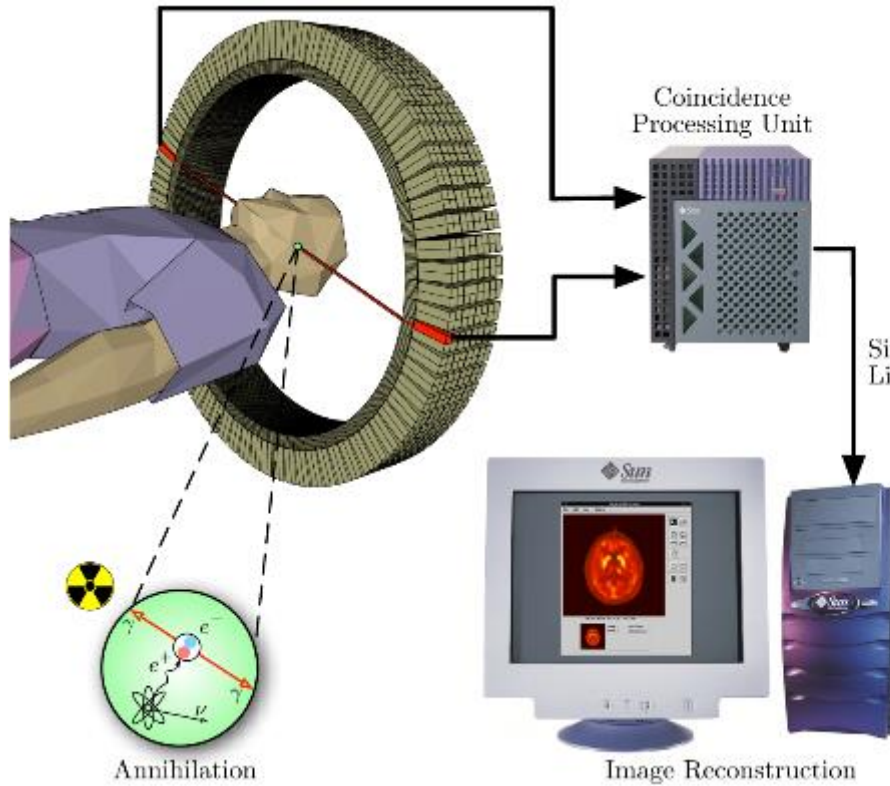
Courtesy of Roentgen museum



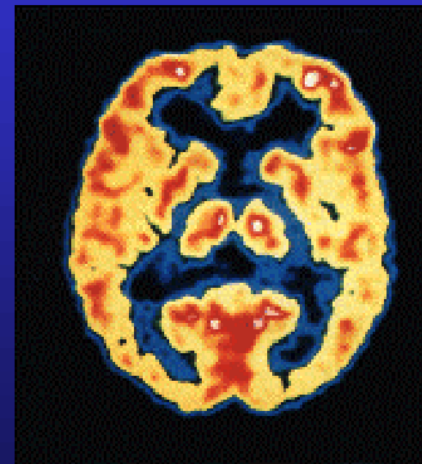
More and more details



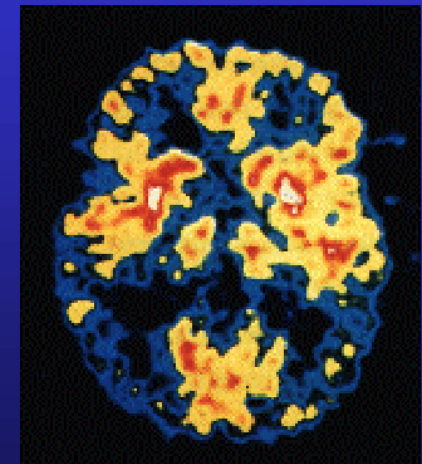
PET Scan



