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
- …

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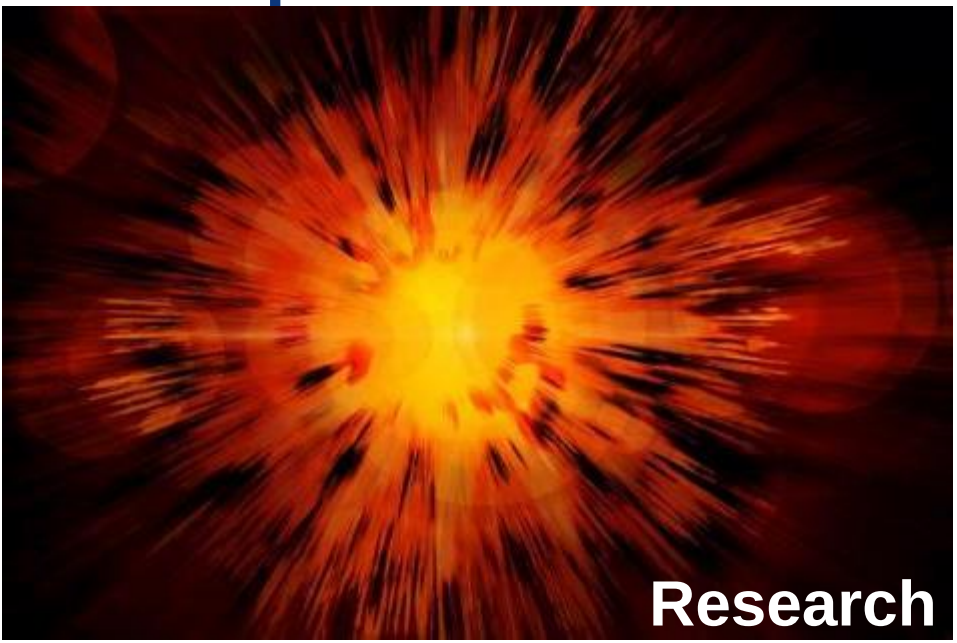
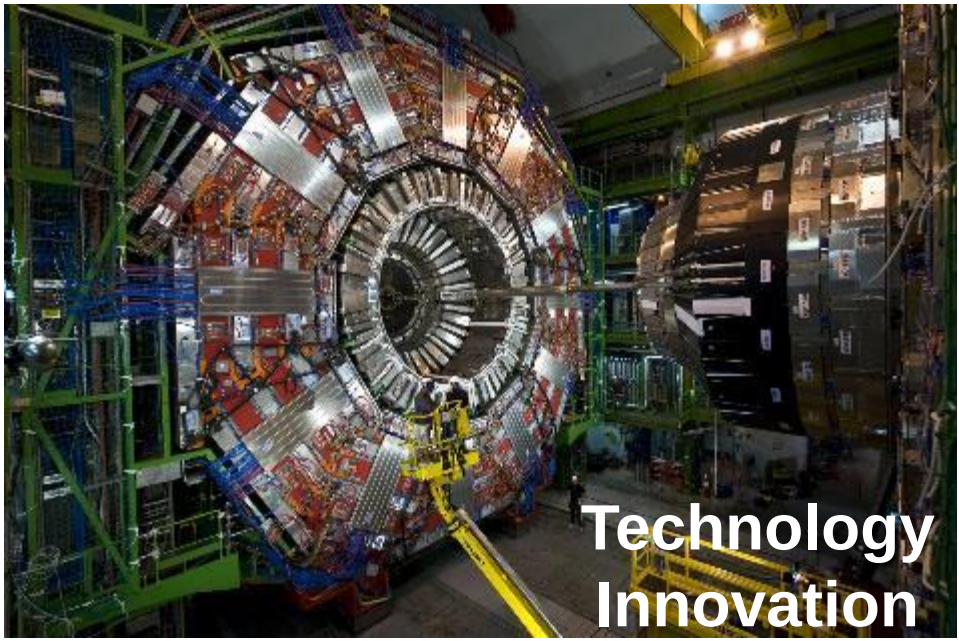
KT: part of CERN mission





KT in everyday life

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The KT mission at CERN

https://pixabay.com/en/hand-keep-globe-earth-continents-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!

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Example of KT

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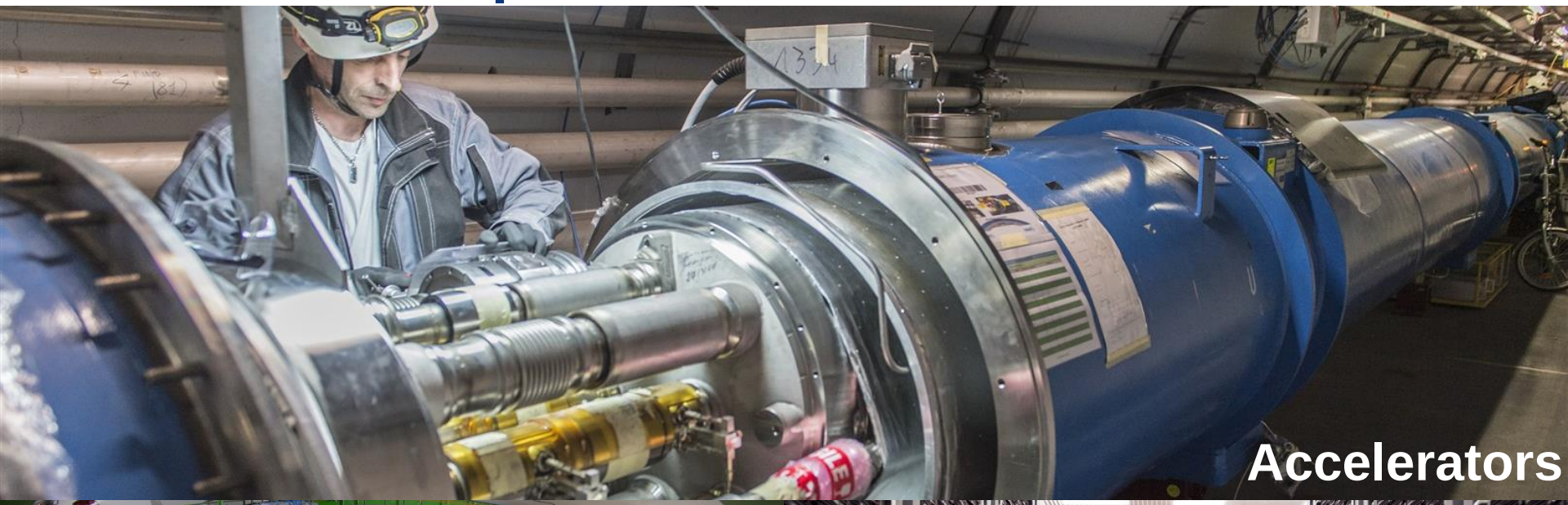
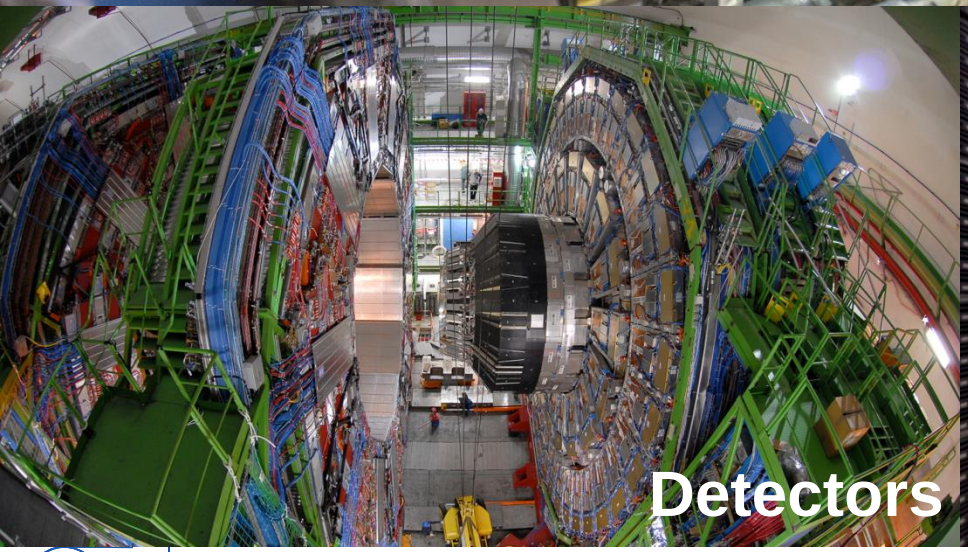
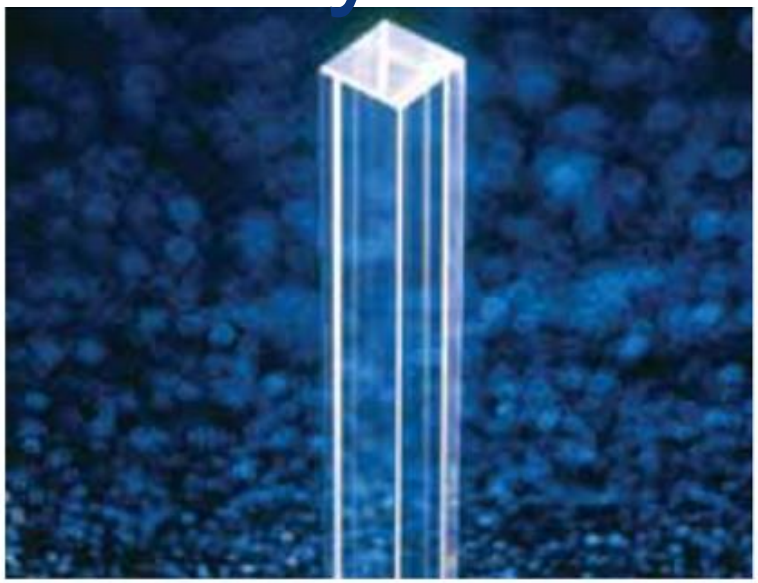
The three pillars





