### 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)



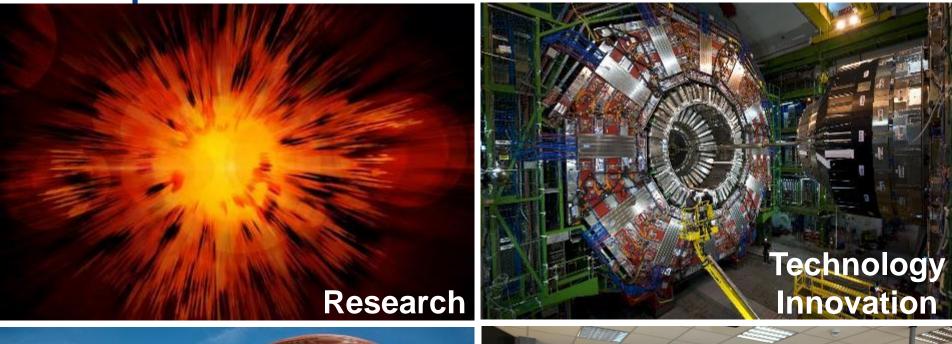


- Medical Applications
- Accelerators for hadrontherapy
- Outreach





# KT: part of CERN mission







# KT in everyday life



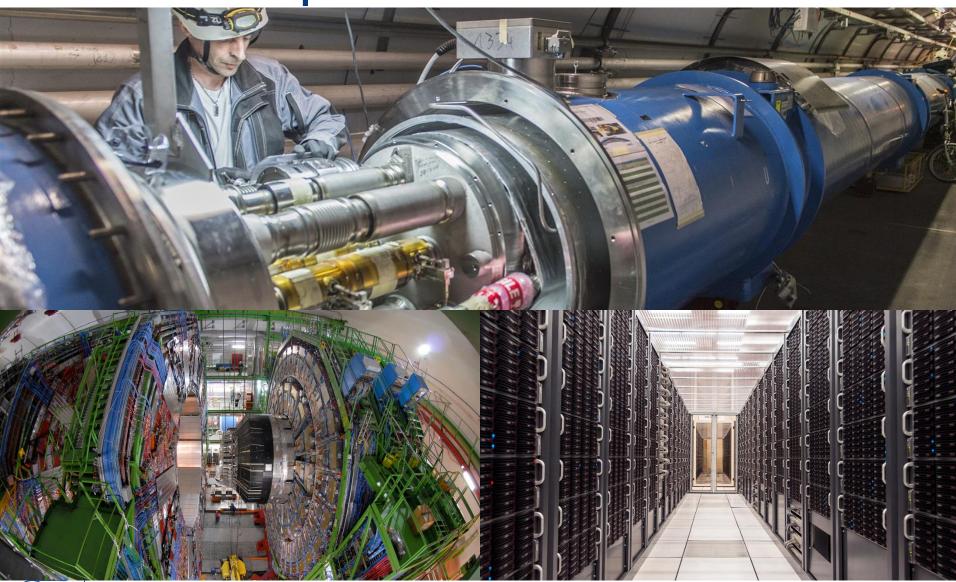


## Example of KT



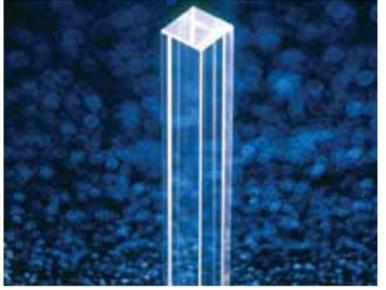


# The three pillars





From Physics to...

