



From MEDICIS to MEDICIS-Promed

MEDICIS-Promed Summer School
Pavia, Italy
4-9 June 2017



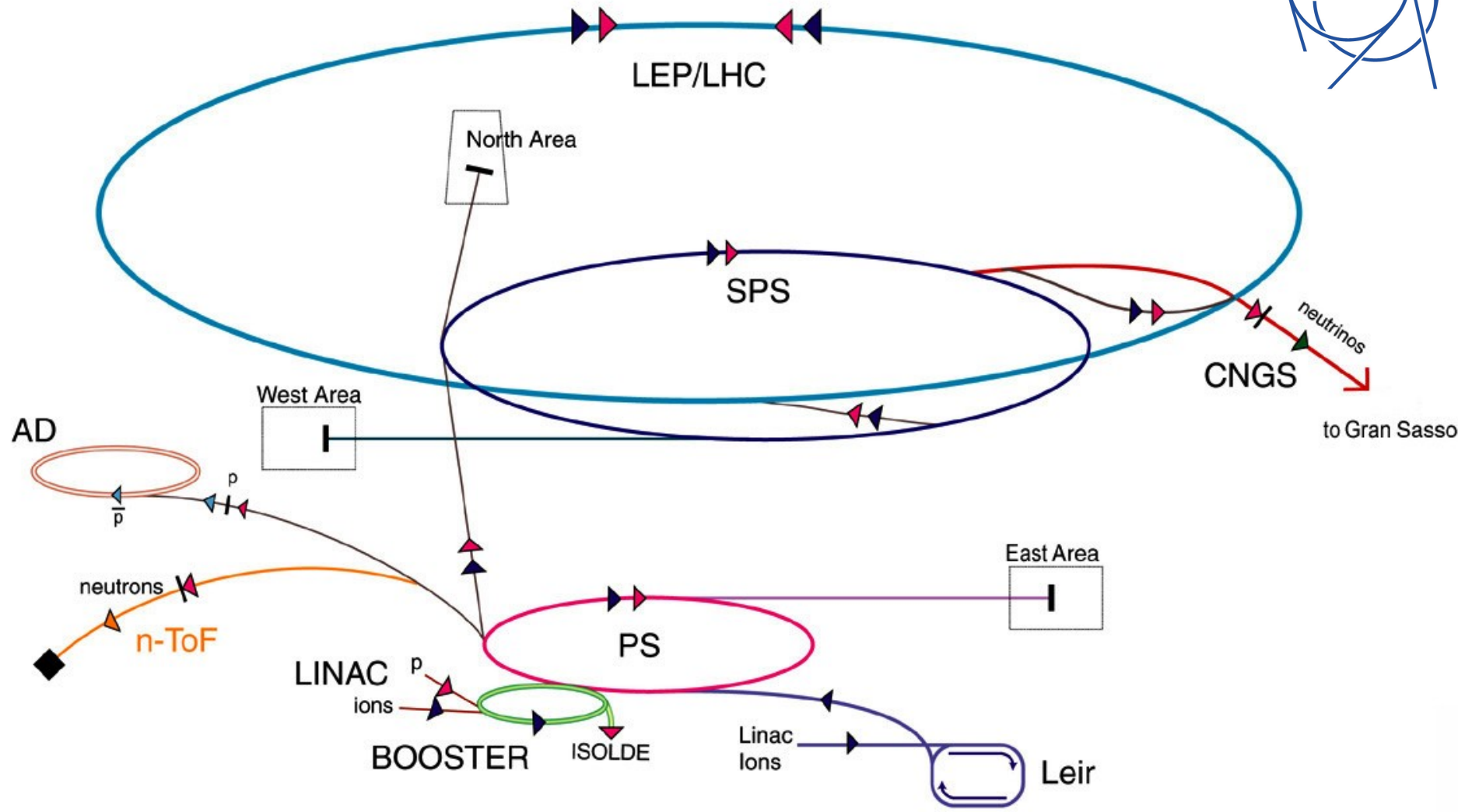
CERN MEDICIS

MEDical Isotopes Collected from ISolde

CERN ISOLDE

Medical isotopes

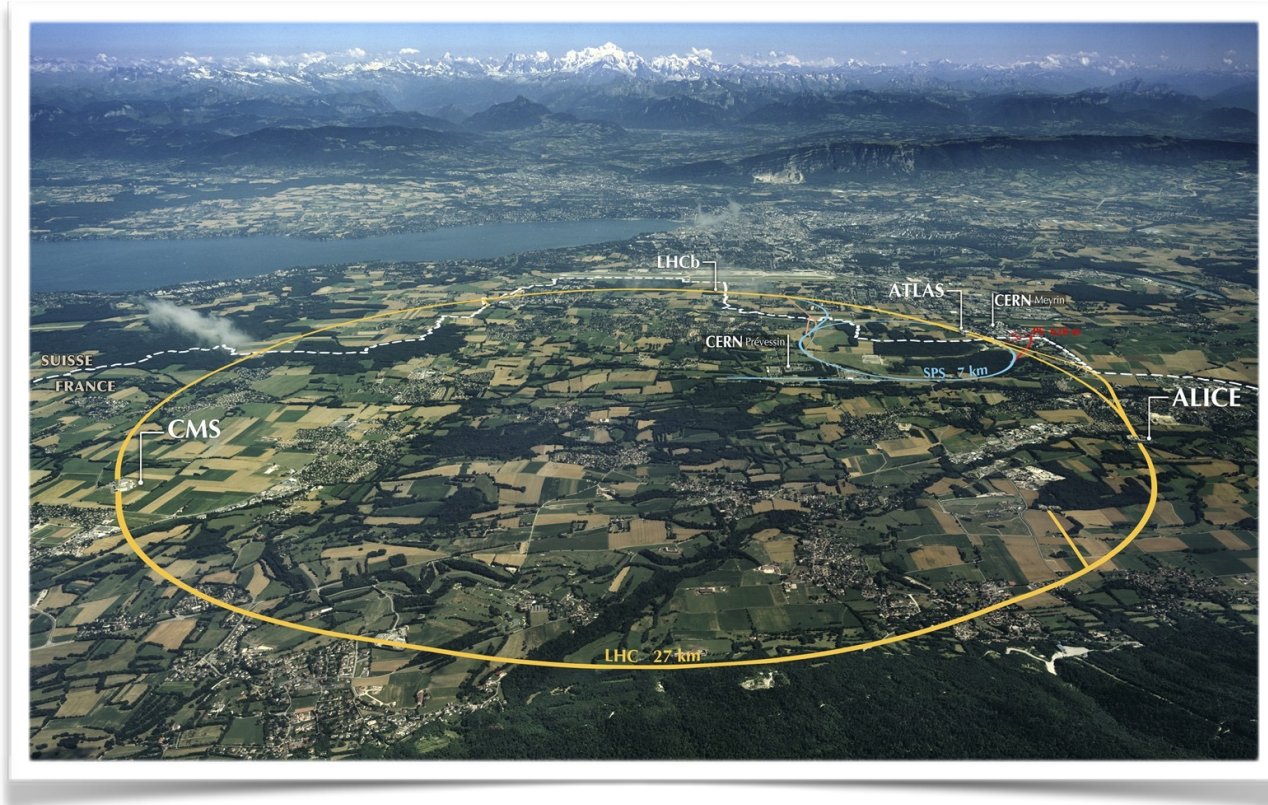
CERN MEDICIS



- p (proton)
- ion
- neutron
- \bar{p} (antiproton)
- proton/antiproton conversion
- neutrino