From Physics to…

Medicine



Aerospace

Safety

Global Communities

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How to KT?

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KT implementation ways

Transfer to Existing Companies → Market Pull

Transfer to Existing Companies → Technology Push

Creation of New Companies → Spin-Off Support

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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

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How the BICs work

<u>CERN</u>

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

<u>The BIC</u>

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

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SRB Energy

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TeraBee

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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.

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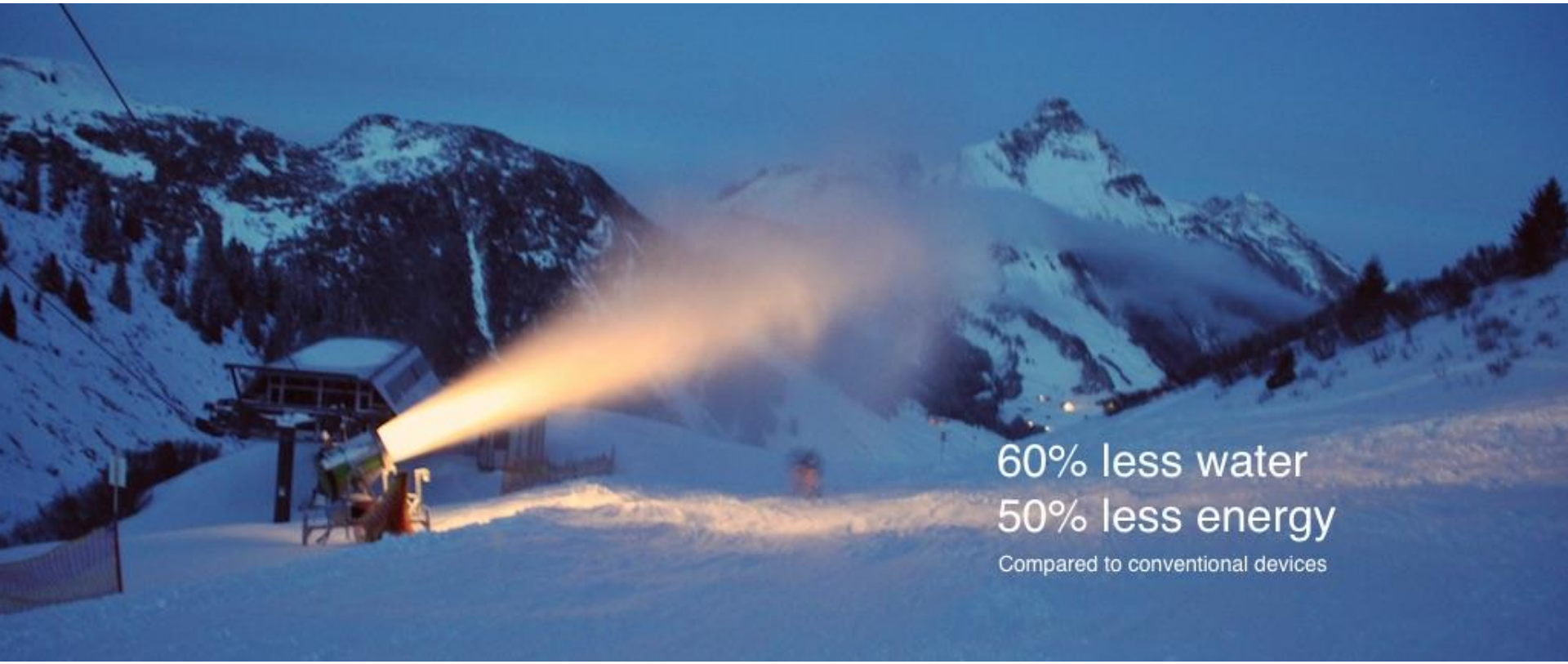
Austria: Neuschnee



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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

echnology

CONTENT

Our Knowledge Transfer Annual Report

Recent Knowledge Transfer Opportunities

Other Interesting News

email: mail-kt@cern.ch

NEWSLETTER

KNOWLEDGE AND TECHNOLOGY TRANSFER NETWORK

#1 | November 2015 | Find out more http://knowledgetransfer.web.cern.ch

Thank you for downloading this newsletter edited by the Knowledge Transfer group at CERN! It is an initial communication tool for sharing information with potential added value to your organization, business and sector. Our intention is to offer an update about our activities linked to Knowledge Transfer to make you aware of potential collaboration opportunities. We will publish this newsletter twice a year with themes that we consider your interest based on the information you provided to from your completed questionnaire. You can always find more information following the links or our CERN KT website: **http://knowledgetransfer.web.cern.ch/**

OUR KNOWLEDGE TRANSFER ANNUAL REPORT

CERN's Knowledge Transfer (KT) activities continue to deliver added value. The dissemination of Intellectual Property (IP) generated at CERN (often in collaboration with other institutes) is steadily increasing.

The KT Fund is established as a very useful tool for reducing the gap from fundamental research to applications. In addition, it contributes to incentivizing CERN researchers to bring their ideas forward.

The idea of a network of Business Incubation Centers (BICs) of CERN Technologies in the Member States comes closer to reality in 2014 and 2015.

The establishment of BICs in UK, The Netherlands, Norway, Greece, Austria, France, Finland and Spain contributes to bring CERN's knowledge to the market by assisting small start-up companies from CERN Member States.

Knowledge Transfer 2014

From physics to medicine

Download the full KT report
http://knowledgetransfer.web.cern.ch/sites/knowledgetransfer.web.cern.ch/files/Knowledge-Transfer-2014.pdf
Information on CERN BIC network
http://knowledgetransfer.web.cern.ch/bic-network

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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