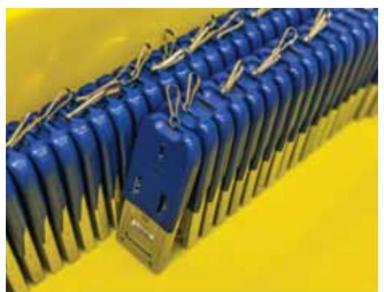




Aerospace

Safety

Medicine





CERN

Knowledge Transfer | Accelerating Innovation

Giovanni Porcellana - giovanni.porcellana@cern.ch

Global Communities

#### The KT mission at CERN



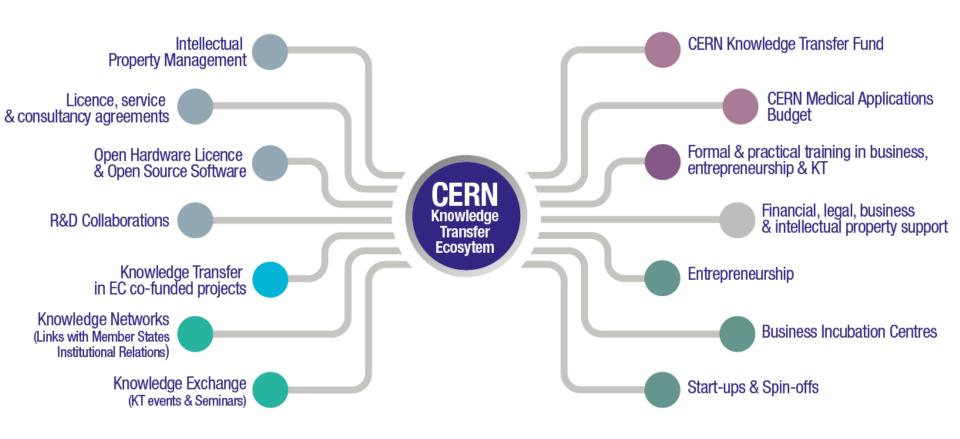
Maximize the return to Society of our technologies and knowledge, especially in the Member States

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

Key words:
Dissemination and
Impact!

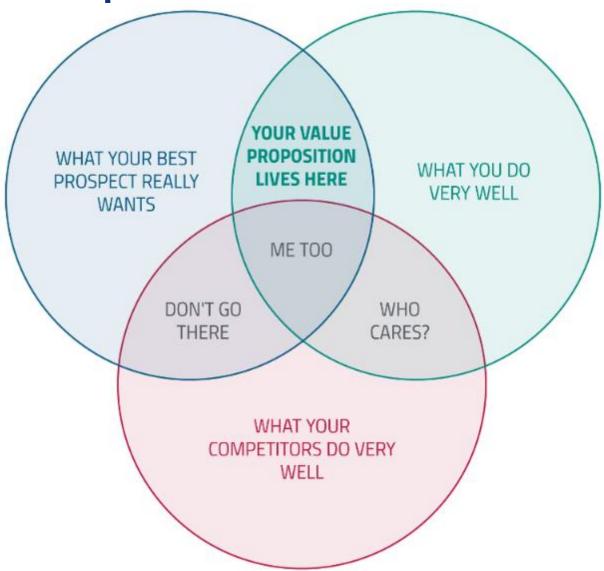


# Accelerating Innovation





Value Proposition





# KT implementation ways

Transfer to Existing Companies

Technology Push

Creation of New Companies

Spin-Off Support





# 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**

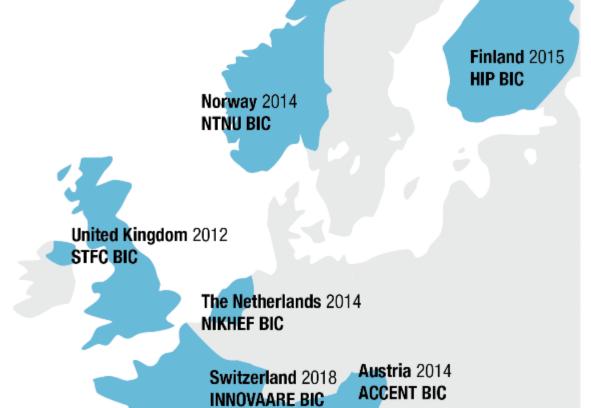
- Technical visits to the Lab
- Contacts with the BICs
- Licences at favourable conditions