Brain Metabolism in Alzheimer's Disease: PET Scan

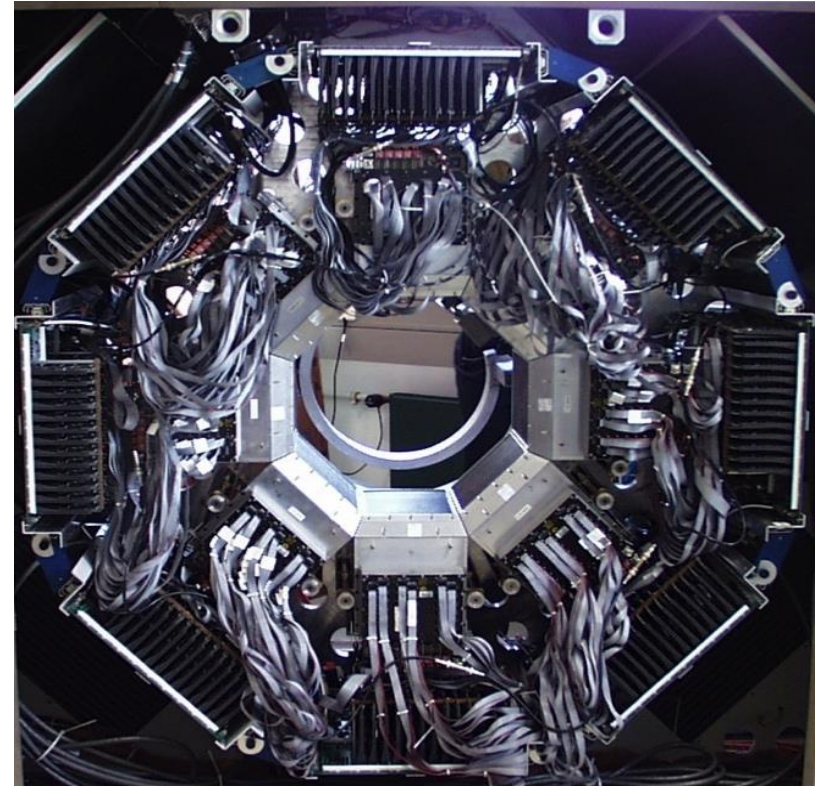
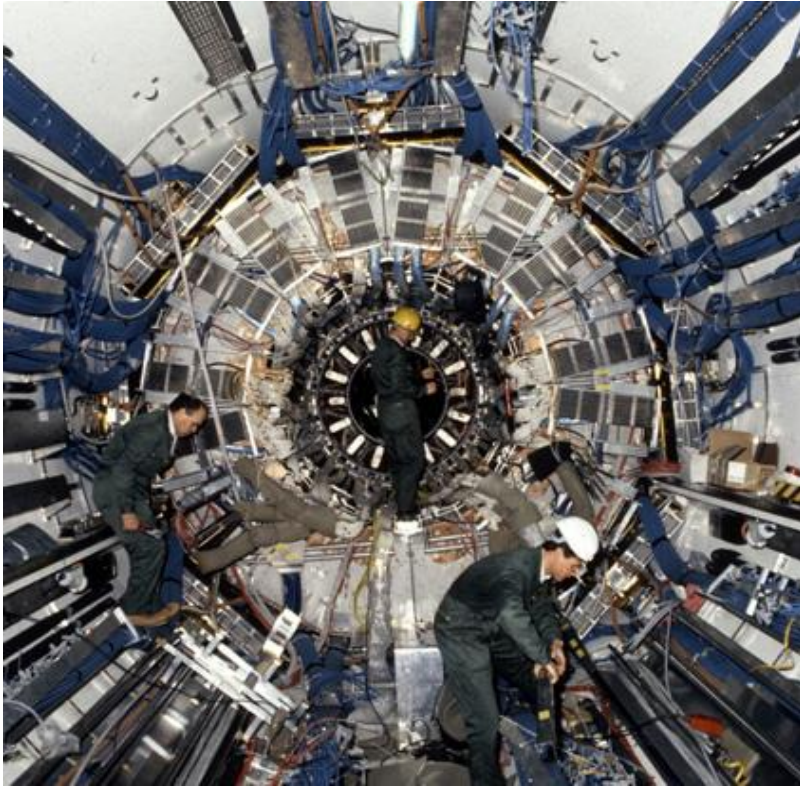


Normal Brain

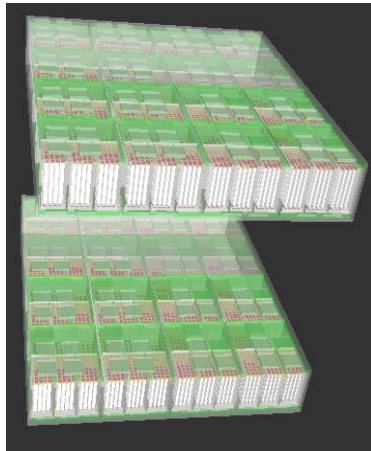
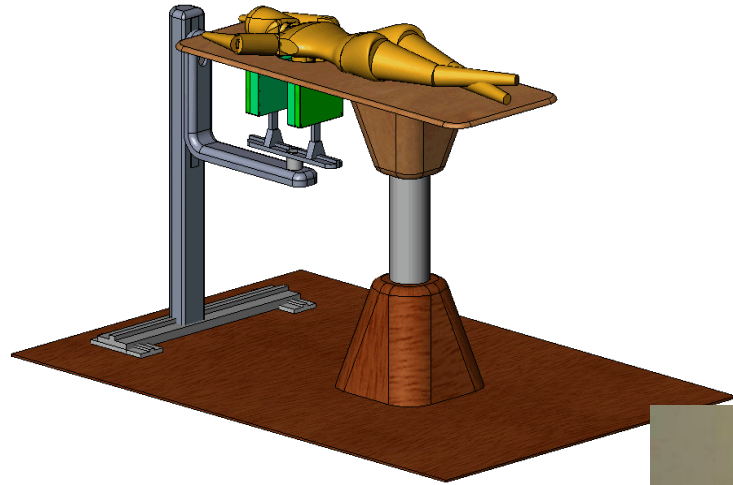