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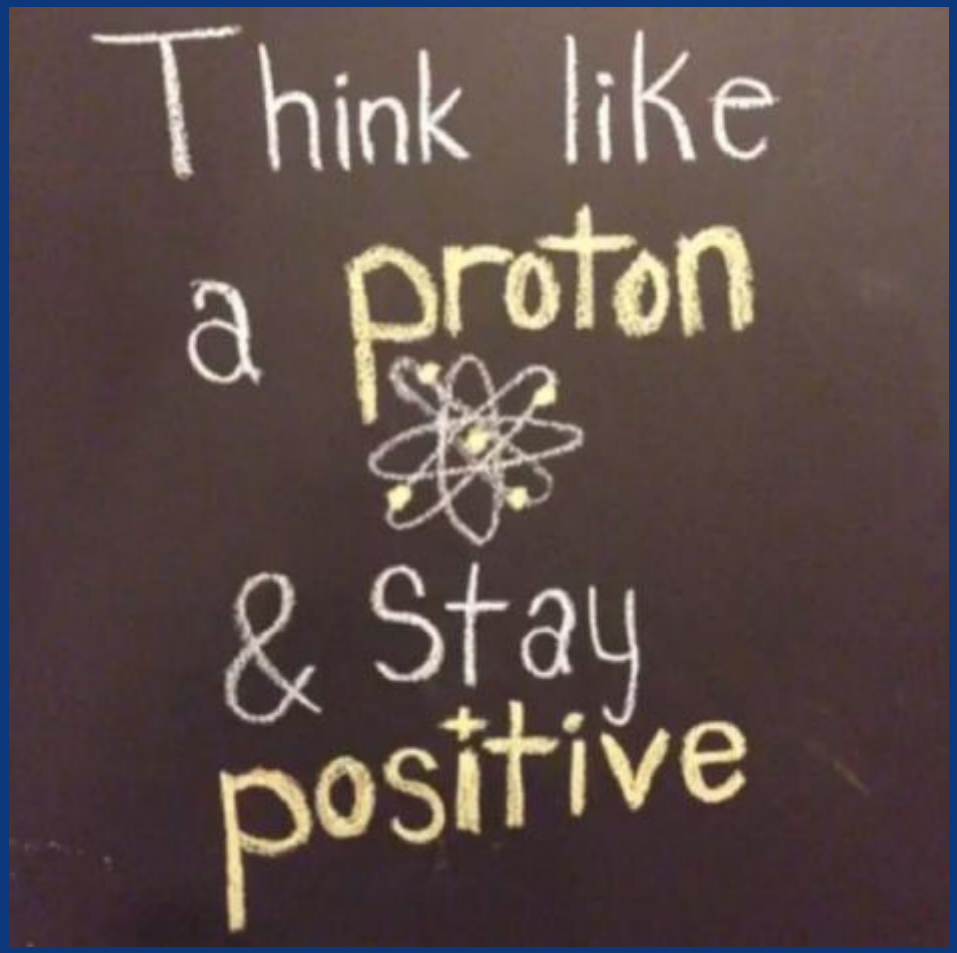
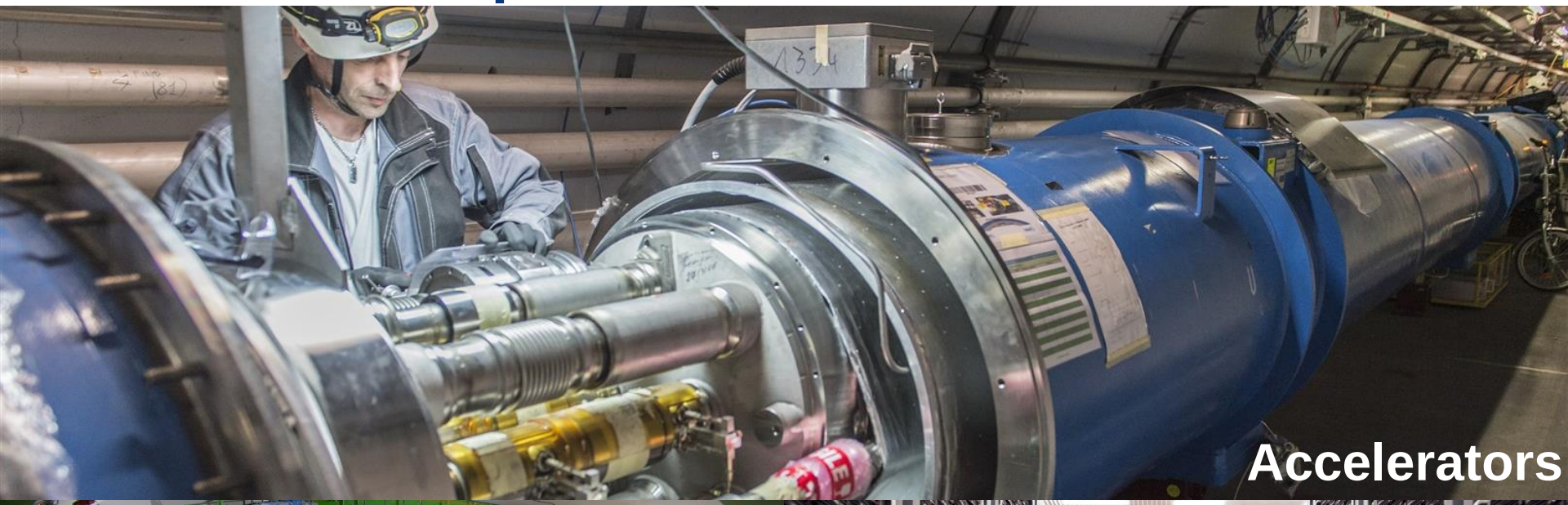
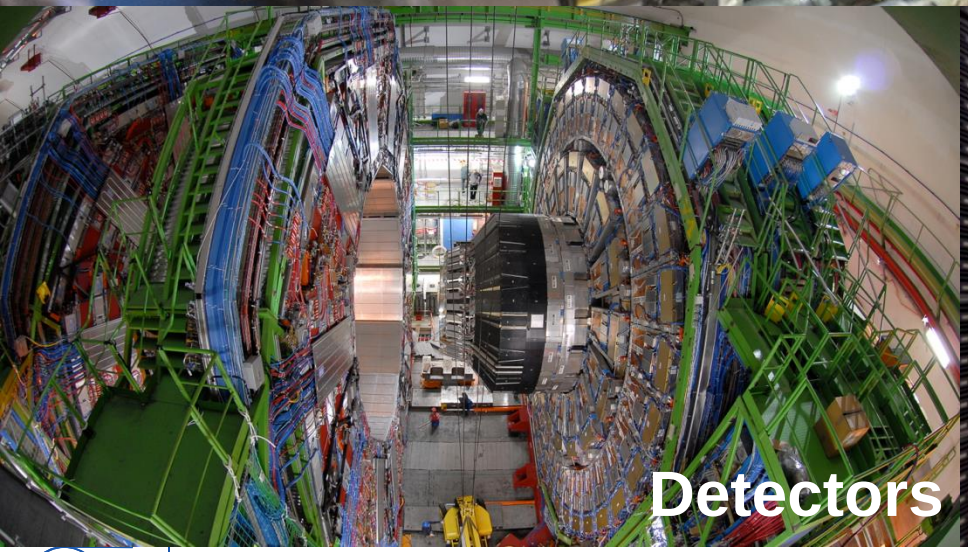

Think like
a proton
& Stay
positive

kt.cern

The three pillars





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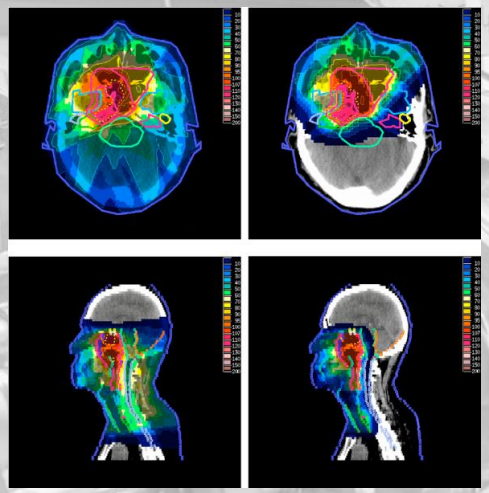

Radiotherapy

Medical Imaging

Medical data management and analysis

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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