#### The BIC

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







France 2015 INNOGEX BIC

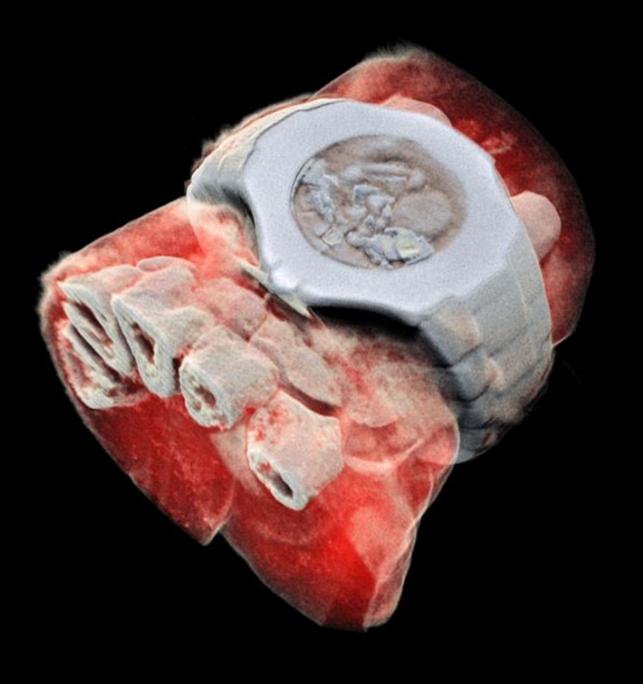
Spain 2015 INEUSTAR BIC Italy 2016 R2I BIC Greece 2014
TECHNOPOLIS BIC



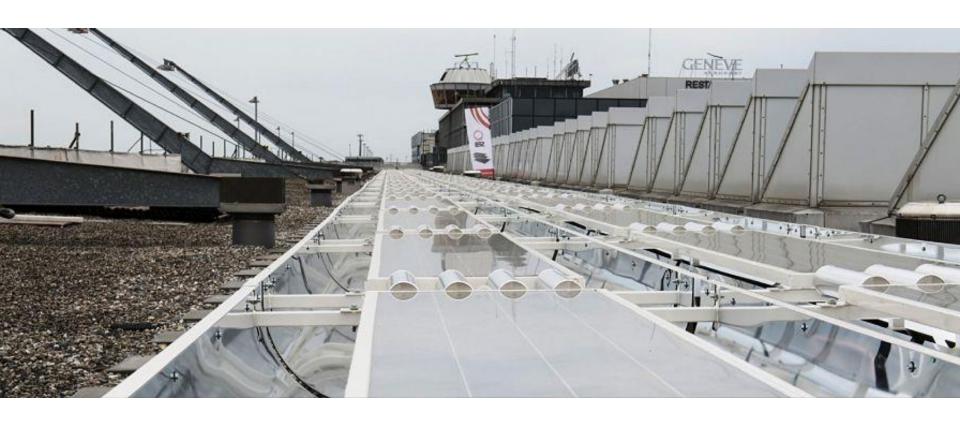
# MARS Bioimaging







# 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





#### SME Network

KT newsletter twice per year

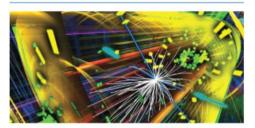
Creation of an internal database of SMEs, but also bigger companies, research centers, universities...