Alzheimer's Disease

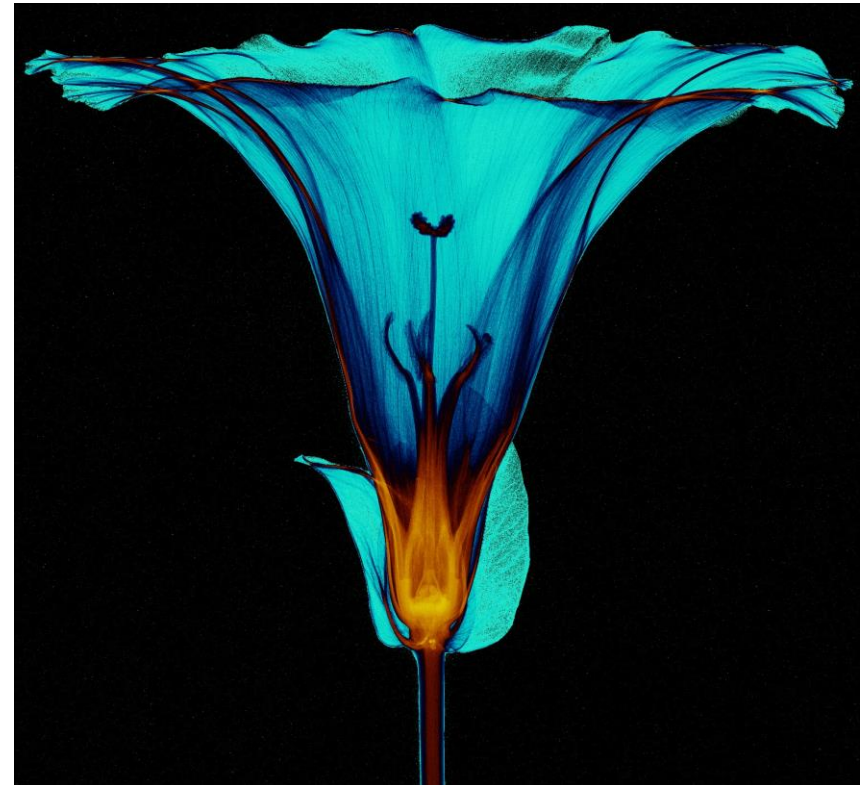
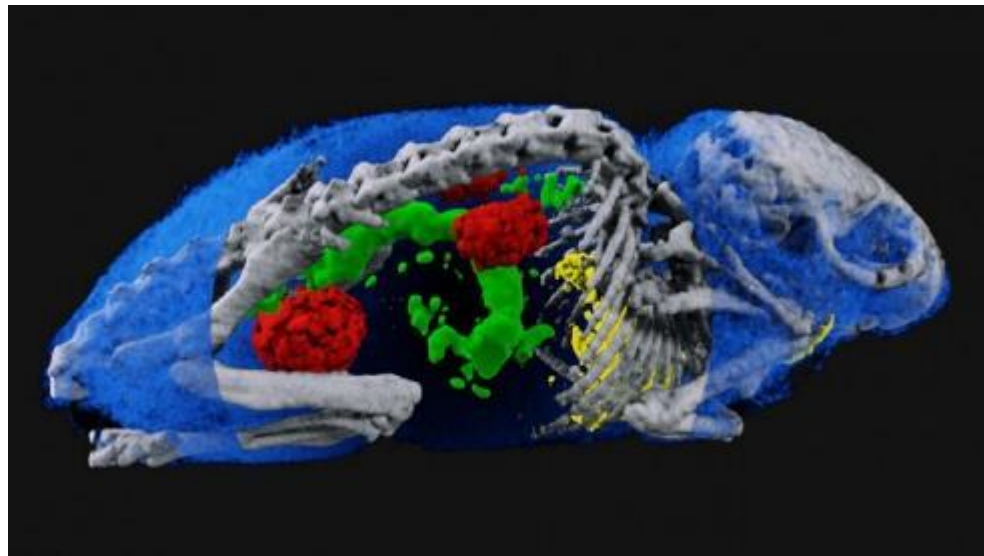
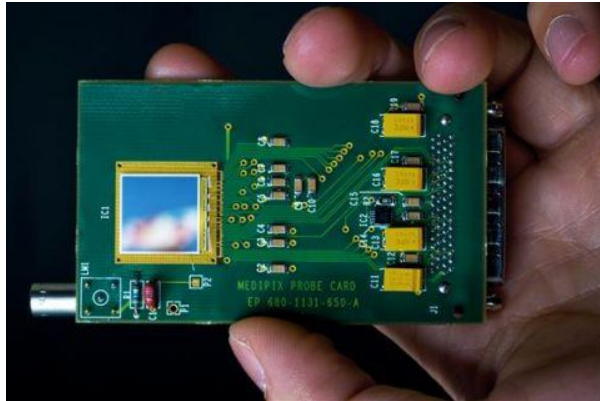
Medical imaging and particle physics: the same challenge?