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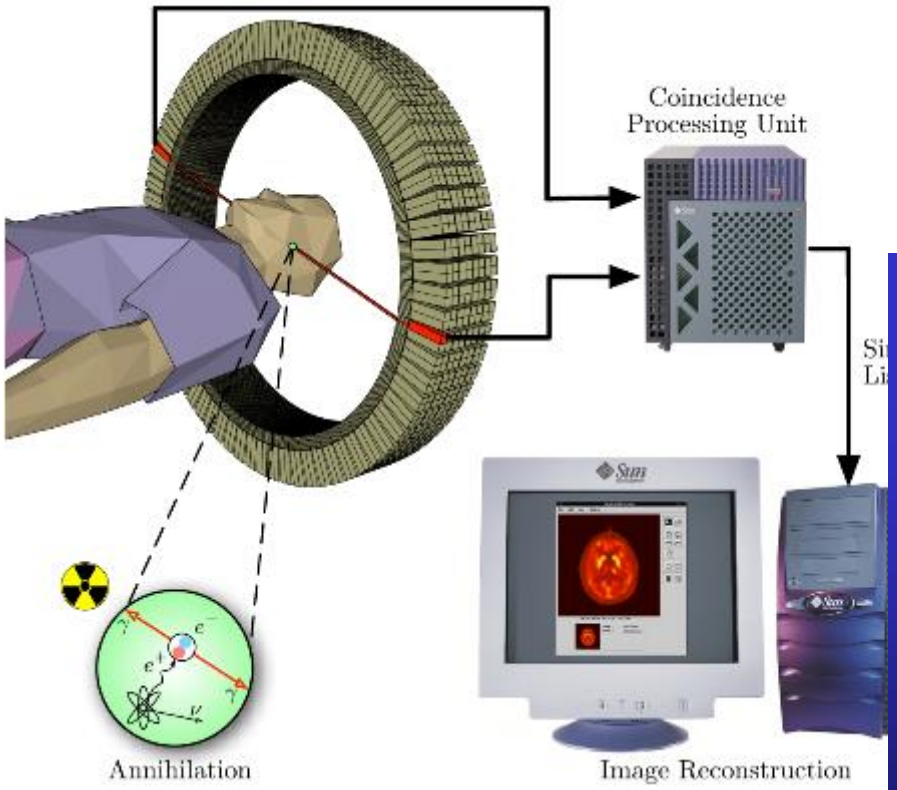
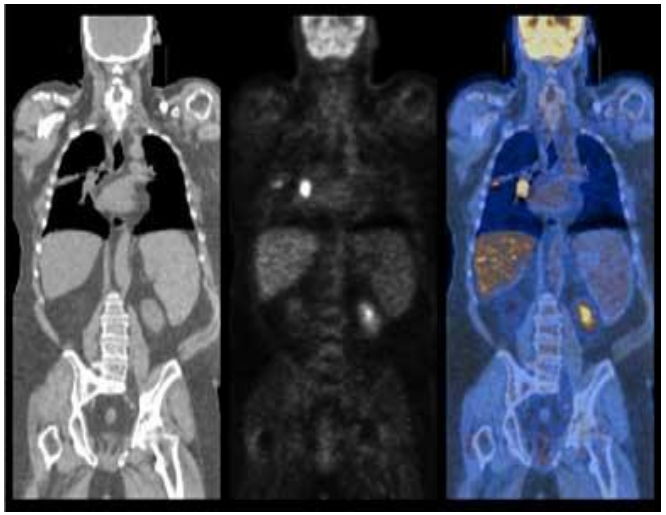
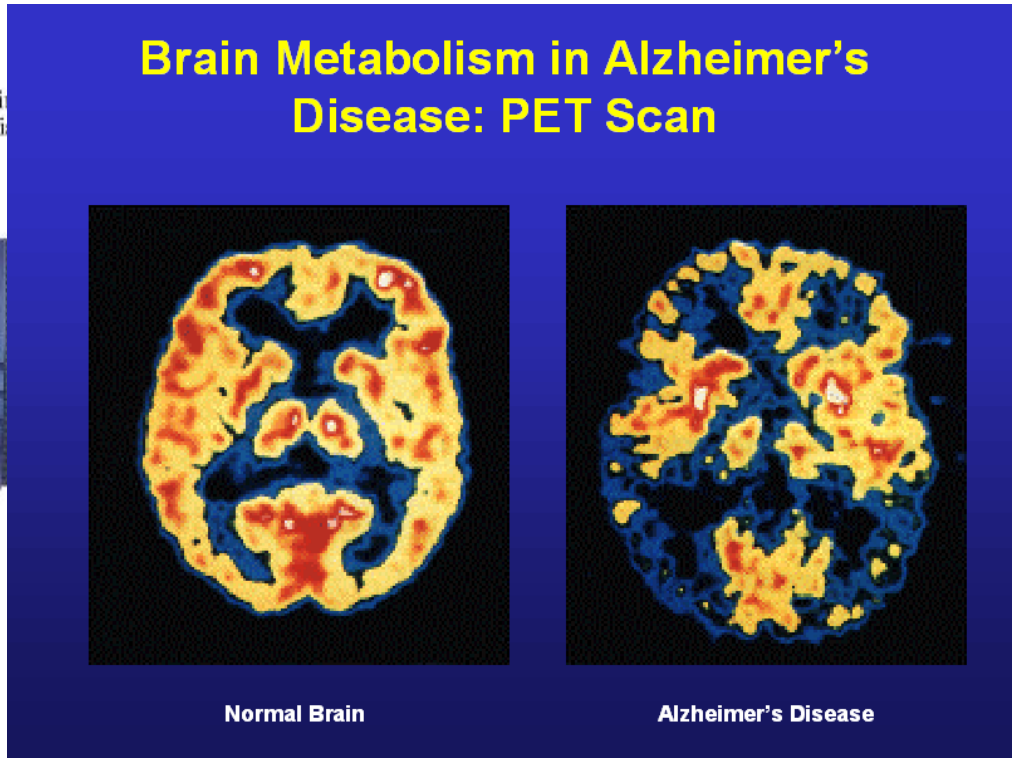
More and more details

Images courtesy of Dr. F. Fellner

PET Scan







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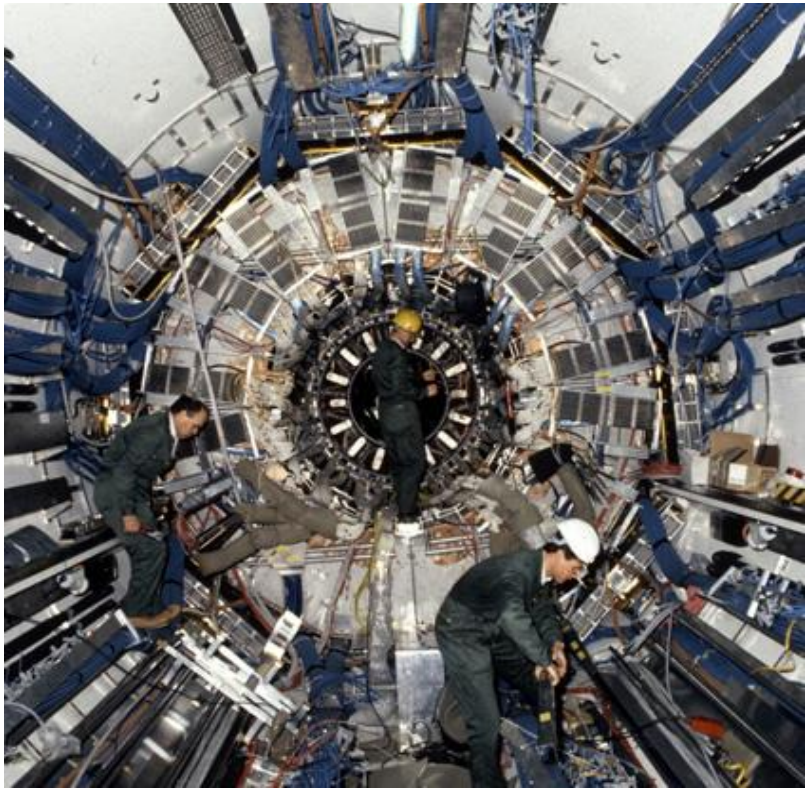
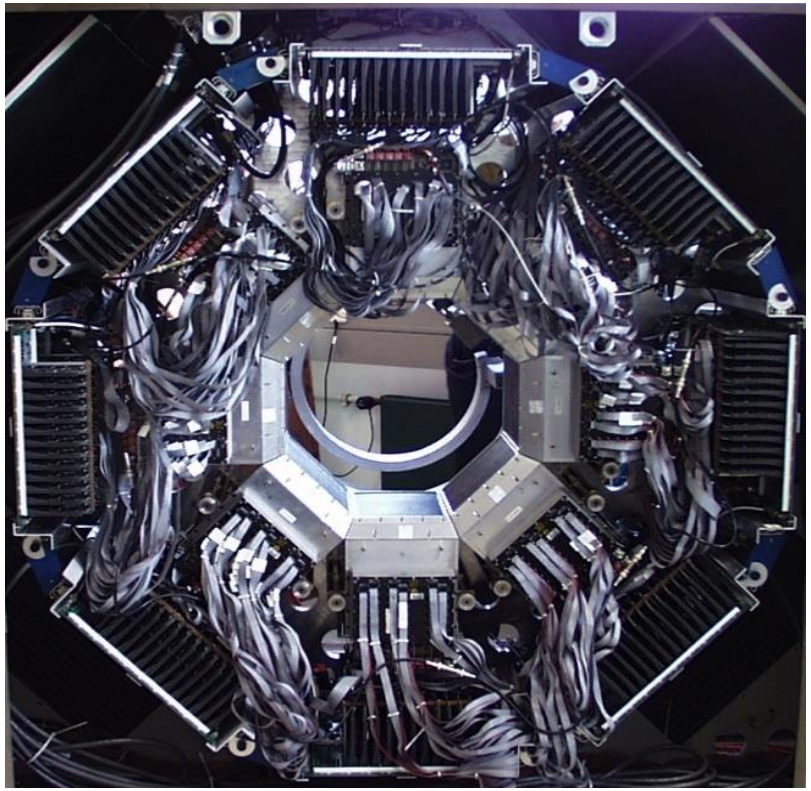
Medical imaging and particle physics: the same challenge?