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



#### NEWSLETTER KNOWLEDGE AND TECHNOLOGY TRANSFER NETWORK

#1 | November 2015 | Find out more http://knowledgetragster web cernich



CERNI 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. The idea of a network of Business Incubation continue to deliver added value. The Centers (BICs) of CERN Technologies in the dissemination of Intellectual Property (IP) generated at CERN (often in collaboration with and 2015. 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

Member States comes closer to reality in 2014

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







Download the full KT report http://knowledgetransfer.web.cern.ch/sites/knowledgetransfer.web.cern.ch/files/Knowledge-Tiansfer-2014.pd ormation on CERN BIC network



# 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





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















Hôpitaux Universitaires Genève









# CERN Entrepreneurship Student Programme (CESP)



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



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









### kt.cern



#### Contacts

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Aerospace Applications: Enrico.Chesta@cern.ch

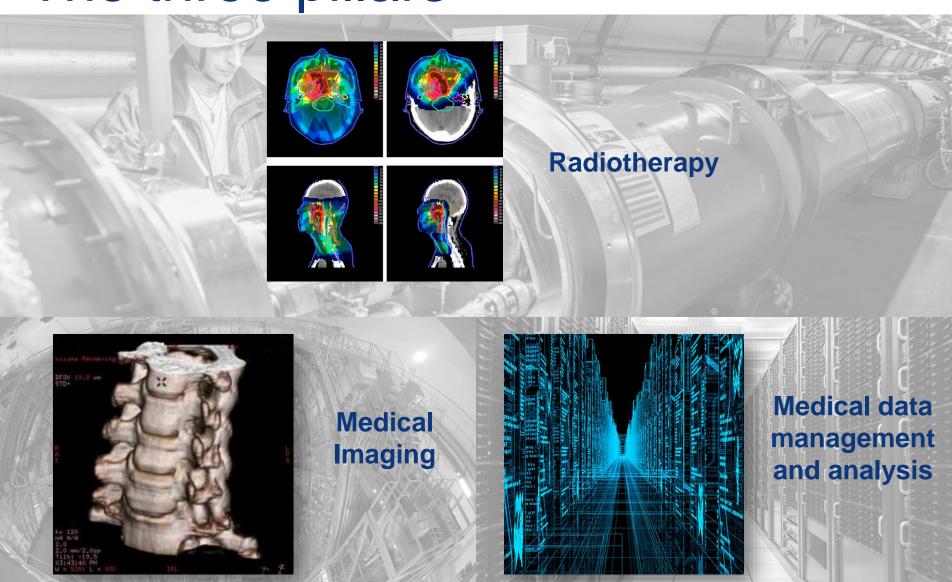


# The three pillars





# The three pillars





# Medical Imaging



# X-rays



Wilhelm Röntgen (1845–1923)