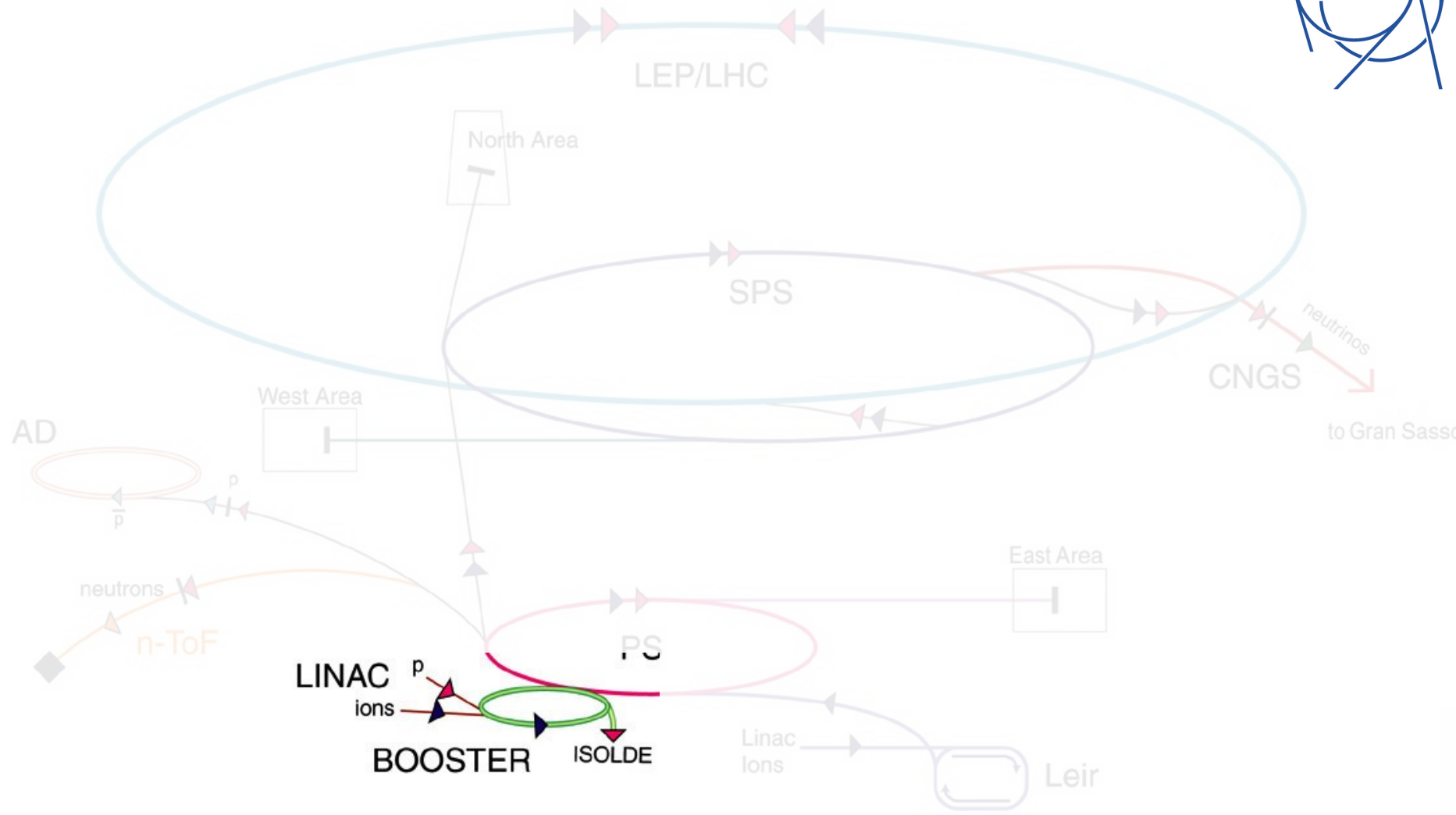
- AD Antiproton Decelerator
- PS Proton Synchrotron
- SPS Super Proton Synchrotron

- LHC Large Hadron Collider
- n-ToF Neutron Time of Flight
- CNGS CERN Neutrinos to Gran Sasso