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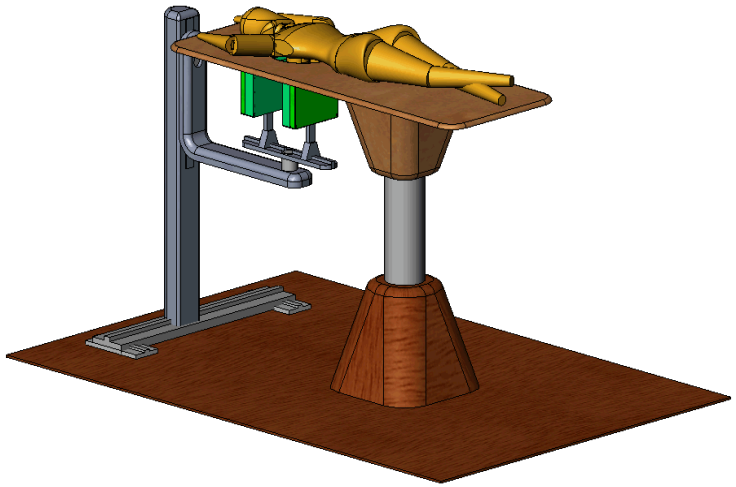
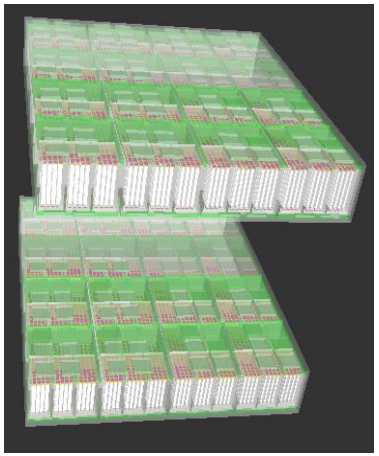
ClearPEM





- PET detector dedicated to breast cancer screening
  - extremely sensitive to small tumour masses
- Spatial resolution1-2 mm
- High counting sensitivity
- Short PET exam
- Coupled to ultrasound

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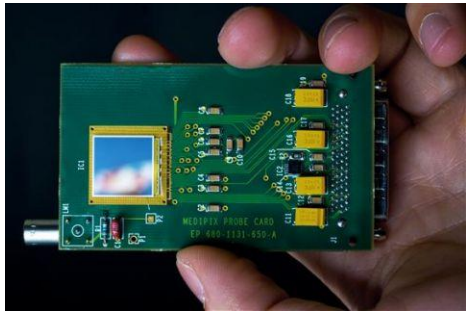
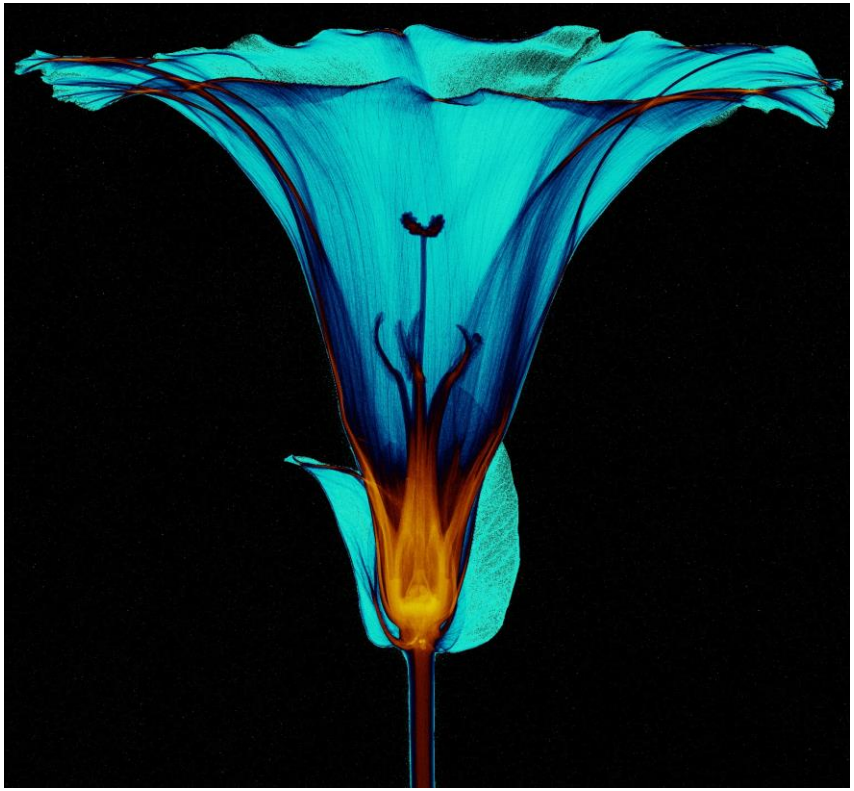
Medipix



- High Energy Physics original development:
  - particle track detectors
- Main properties:
  - fast fully digital device similar to the electronic chip in a digital camera but sensitive to X-rays instead of visible light
  - good conversion efficiency of low energy X-rays
  - it can create the first true colour images with X-rays



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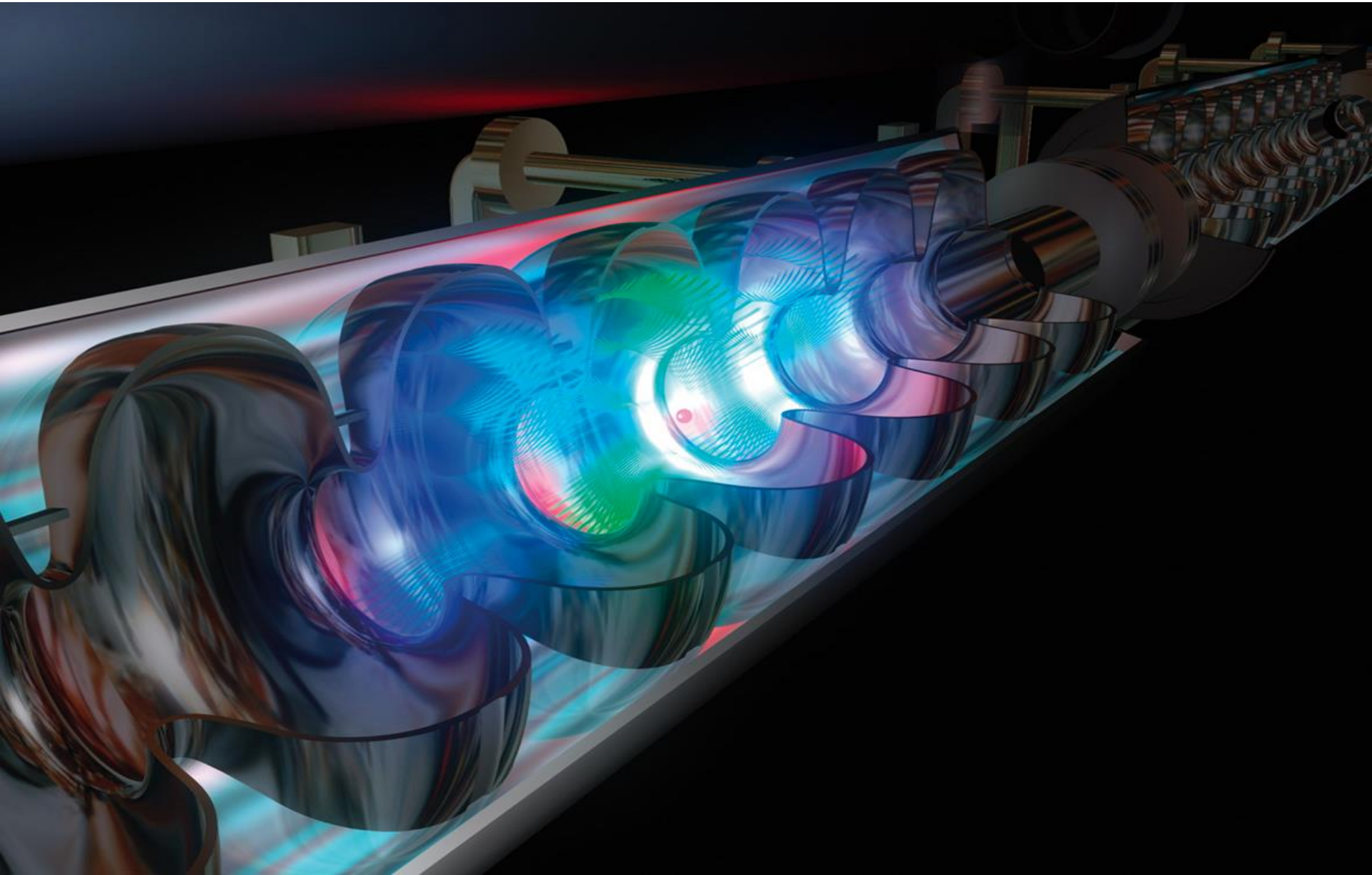
Accelerators for cancer treatment