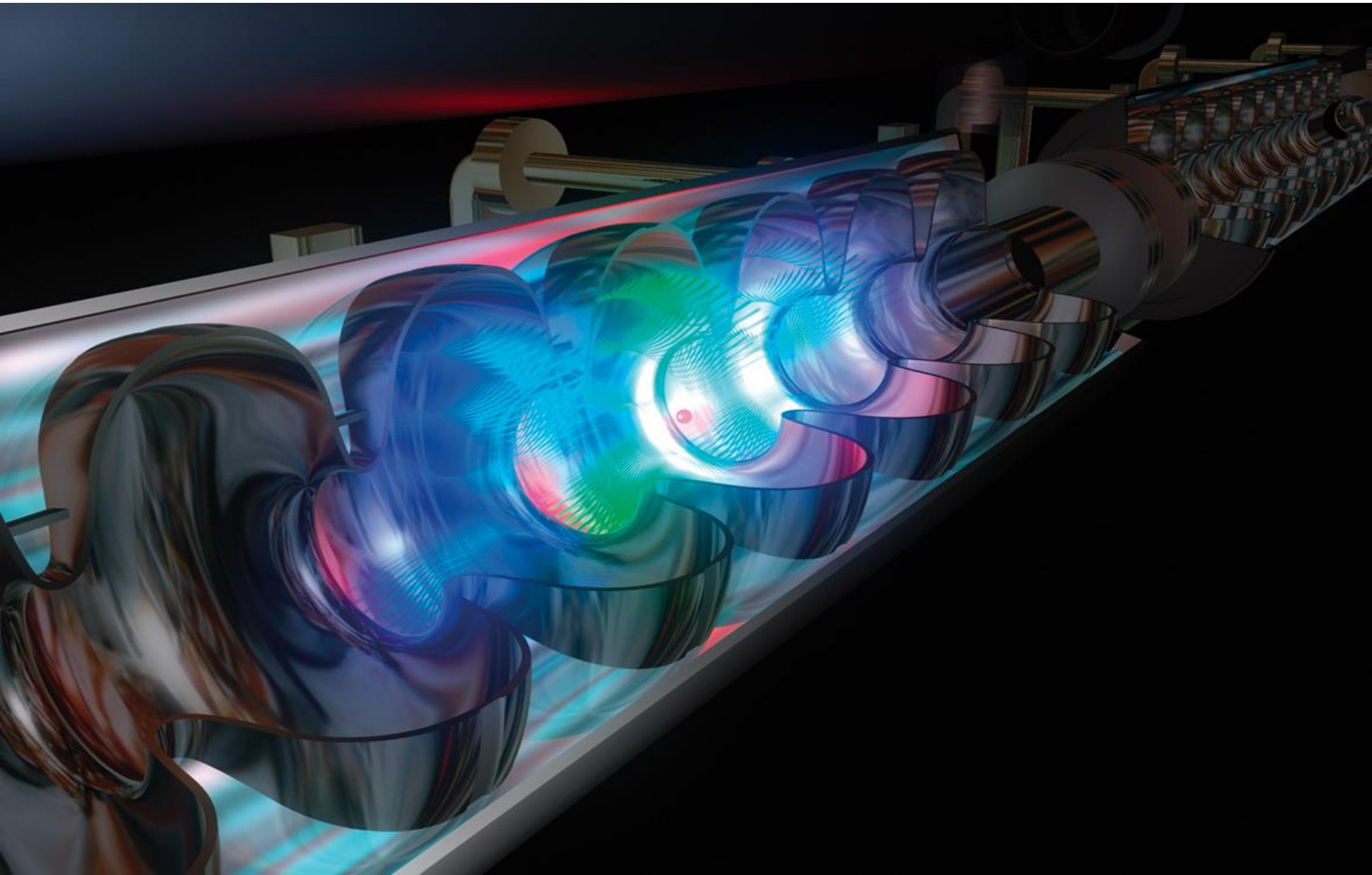
ClearPEM



Medipix



Accelerators for medicine



Accelerators for radio-isotopes



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

La lutte anti-cancer se prépare au Cern