1901: Nobel prize

8 November1895:X-rays discovery

22 December1895:first radiography

Courtesy of Roentgen museum

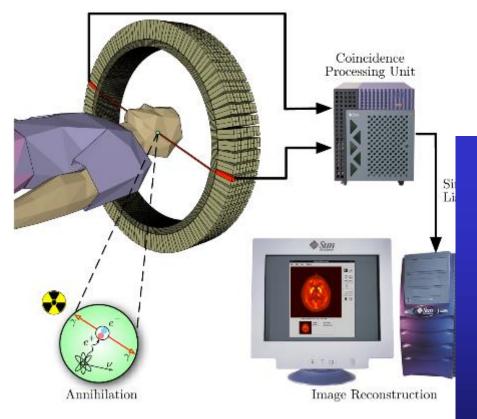


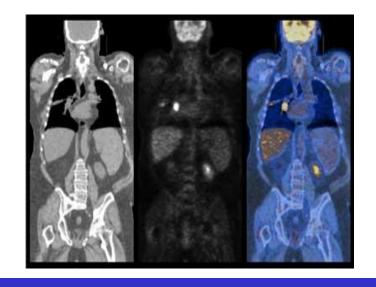


## More and more details

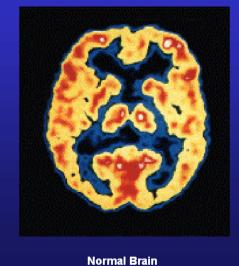


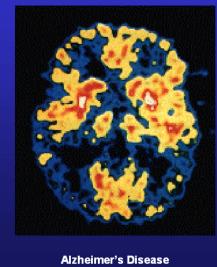
## PET Scan





Brain Metabolism in Alzheimer's **Disease: PET Scan** 

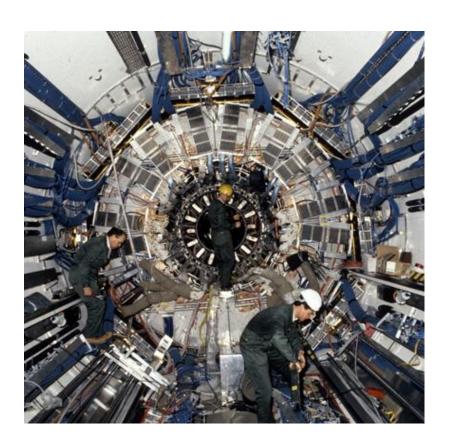


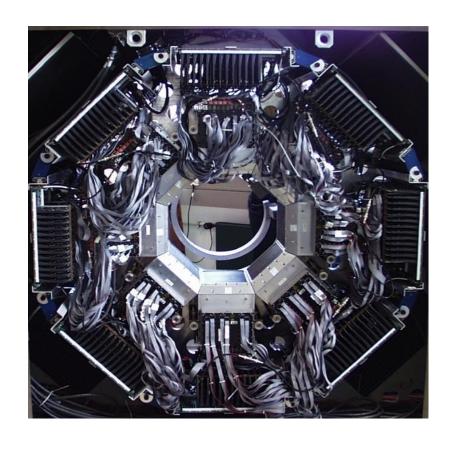






# Medical imaging and particle physics: the same challenge?

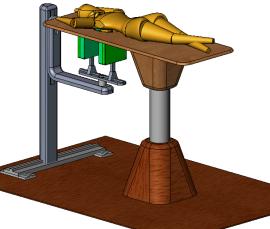