Accelerators for cancer treatment

State of the art treatments

Innovative practice

Hadrontherapy

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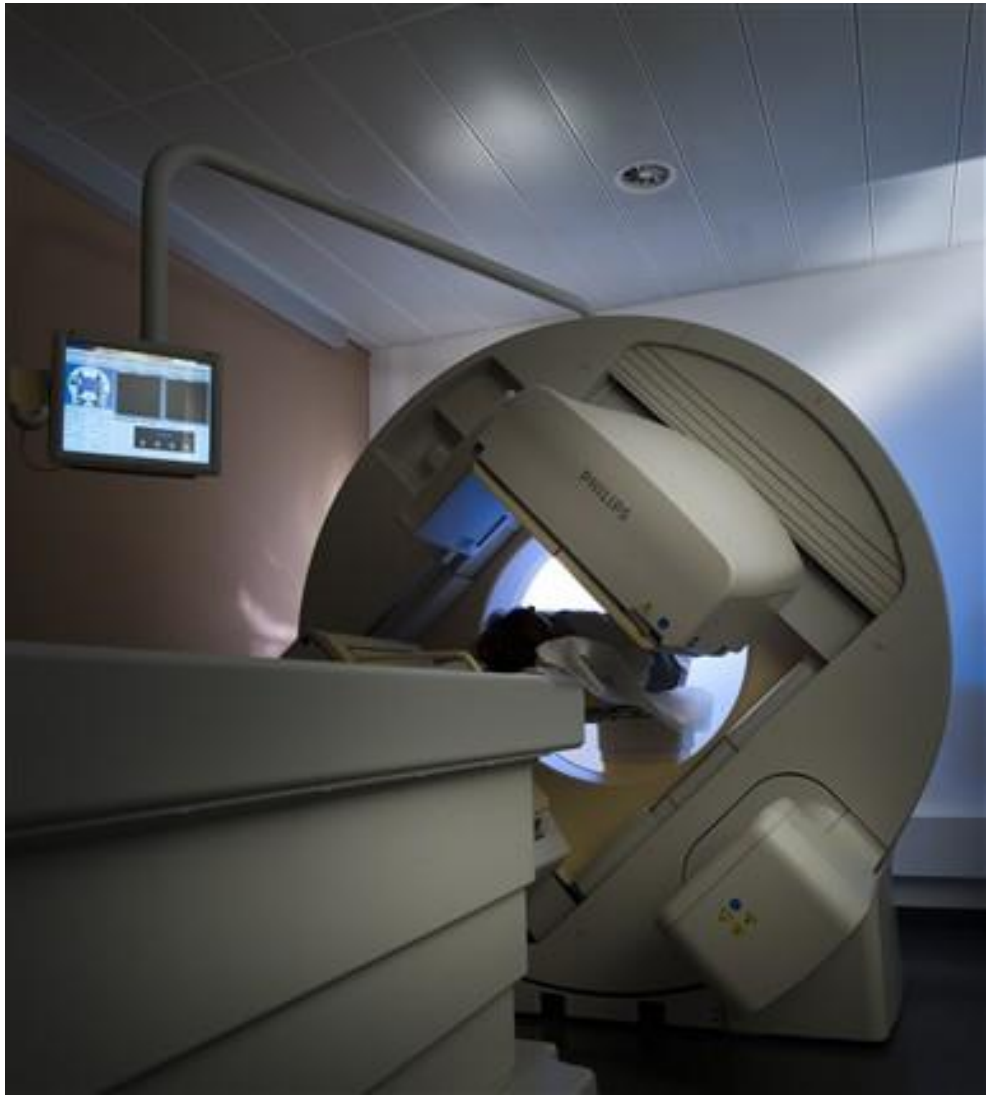
Radiotherapy

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



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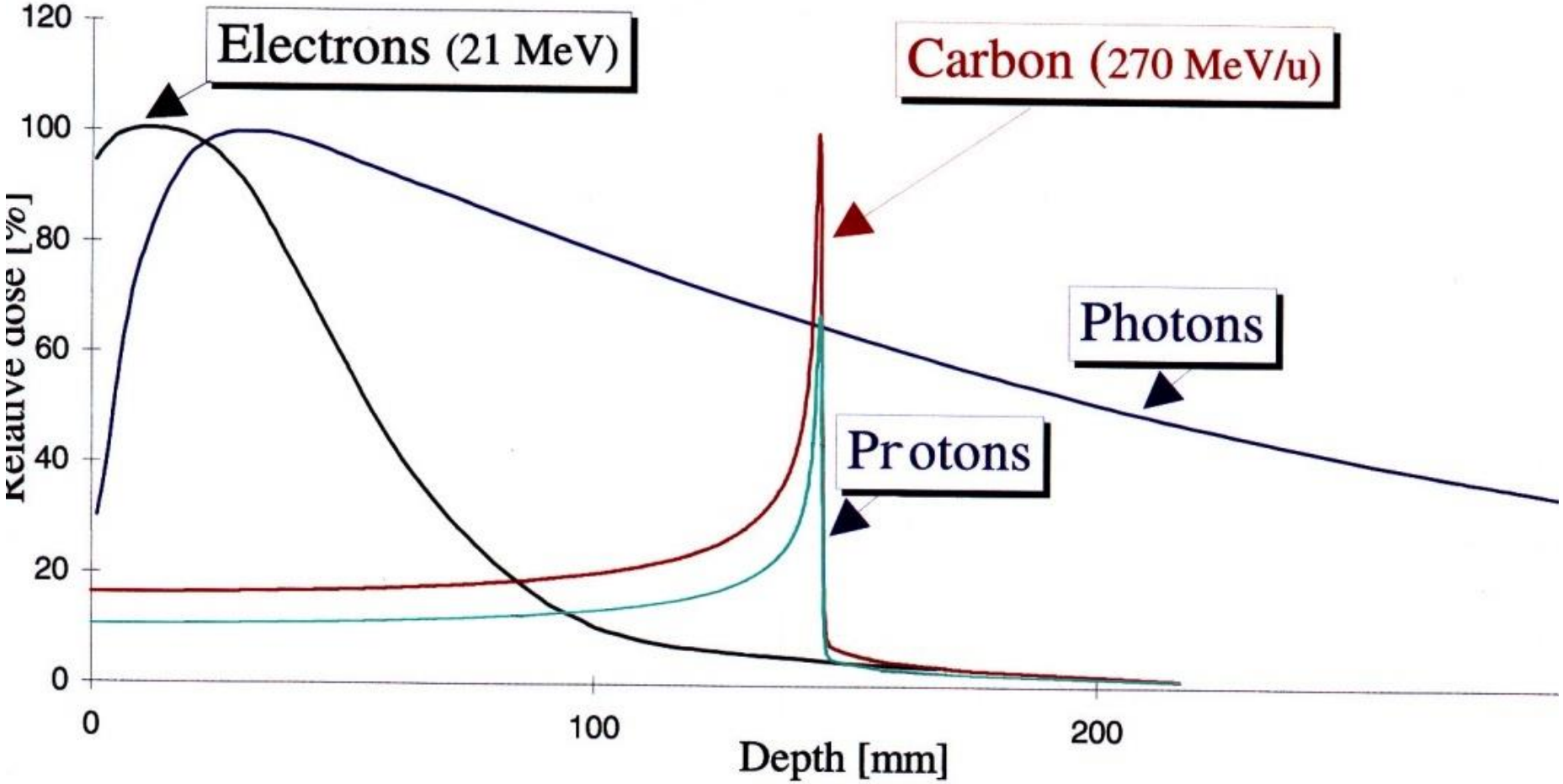
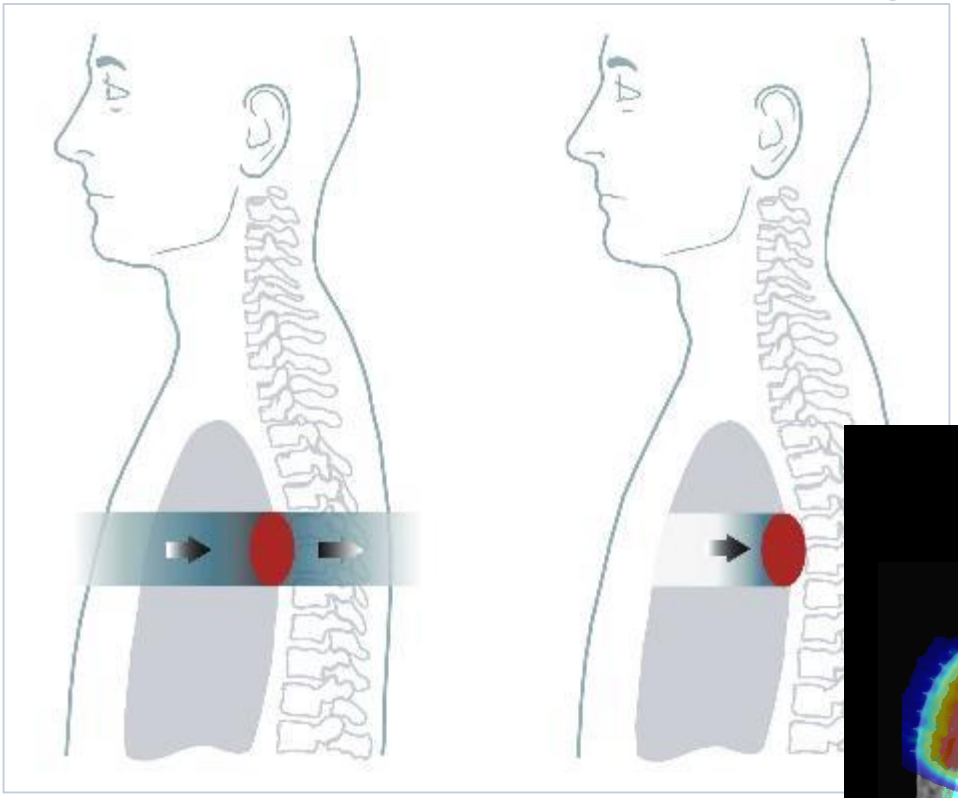
Hadrontherapy