CERN

European Organisation for Nuclear Research

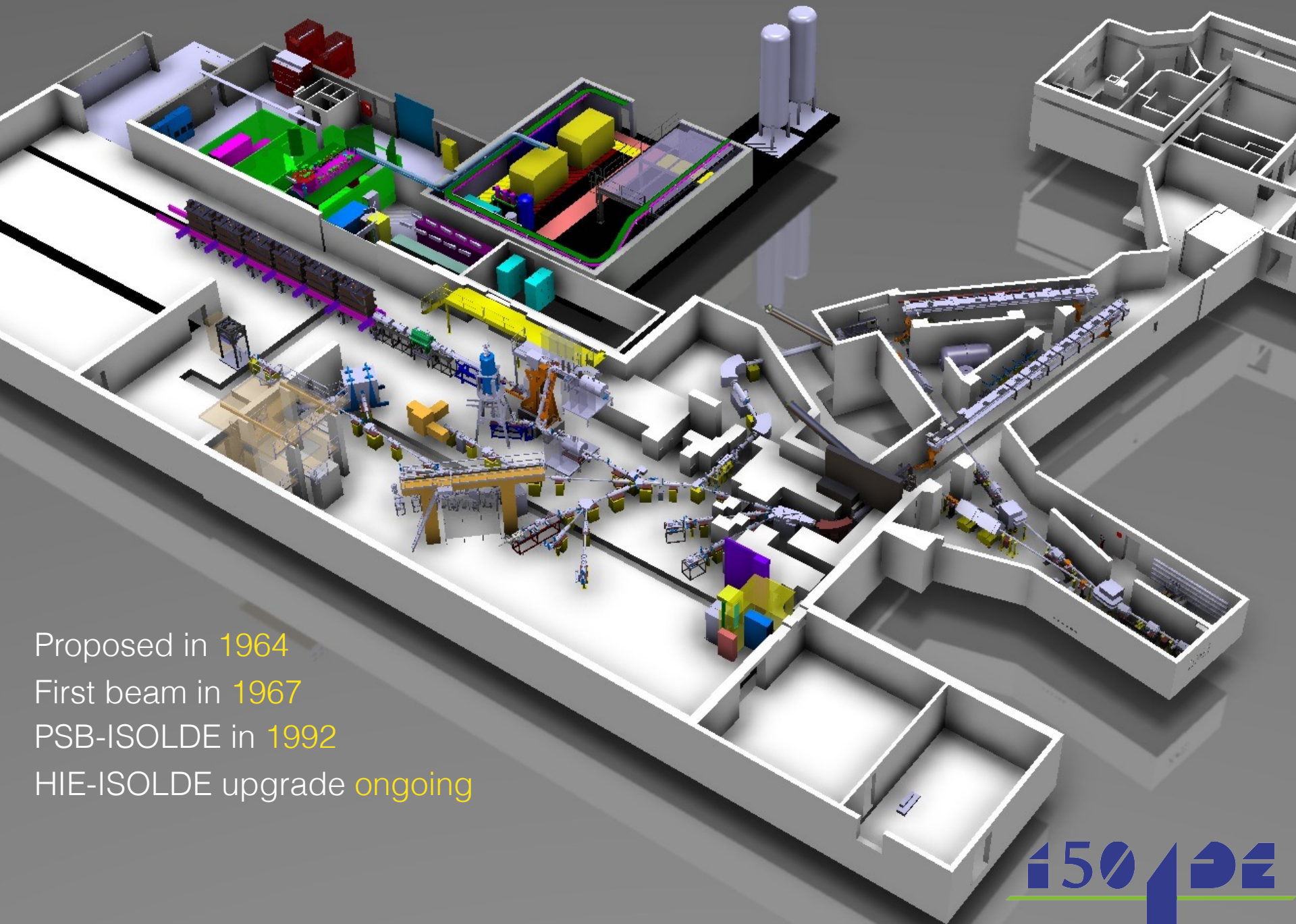


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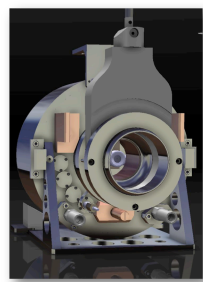
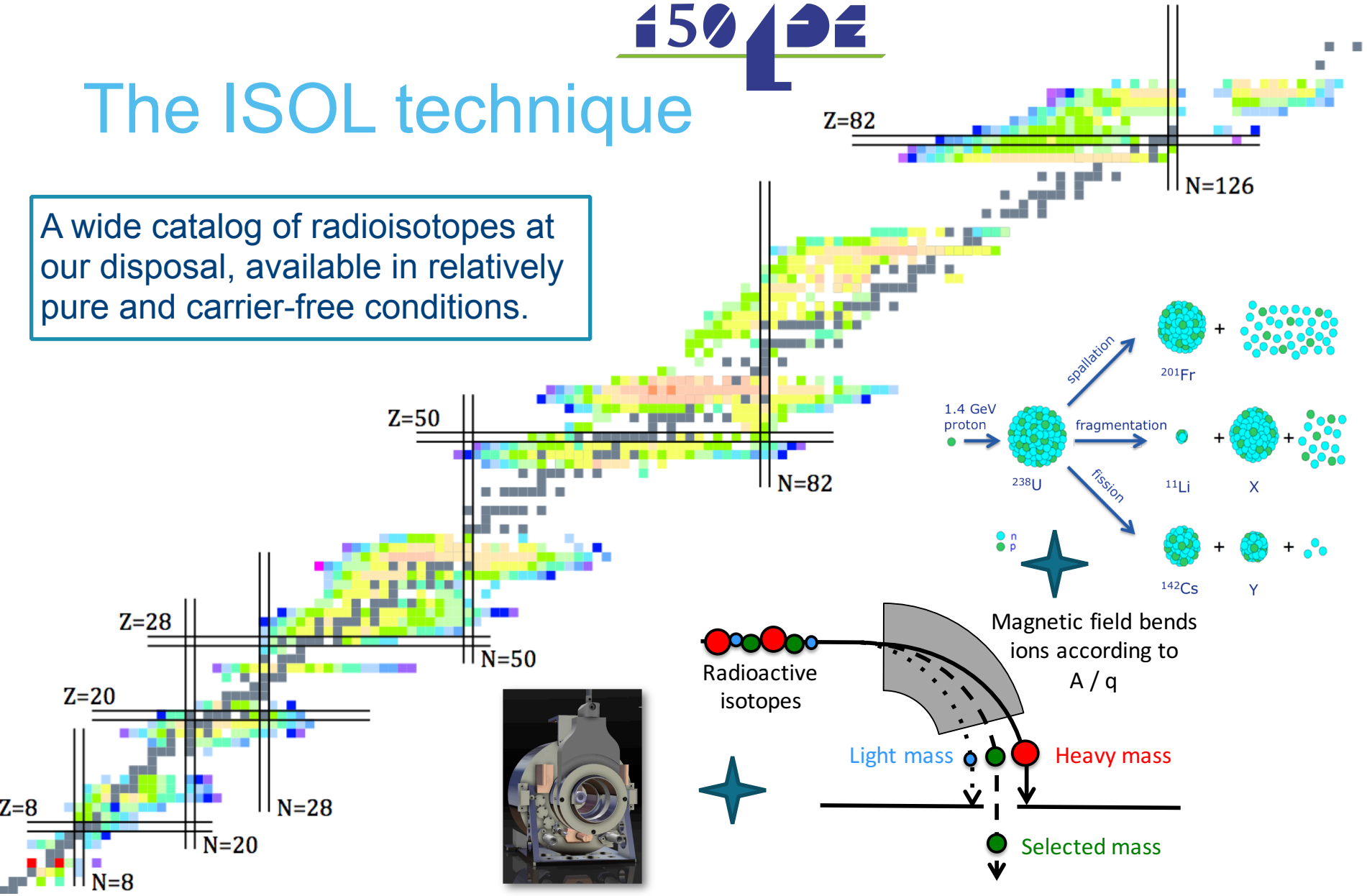
LHC Large Hadron Collider
 n-ToF Neutron Time of Flight
 CNGS CERN Neutrinos Gran Sasso



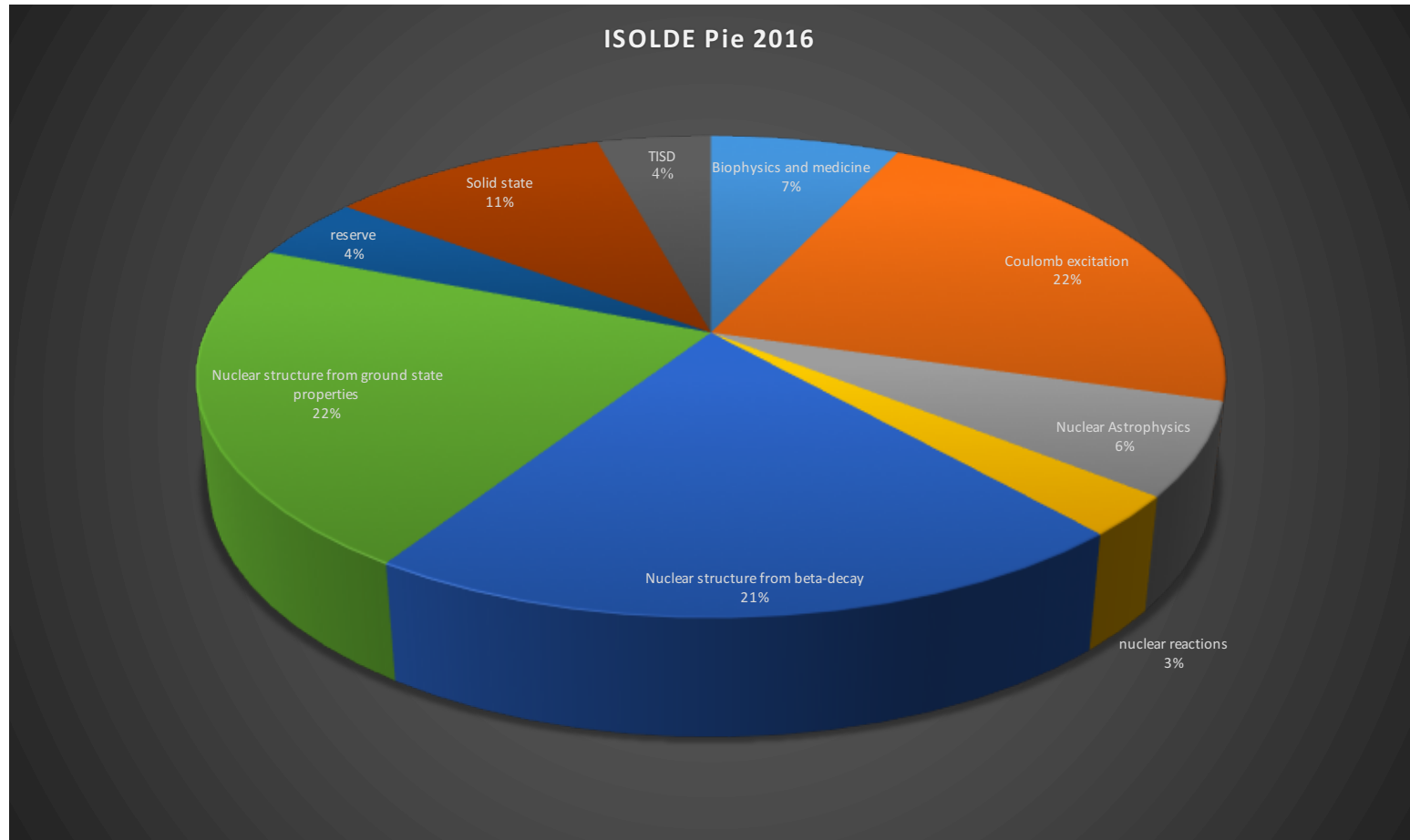
Proposed in 1964
First beam in 1967
PSB-ISOLDE in 1992
HIE-ISOLDE upgrade ongoing

The ISOL technique

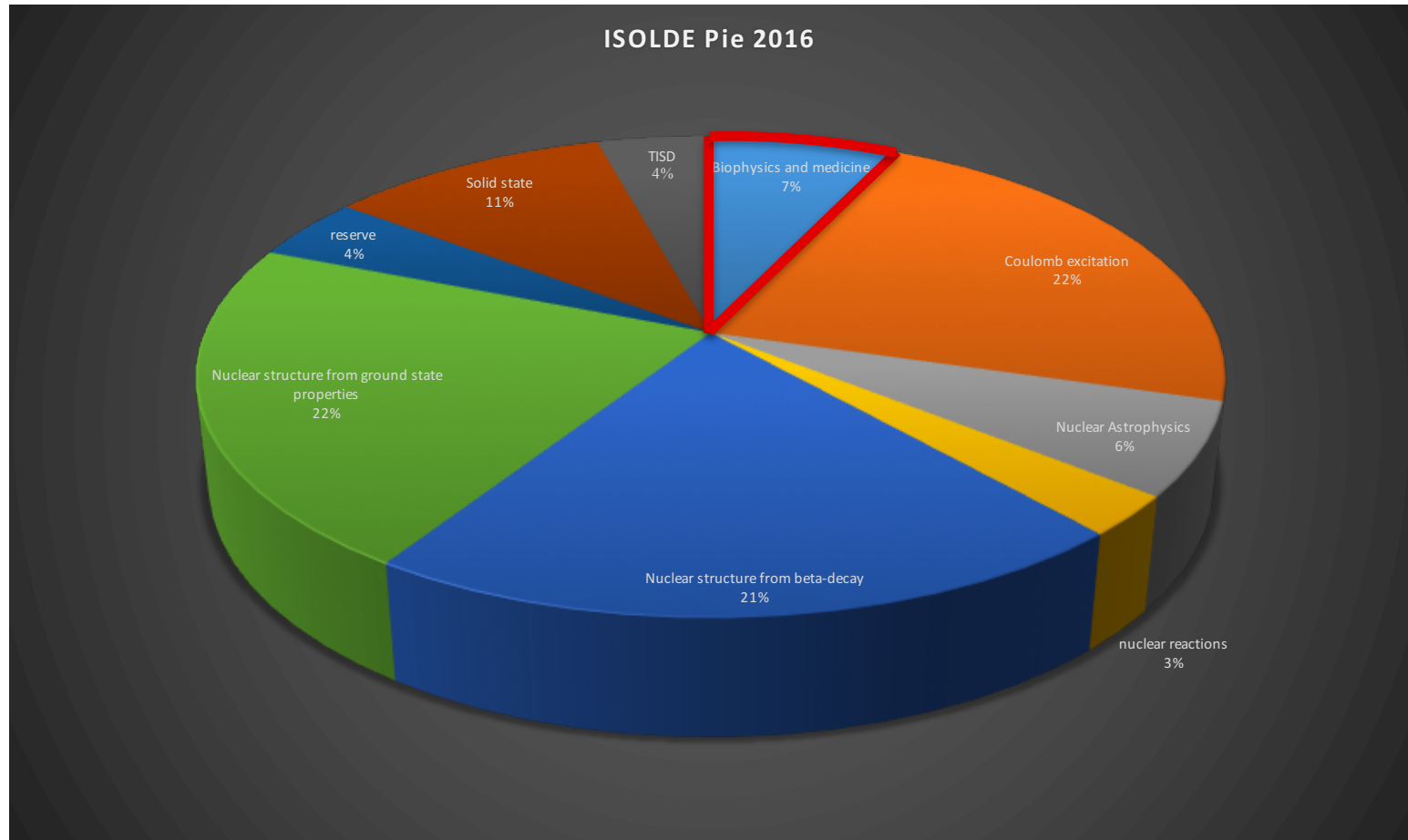
A wide catalog of radioisotopes at our disposal, available in relatively pure and carrier-free conditions.