### ClearPEM





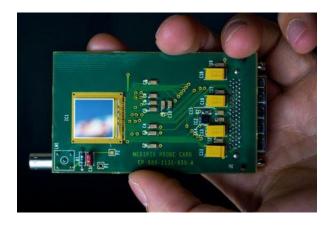


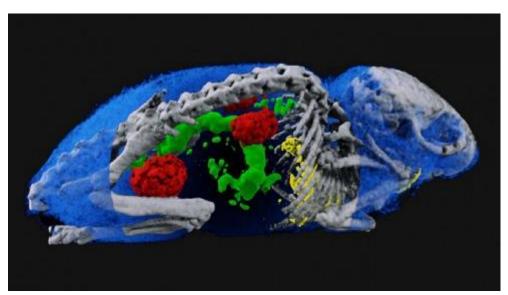




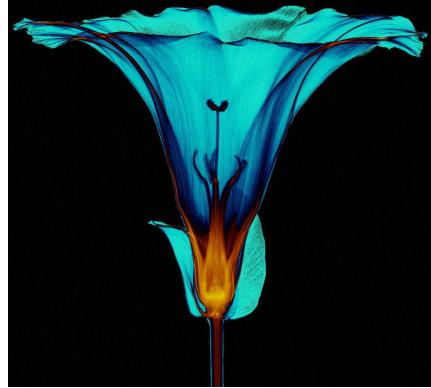


## Medipix





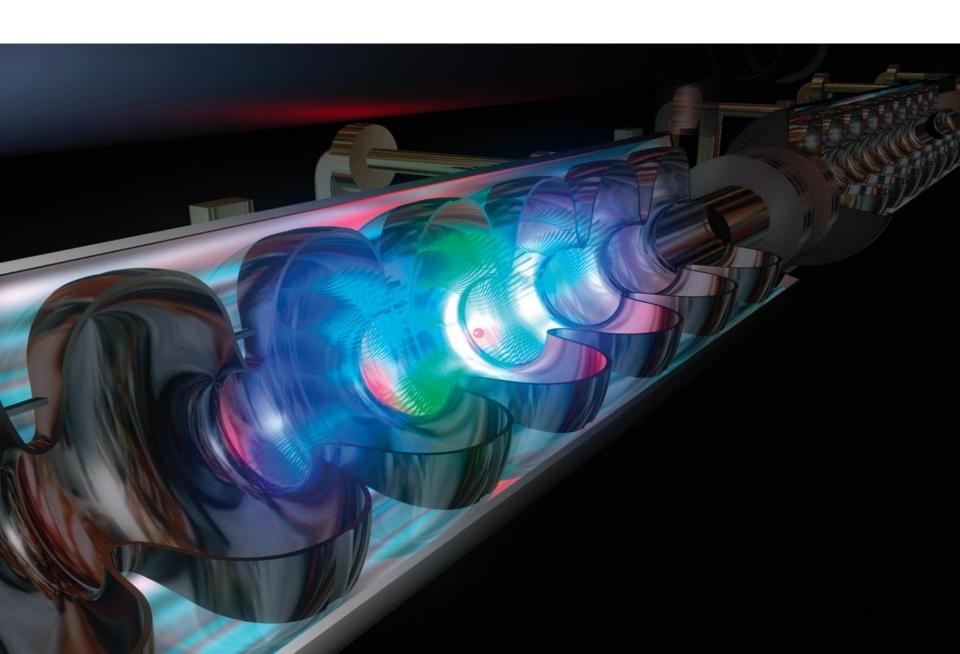




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### Accelerators for medicine



### 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** 





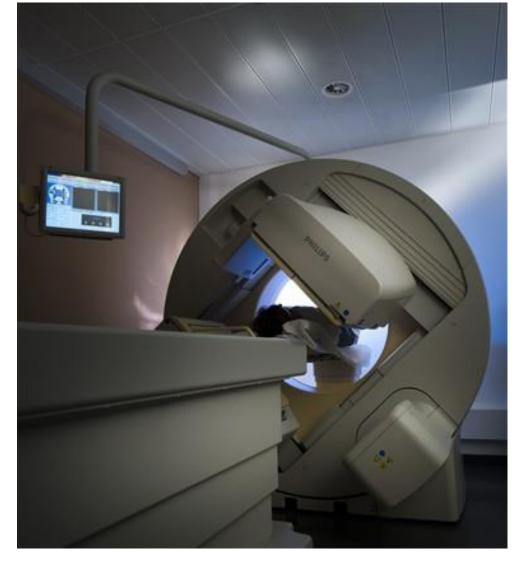
### Radiotherapy

#### Cheap:

 the least expensive cancer treatment method (around 5% of total cost)

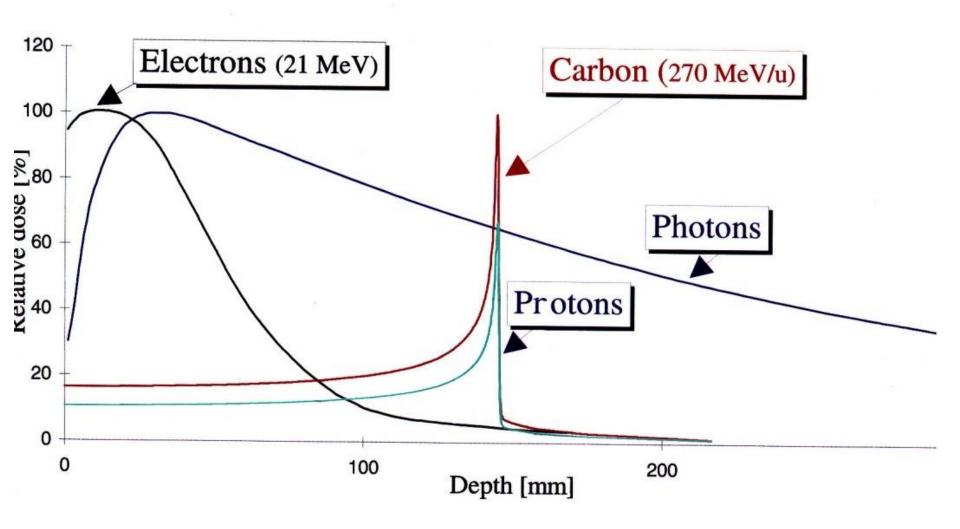
#### Cure:

- good cure rate
- Conservative:
  - generally non-invasive, fewer side effects



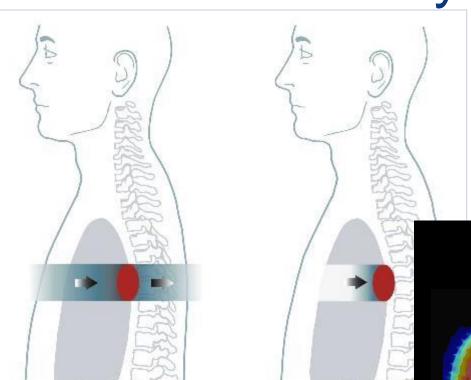


### Hadrontherapy





Protons vs X-rays



Electrons (21 MeV)

Photons

Protons

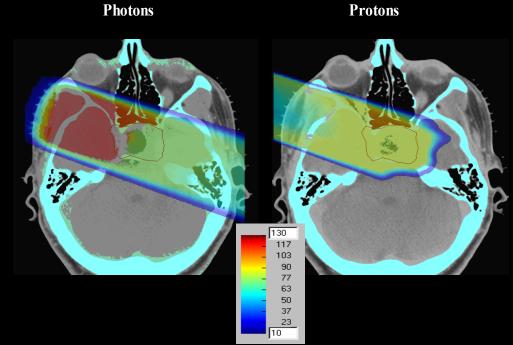
Protons

Depth [mm]

X-rays

Courtesy of MedAustron

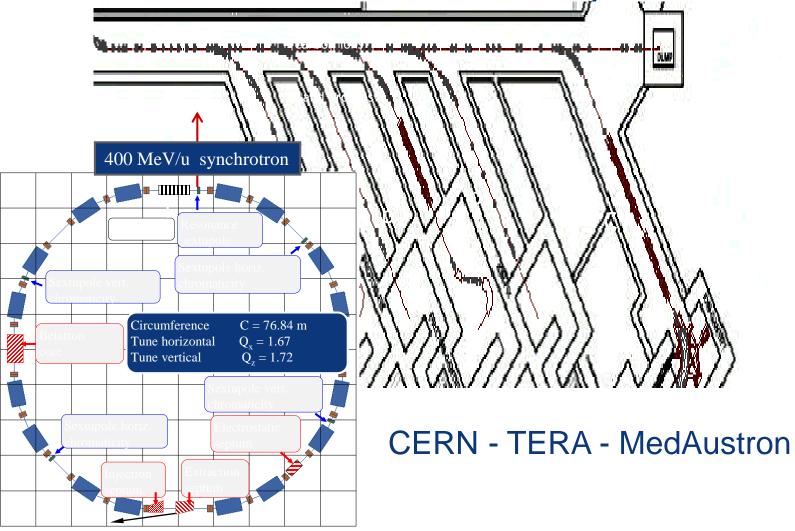
**Protons** 





### PIMMS at CERN (1996-2000)

Proton Ion Medical Machine Study





# CNAO, Pavia (Italy)





### MedAustron, Vienna (Austria)



### **European Centres**