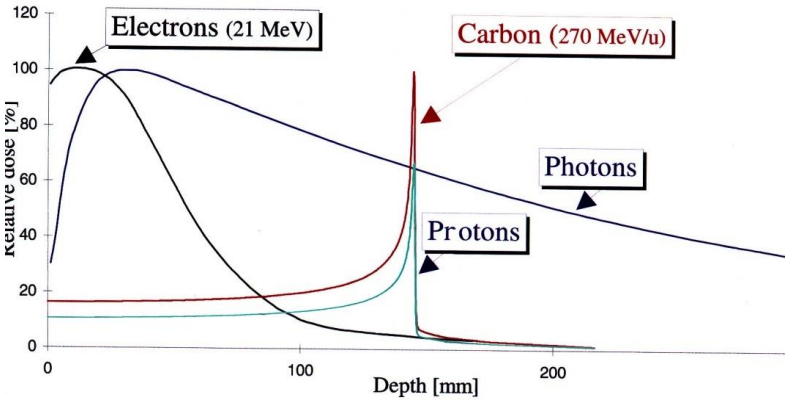


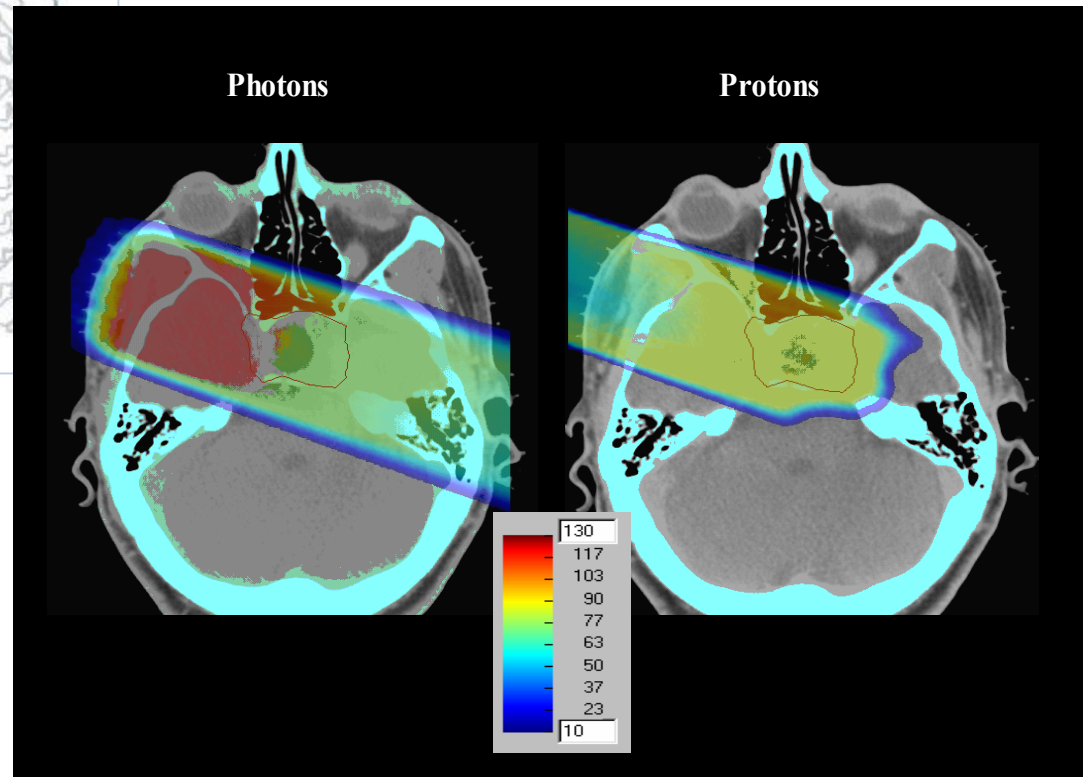
Protons vs X-rays



X-rays Protons

Courtesy of MedAustron





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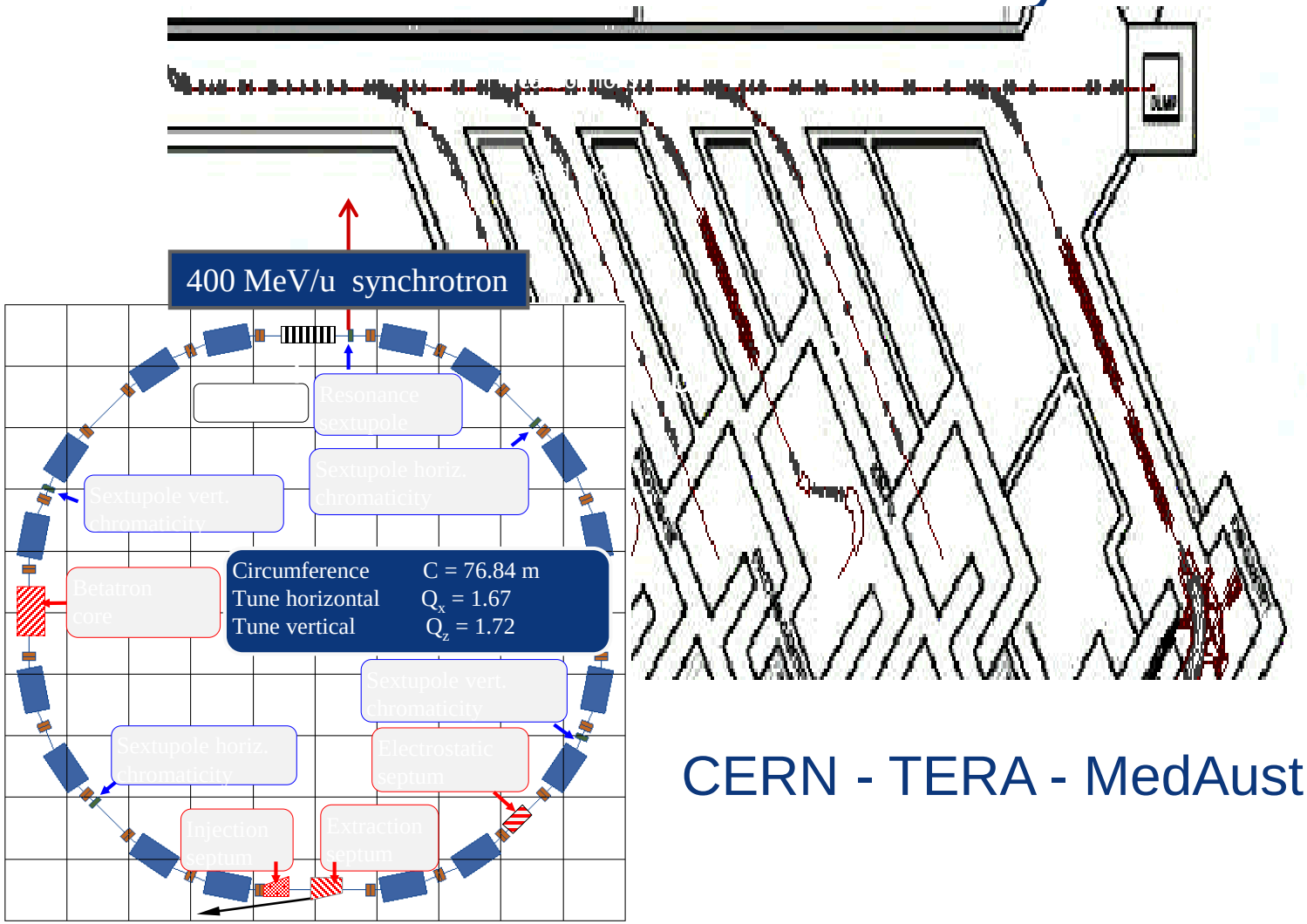
PIMMS at CERN (1996-2000)

- Proton Ion Medical Machine Study