Accelerators for cancer treatment

State of the art treatments



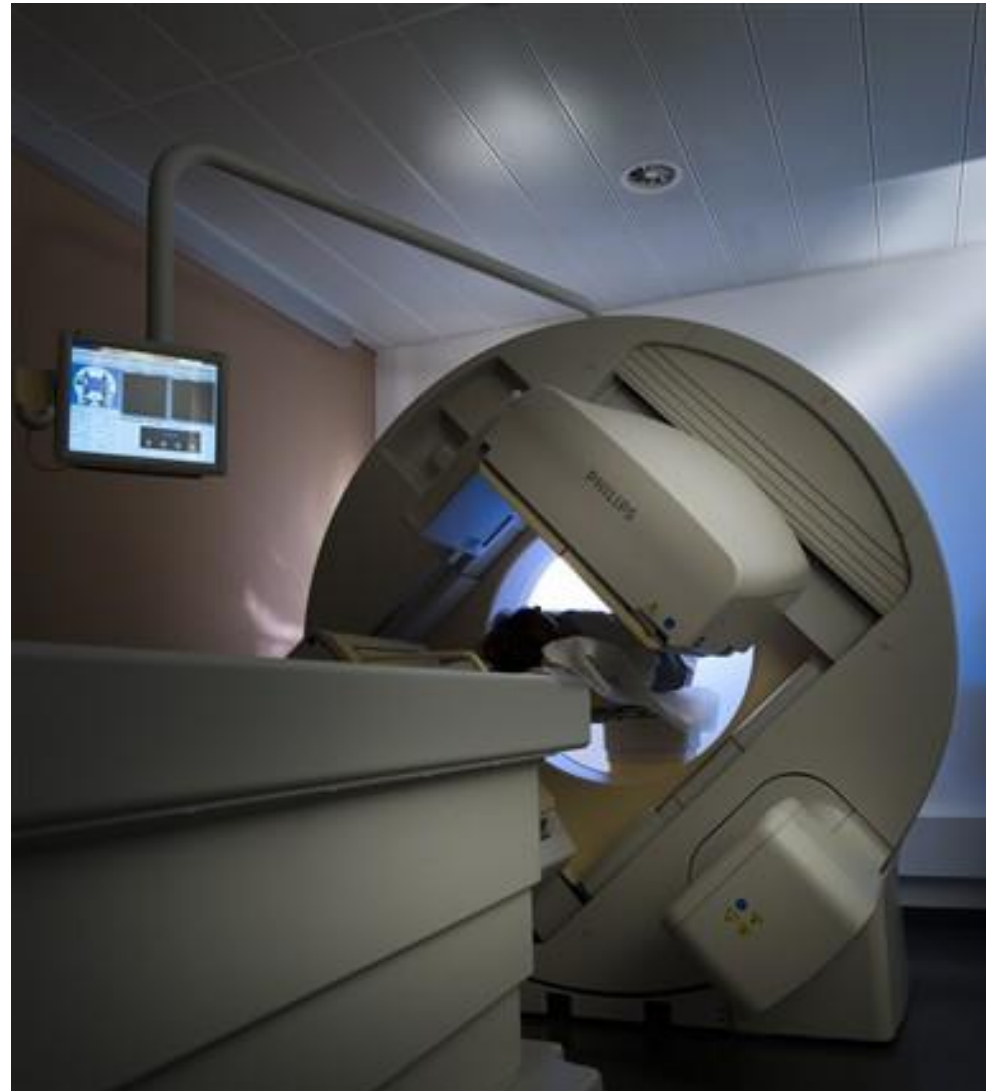
Innovative practice

Hadrontherapy

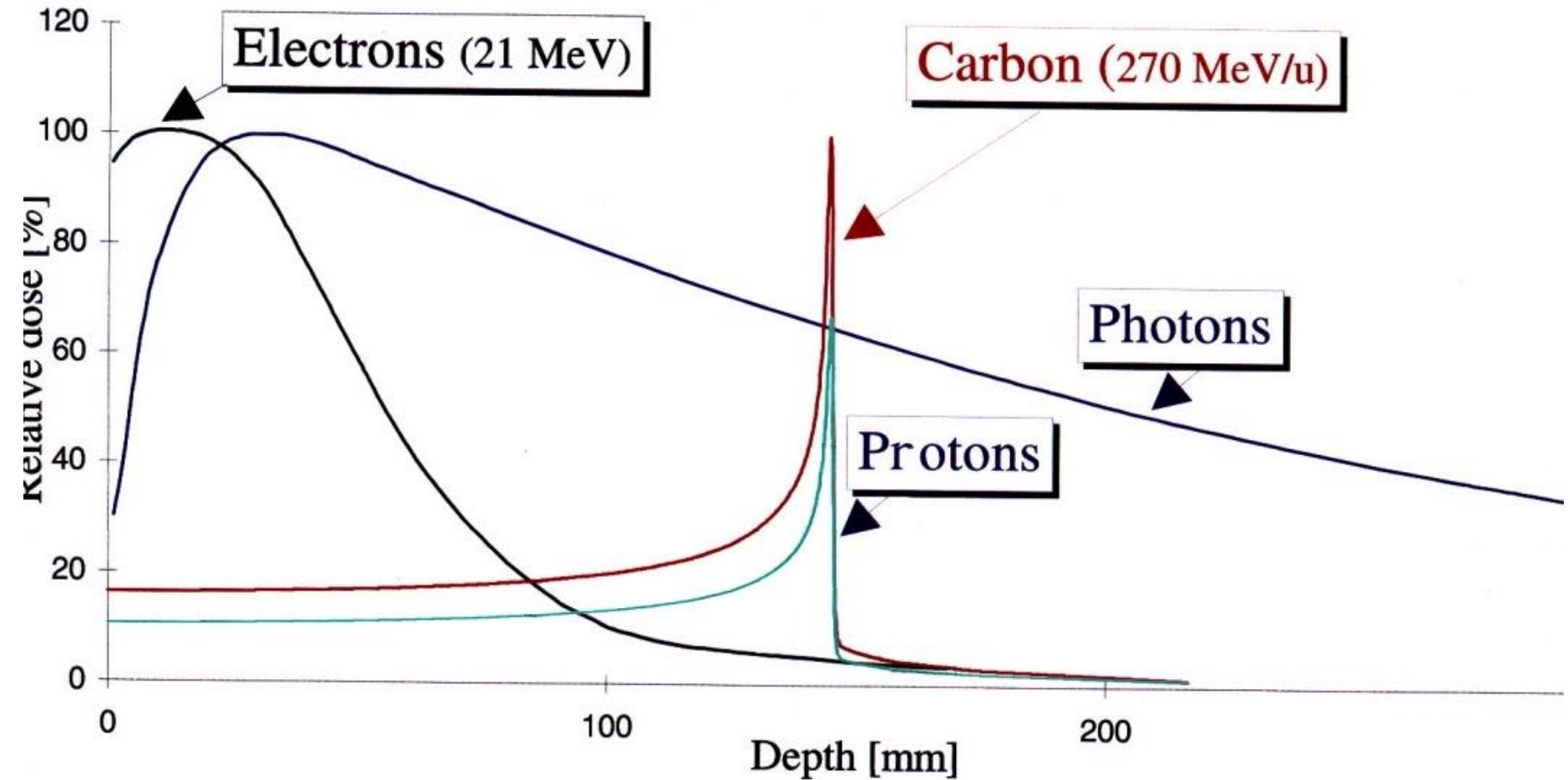


Radiotherapy