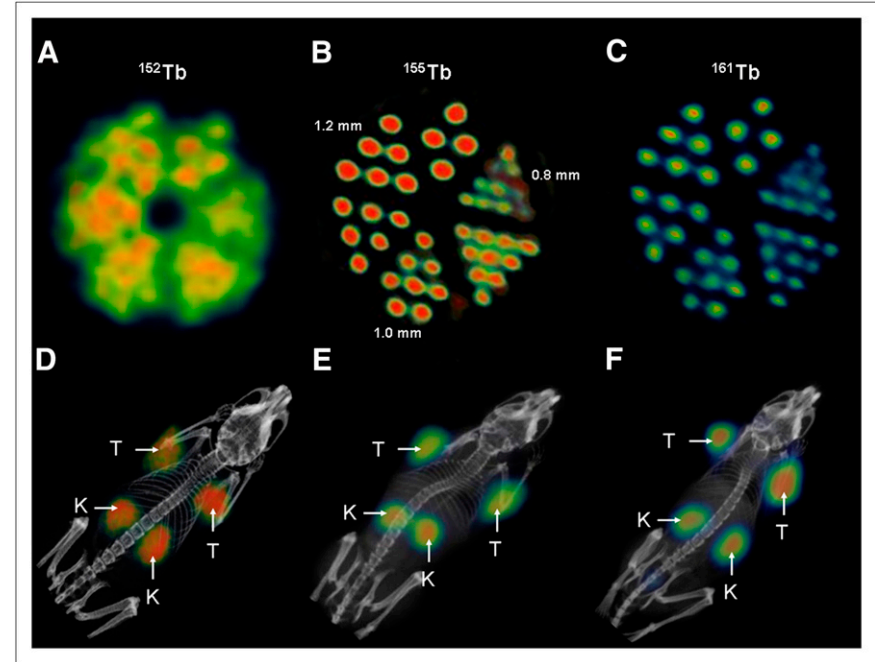
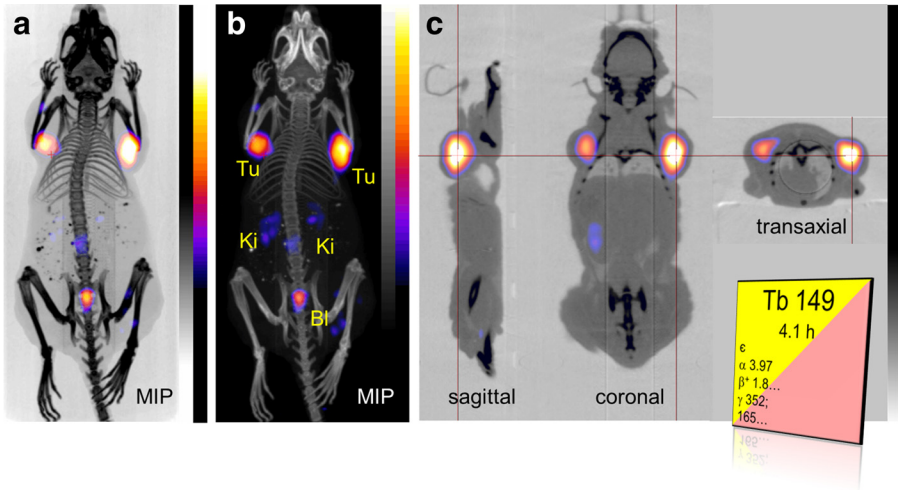
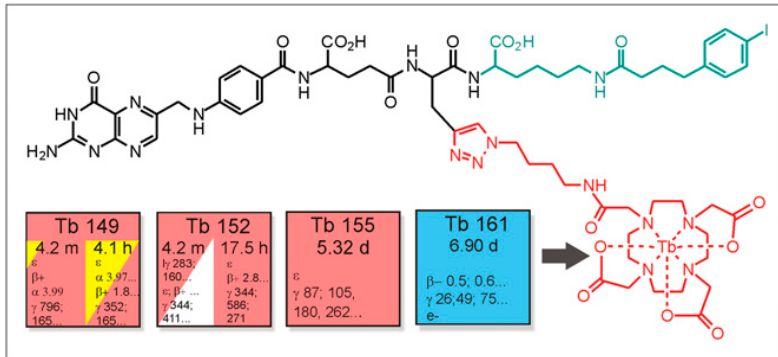
ISOLDE scientific programme



ISOLDE scientific programme



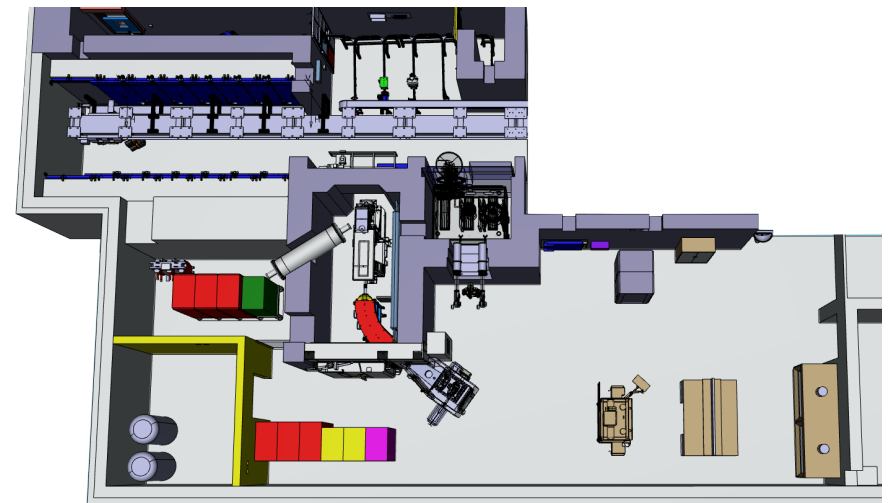
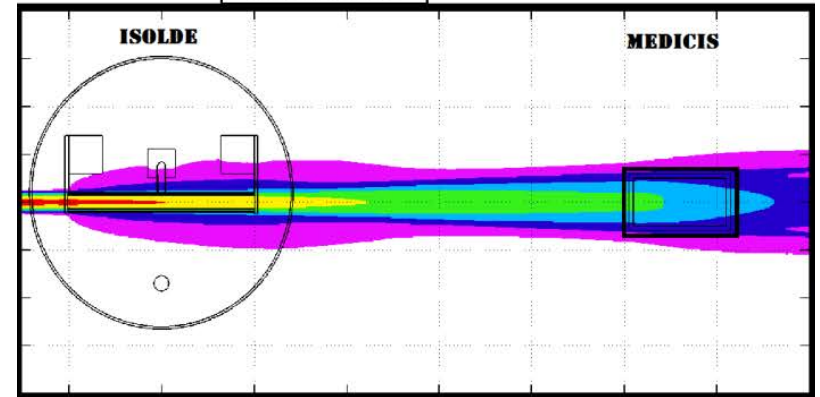
Tb research at PSI