CERN - TERA - MedAustron

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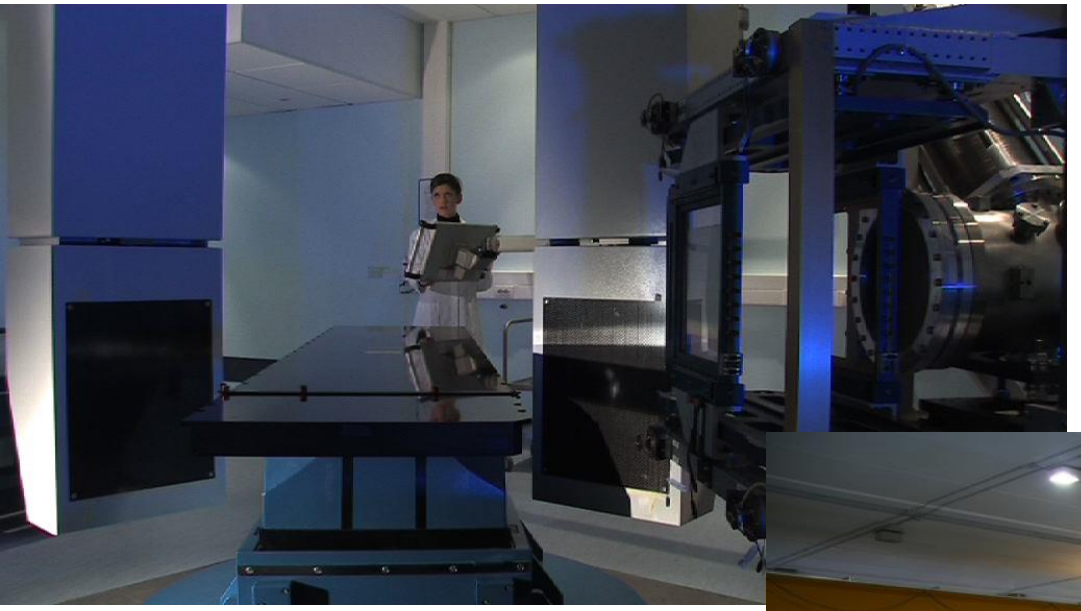
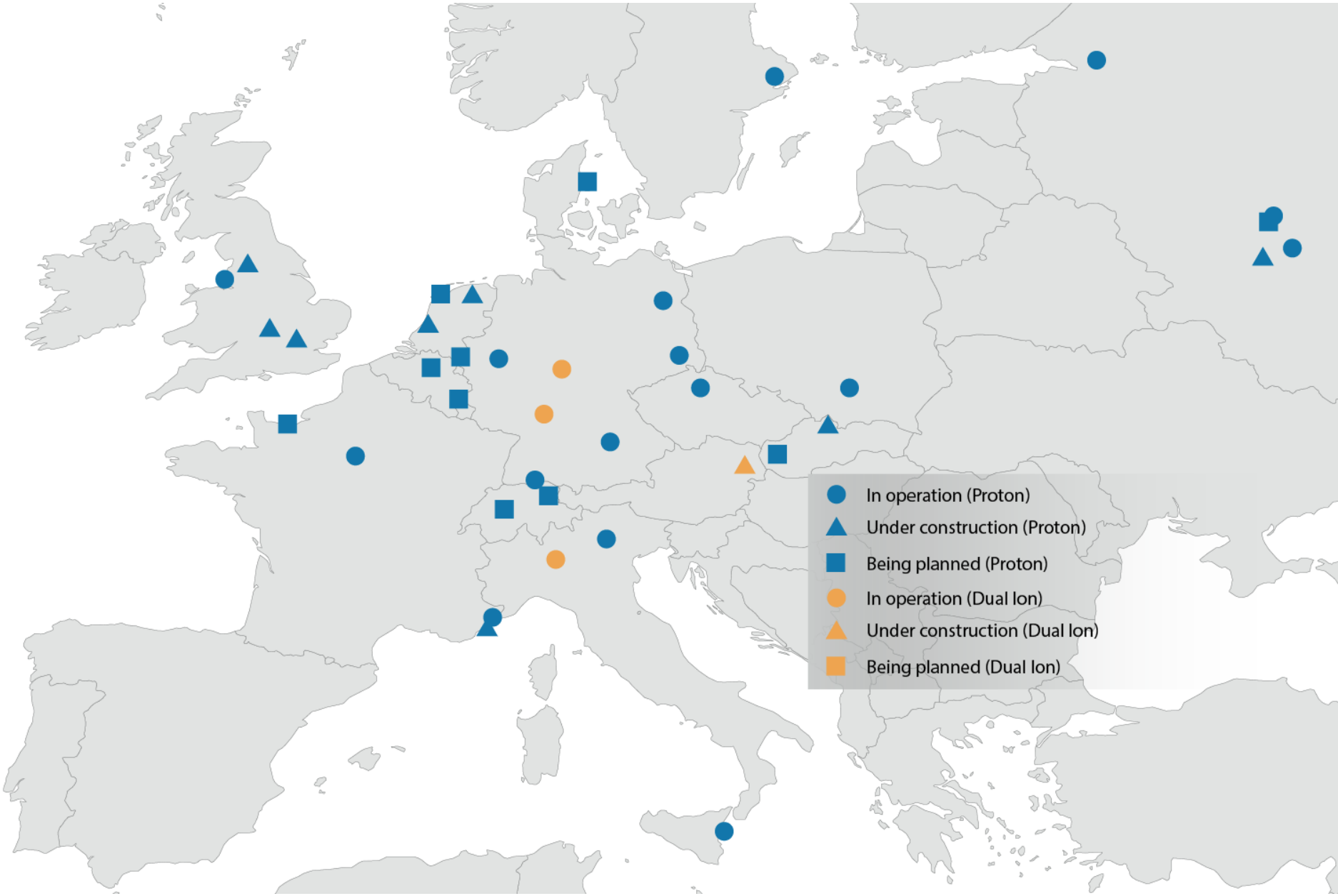
CNAO, Pavia (Italy)



MedAustron, Vienna (Austria)

European Centres



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