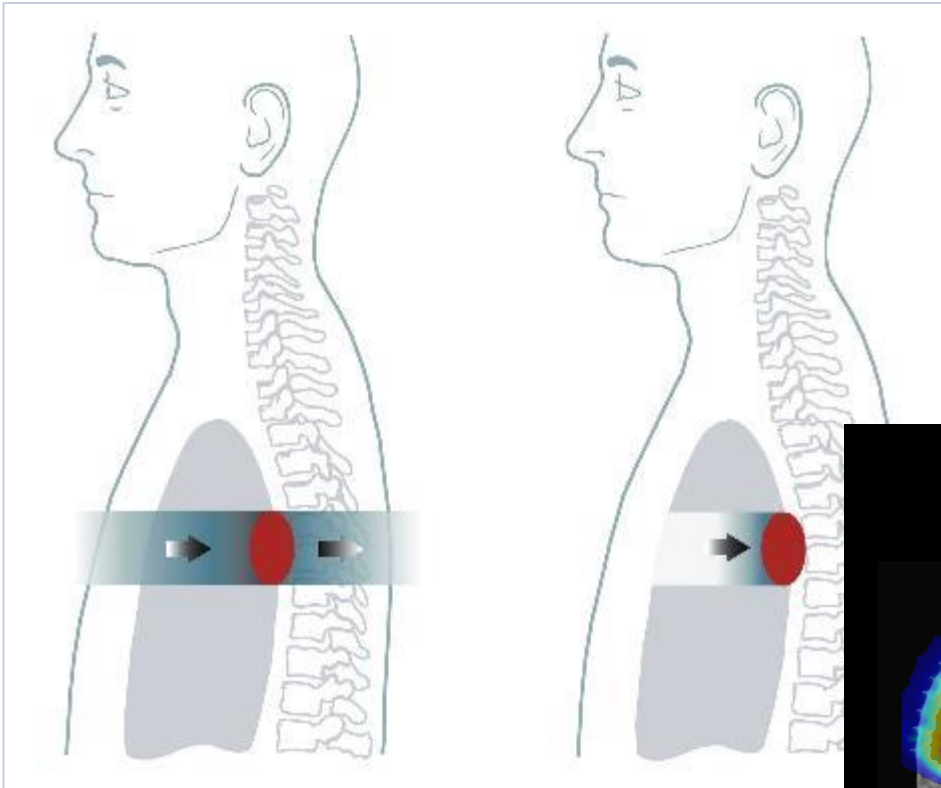
- Cheap:
 - the least expensive cancer treatment method (around 5% of total cost)
- Cure:
 - good cure rate
- Conservative:
 - generally non-invasive, fewer side effects