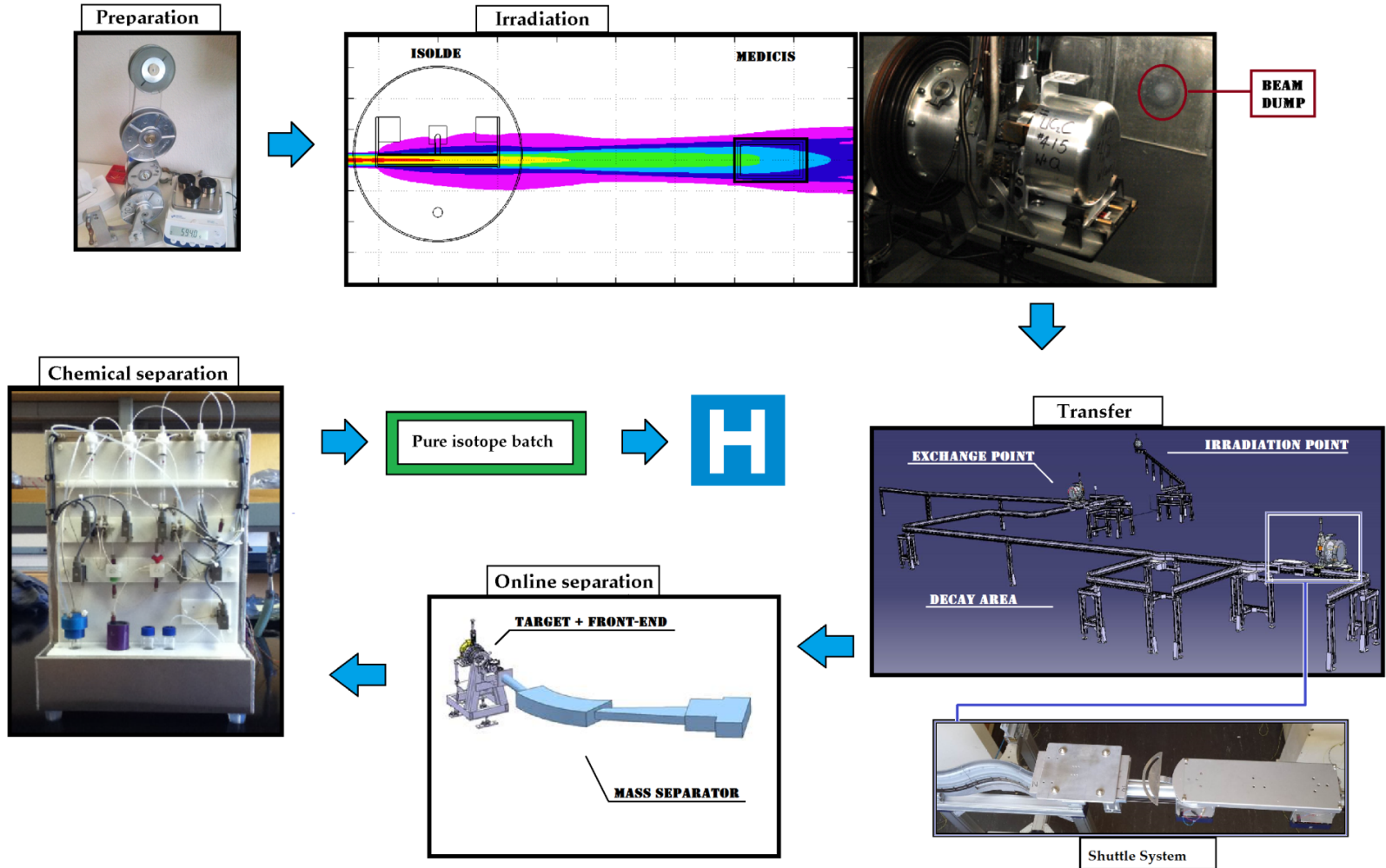
This work is based on 2 possible collection periods at ISOLDE each year and is highly held back by the availability of the radioisotopes.

Free beam for “free” radioisotopes at CERN

- 80% of the proton beam goes through the ISOLDE target unaffected
- That beam is then sent onto another target
- The target can be removed from the target area towards a Class A laboratory
- An off-line separator is used to extract radioisotopes of interest



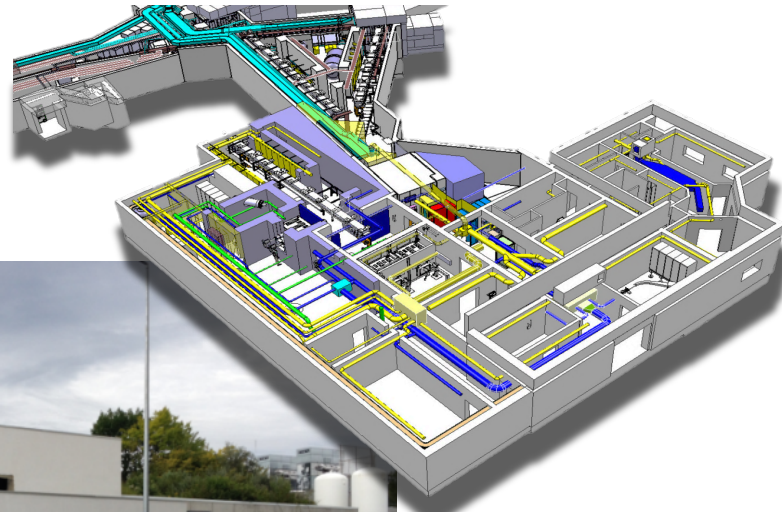
CERN MEDICIS from A to Z



MEDICIS timeline



Ground breaking
3 Sept 2013



Separator installed
10 March 2017



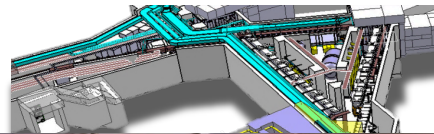
Building delivered
15 Oct 2014



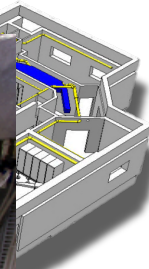
MEDICIS timeline



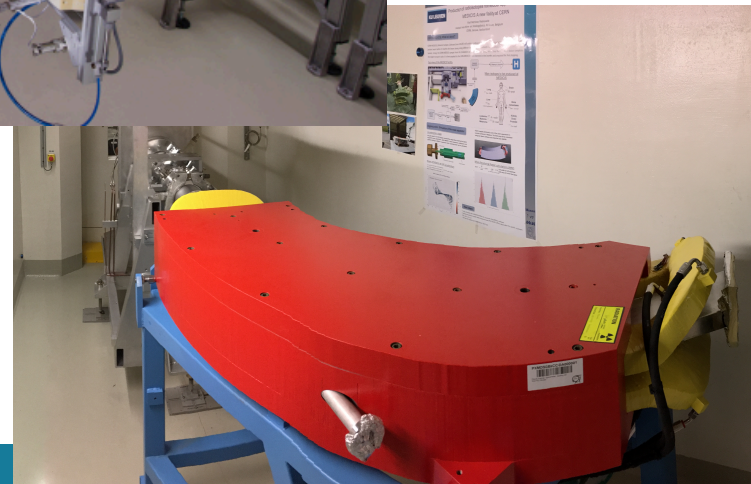
Ground breaking
3 Sept 2011



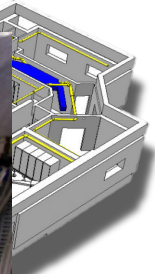
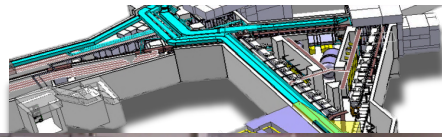
Building delivered
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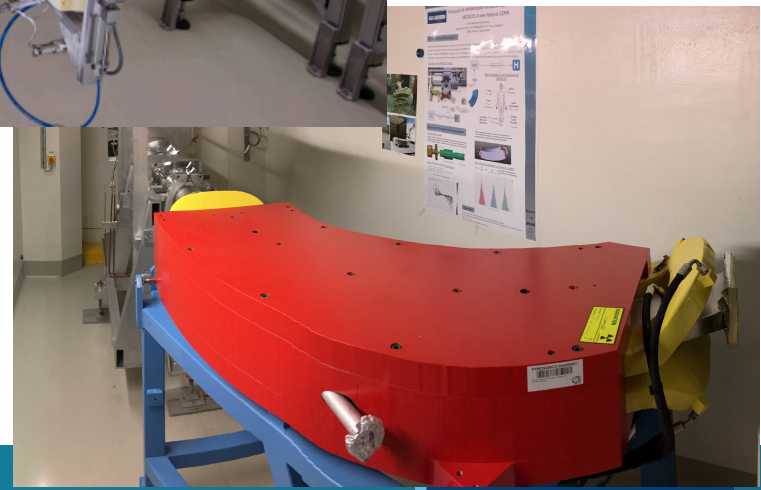
Detector installed
March 2017



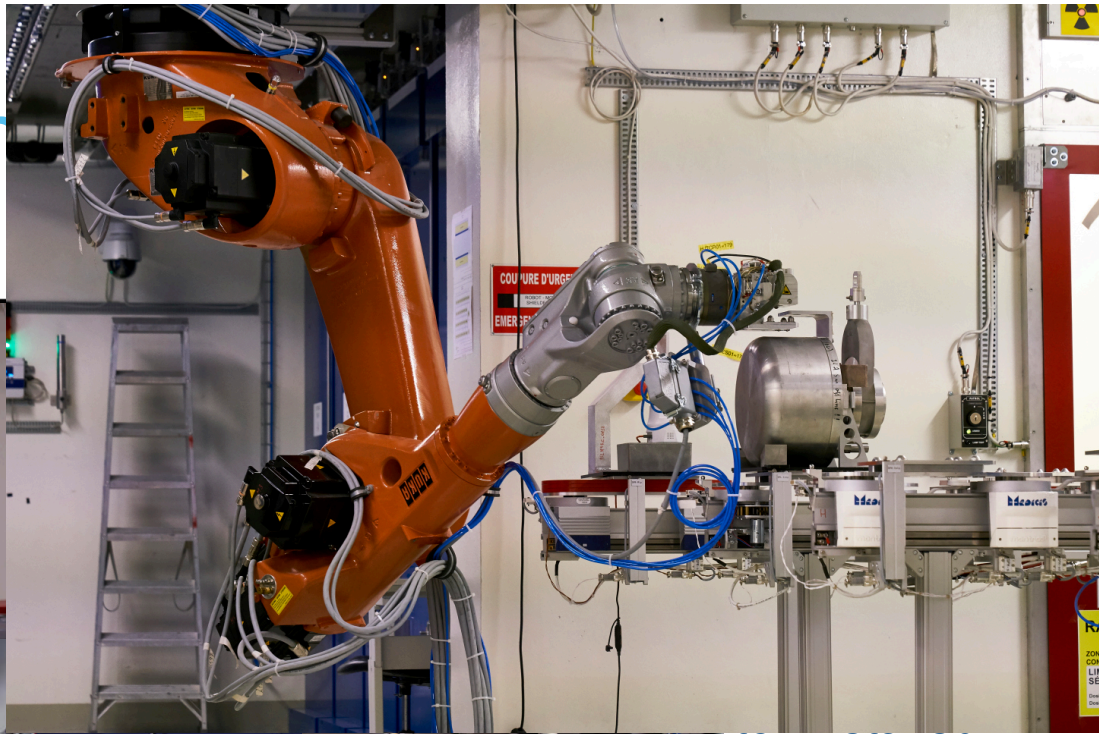
MEDICIS timeline



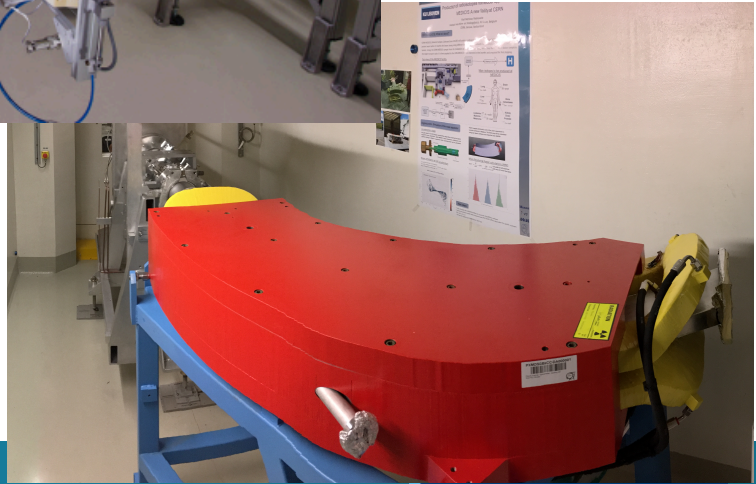
Accelerator installed
March 2017



MEDICIS timeline



arch 2017

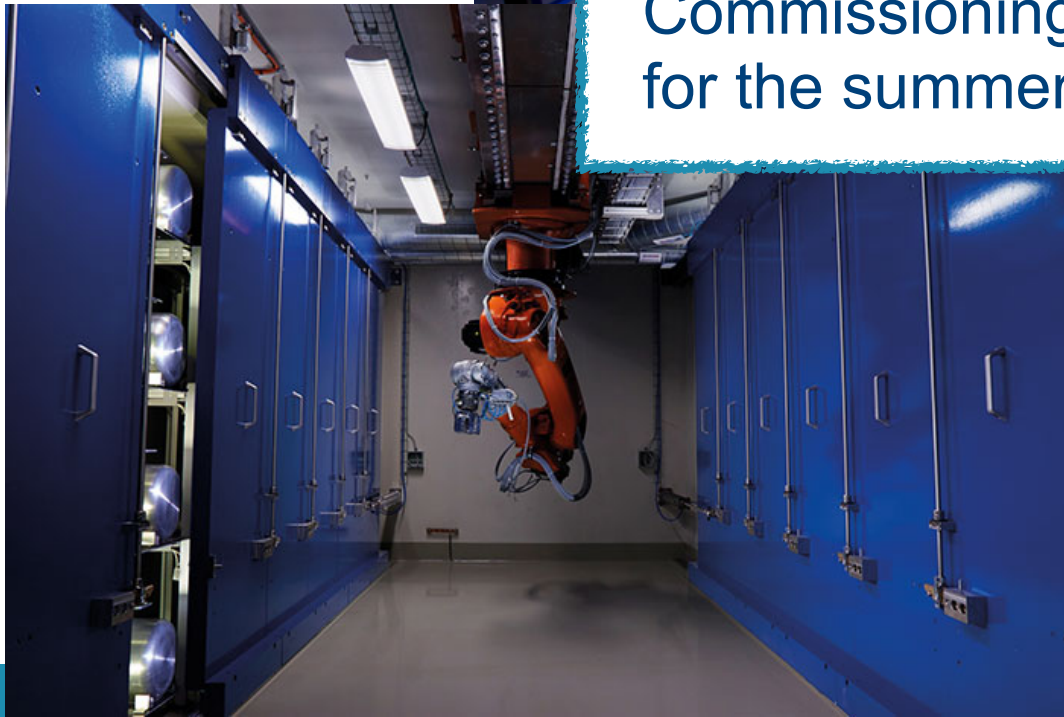


MEDICIS timeline



Commissioning planned for the summer of 2017!

March 2017





European
Commission

Horizon 2020
European Union funding
for Research & Innovation



MEDICIS-Promed

MEDICIS-PROduced radioisotope beams for MEDicine

Network

Research

Training



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For more information <https://medicis-promed.web.cern.ch/>