Hadrontherapy



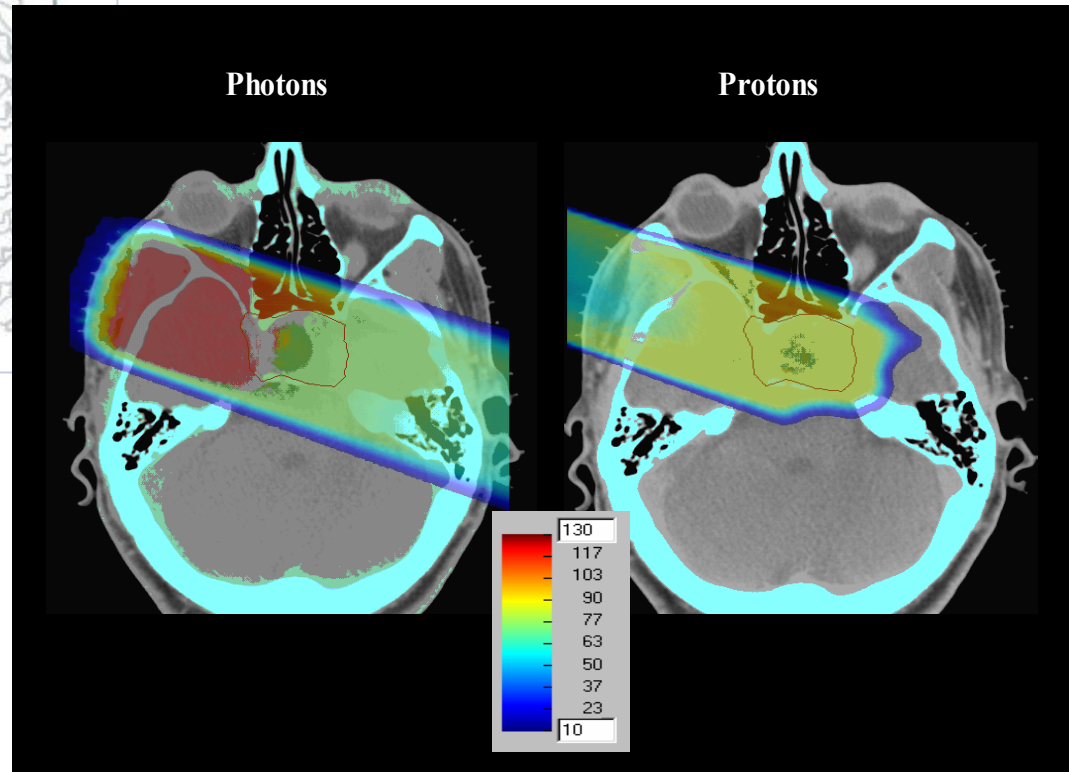
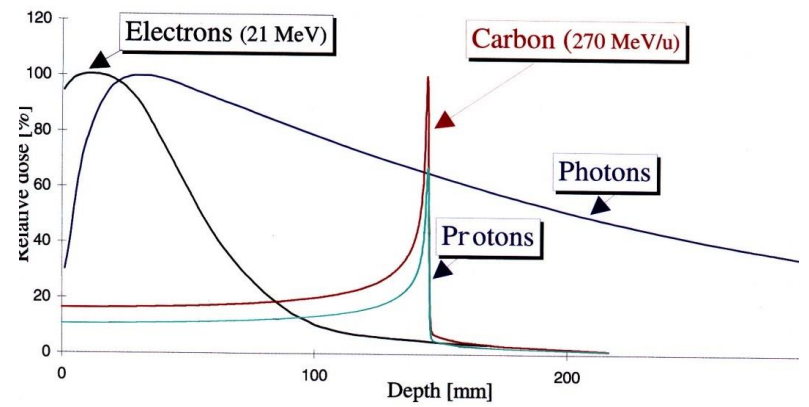
Protons vs X-rays