KU LEUVEN

MEDICIS-Promed



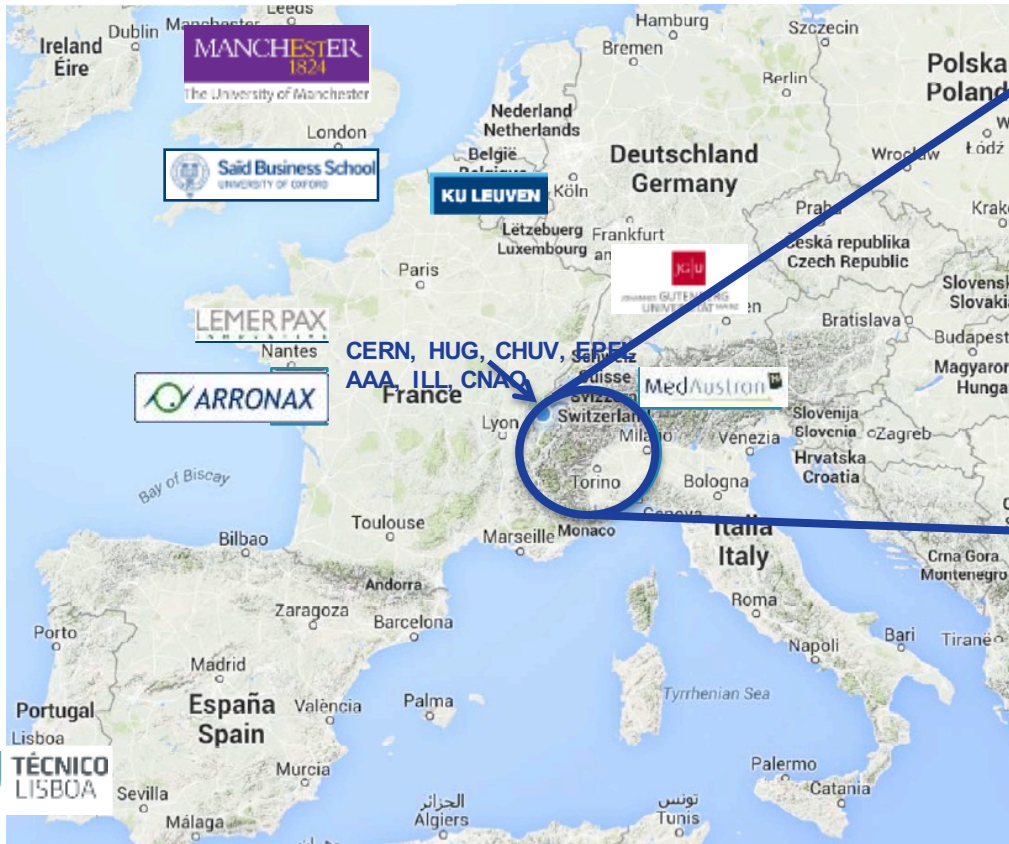
European
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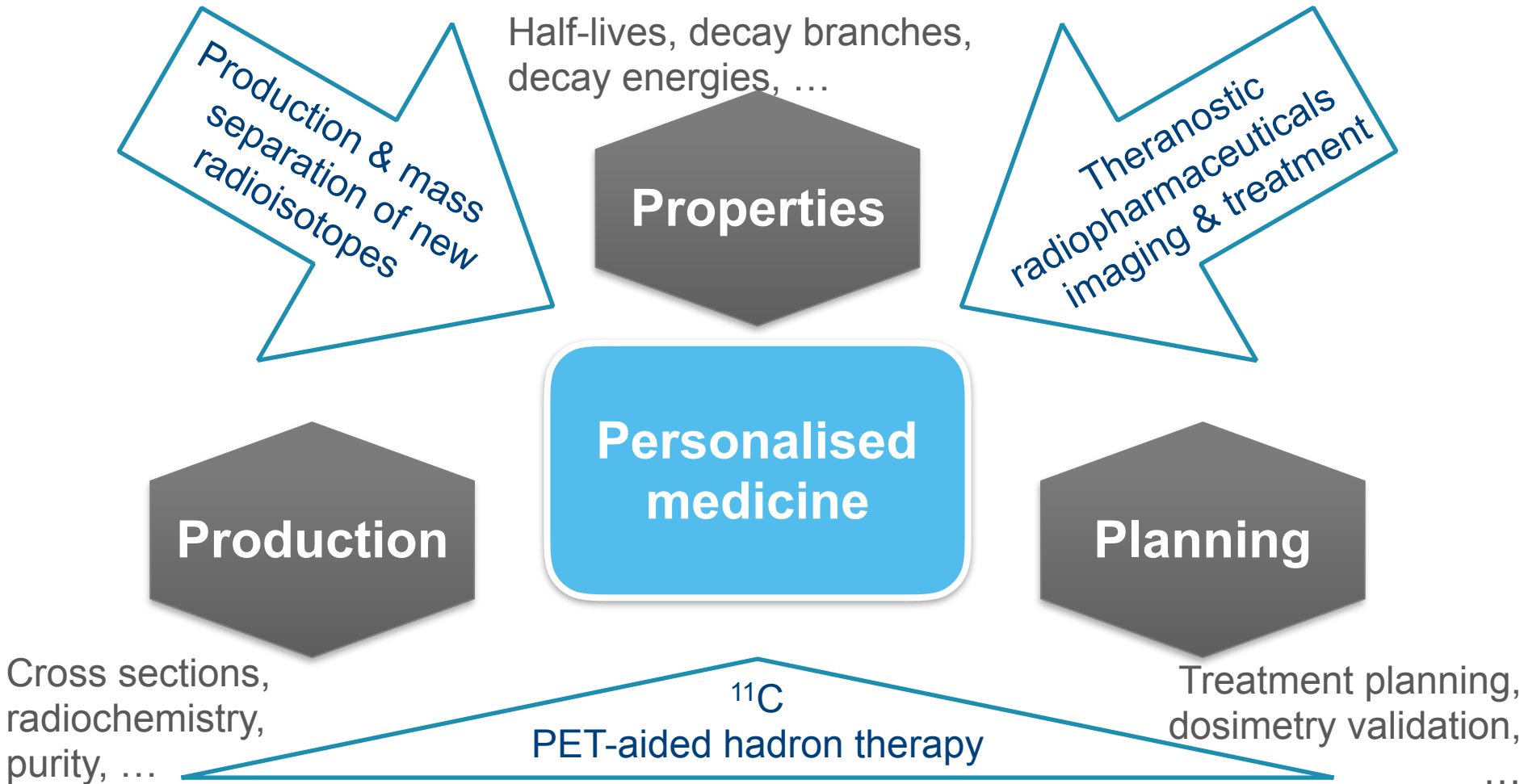
- A **Marie Skłodowska-Curie Innovative Training Network** coordinated by CERN under Horizon2020
- Bringing together academia, industry and the medical world
- Training **15 Early Stage Researchers (ESR)** for the development of new medical applications and accelerator technologies



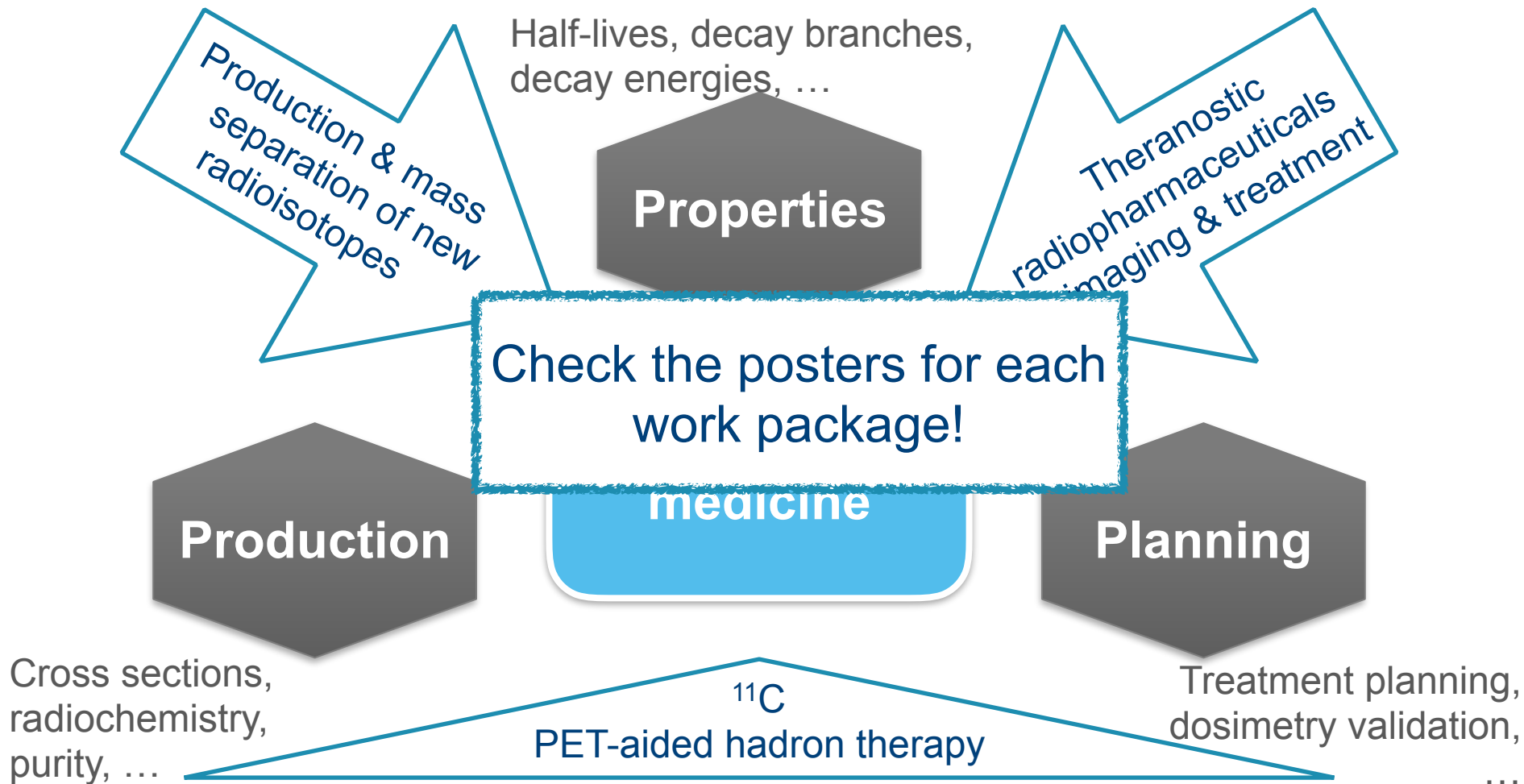
MEDICIS-Promed network



MEDICIS-Promed research



MEDICIS-Promed research



MEDICIS-Promed trainings

- Feb 2016: Kick-off week in CERN and in the Alps
- Sept 2016: General Training on Advanced Materials in Manchester
- **June 2017: Summer School on PET-aided hadron therapy in Pavia**
- Sept 2017 Specialised Training on Radioisotope production in Leuven
- 2018: Summer School on Radioisotopes for Medicine in Lisbon
- 2018: Specialised Training on Radio-Imaging in Geneva/Lausanne

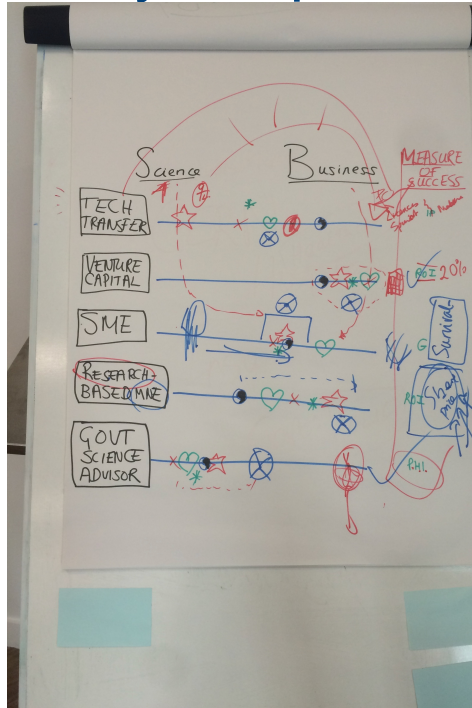


MEDICIS-Promed trainings

- **Academic training:** lectures and hands-on activities to study the production, handling, and use of radioisotopes, including concepts from nuclear physics, material science, radiochemistry, medical imaging, ...
- **Transferable skills:** lectures, workshops, and panel activities on the following topics: presentation skills, business & innovation, entrepreneurship, investment, institutions, impact, ...
- **Networking:** A unique opportunity to interact with top researchers in your field and link with other young researchers with similar interest!

MEDICIS-Promed trainings

- Academic training to study the production of science, physics, and business



...r field and link
...similar interest!

MEDICIS-Promed Label

- Offer a label to PhD candidates participating in our events and sharing our interest
 - ▶ Strong research programme in a topic of interest to the members and partners of MEDICIS-Promed
 - ▶ Secondment to a different type of institution (minimum 3 months)
 - ▶ Participation at events recognised by the Training Office
 - ▶ Career Development Plan in line with MEDICIS-Promed, including academic training and transferrable skills
- 2 students already subscribed and a few more have expressed interest

Summer School 2017
Pavia, 4-9 June 2017



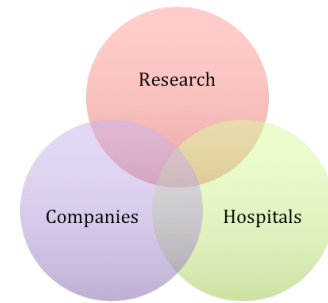
Summer School: Lectures

- **Monday:** Ion sources for radioactive beams by F. Wenander (CERN)
- **Tuesday:** Treatment planning by E. Sterpin & C. Deroose (UZ Leuven) & Accelerated radioactive beams by L. Penescu (Abstract Landscapes)
- **Wednesday:** PET session by D. Tuch () and F. Haddad (ARRONAX/Subatech), & Health Economics by M. Johannesma (CZ) and B. Ramaekers (Maastricht University Medical Center)
- **Thursday:** Radiobiology by A. Facchetti (Pavia) and C. Mancini (Roma) & Imaging by G. Dedes (Munich)

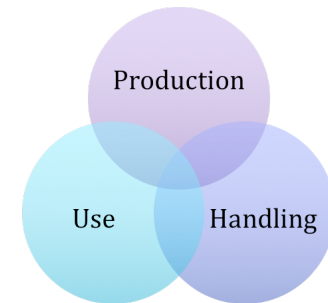
Summer School: Lectures

- **Monday:** Ion sources for radioactive beams by F. Wenan
- **Tuesday:** Lecture series are concluded with a **'Guided Reflexion'**. This is the moment when YOU take the lead and confront the lecturers in order to bring new knowledge to your research topic. + Final closing discussion on Friday morning
- **Wednesday:** (ARRO) Johann Univers
- **Thursday:** Radiobiology by A. Facchetti (Pavia) and C. Mancini (Roma) & Imaging by G. Dedes (Munich)

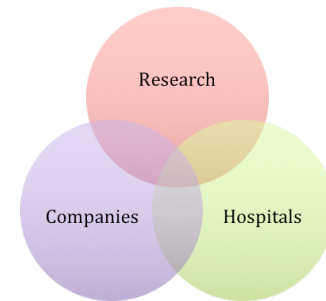
Summer school: Guided reflexion



- **2 participants** are chairing the reflexion
 - ▶ They give a short summary of each talk (1 min)
 - ▶ They present the impact that the content may have on their research, or their research topic
- Starting with those participants, go around and discuss the impact of the presentation
 - How might we...
 - Problems > Progress > Plan
 - Co-creating a solution
- Friday => Drawing the supply chain together

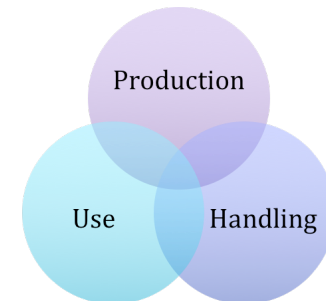


Summer school: Guided reflexion



- **2 participants** are invited to give a guided reflexion
 - ▶ They give a short presentation (1 min) each talk (1 min)
 - ▶ They present their research topic and what the content may have on their research topic
- Starting with these participants, go around and discuss the impact of the presentation
 - How might we...
 - Problems > Progress > Plan
 - Co-creating a solution
- Friday => Drawing the supply chain together

Volunteers needed!



Summer School: Practical Sessions

- **Monday:** FLUKA workshop: introduction to simulations with FLUKA and hands-on work for the simulations of activities related to your research, be it radioactive beam production or treatment planning. Introduction and guidance by A. Mairani (CNAO).
- **Tuesday:** Workshop on how to design a PET-isotope-based hadron therapy centre. Working together to solve all the aspects of the question, from the science to the patient handling, from conceptual ideas to generating funding. Guidance by L. Penescu (Abstract Landscapes)
- **Thursday:** Poster session, together with OMA. Showcase your work and learn from the others as well! Networking is at your fingertips!

Summer School: Public Lectures

- **Monday:** MEDICIS-Promed open lecture by K. Noda (NIRS) on Carbon ion hadron therapy
- **Tuesday:** OMA open lecture by M. Pullia (CNAO)
- **Wednesday:** MEDICIS-Promed open lunch seminar by S. Myers (ADAM) on ADAM and Entrepreneurship Success
- **Thursday:** OMA open lecture



Summer School: Extra Activities

- **Sunday:** CNAO visit & Welcome Reception
- **Tuesday:** Supervisory Board (pass on any remarks to your representative, Vadim)
- **Wednesday:** Visit of Pavia
- **Thursday:** Gala dinner
- **Friday:** Wrapping up and group reporting

- **Saturday:** Visit of the Trento Proton Therapy Centre



European
Commission

Horizon 2020
European Union funding
for Research & Innovation

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The University of Manchester



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE



Enjoy the school!

Thierry, Cristina, Monica, and myself are at your disposal during the whole week...