X-rays

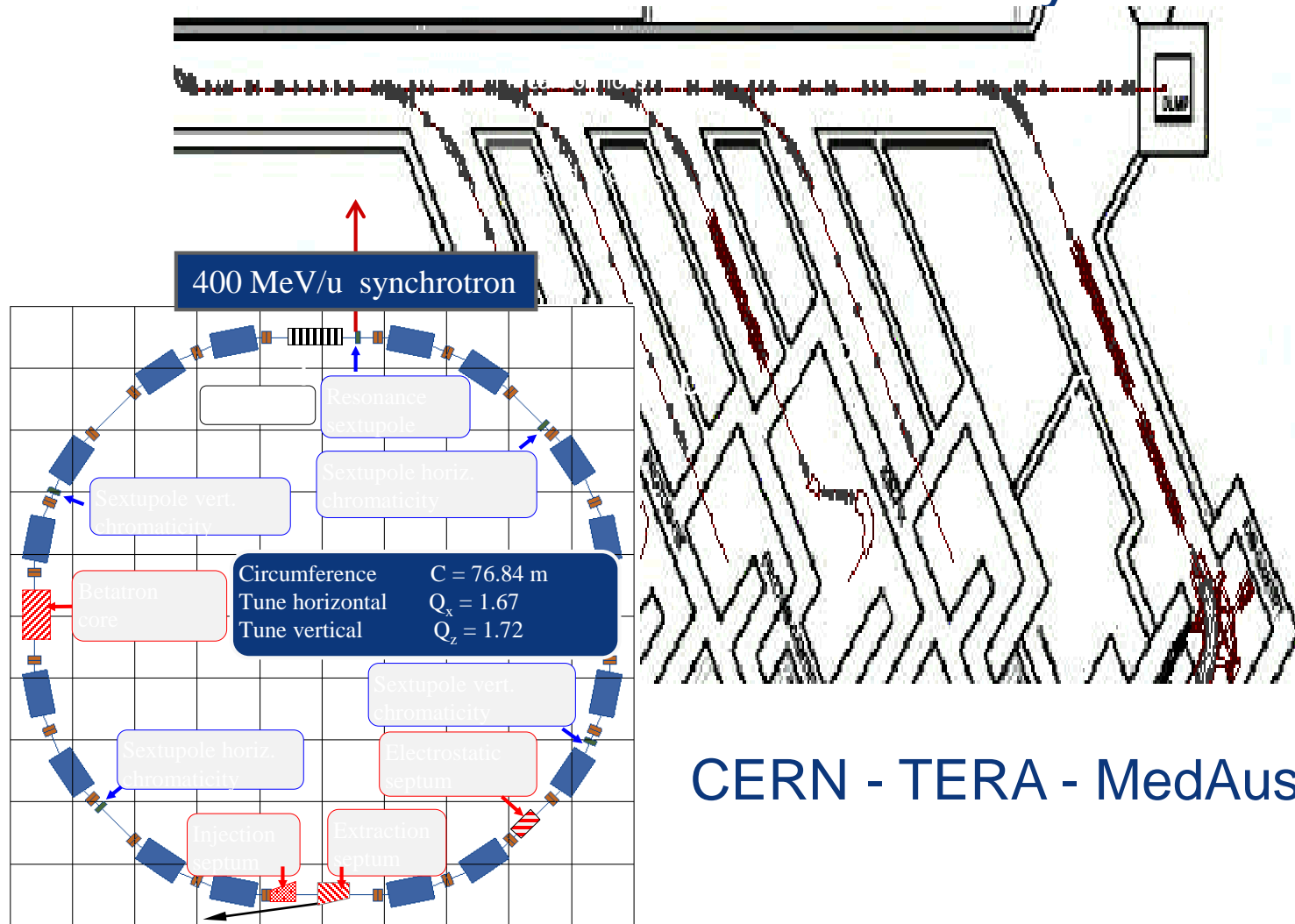
Protons

Courtesy of
MedAustron



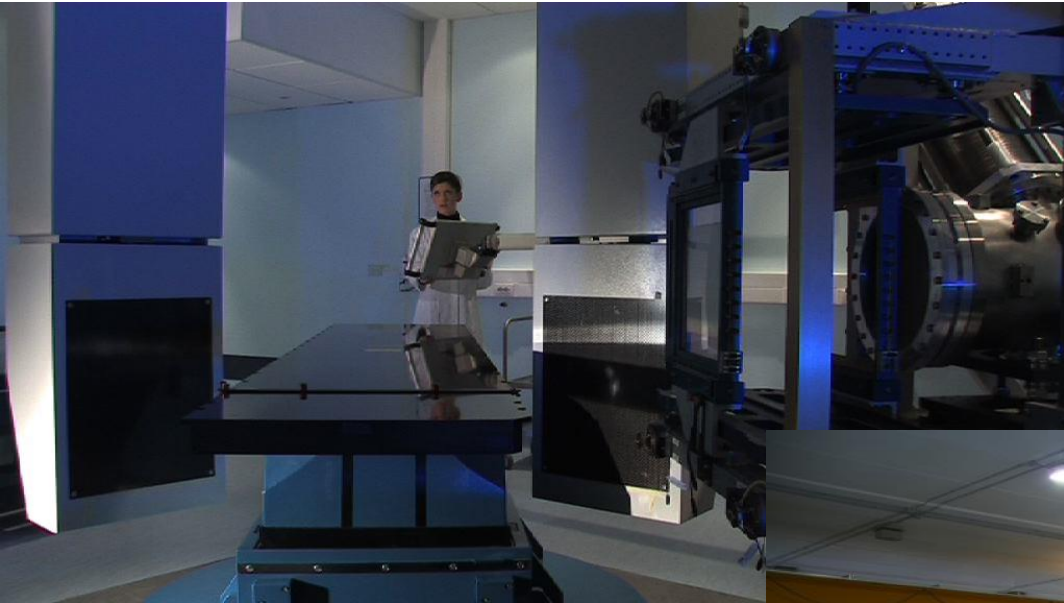
PIMMS at CERN (1996-2000)

- Proton Ion Medical Machine Study



CERN - TERA - MedAustron

CNAO, Pavia (Italy)



TERA

INFN

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MedAustron, Vienna (Austria)



European Centres

