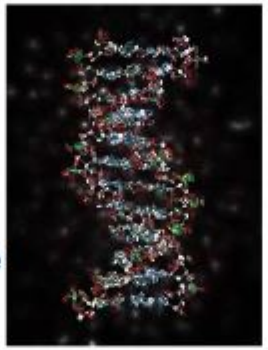
Para que servem os aceleradores de partículas?

Para tudo e mais alguma coisa...

Accelerator Applications

Science Research
- Particle Physics
- Nuclear Physics
- Astrophysics
- Probing material structure
- Biosciences
- Microscopy
- Artifact dating
- Light sources (includes X-ray)
- Neutron sources
- Lasers



Industry
- Ion implantation
- Food Sterilization
- Lithography
- Nanotechnology

Accelerators

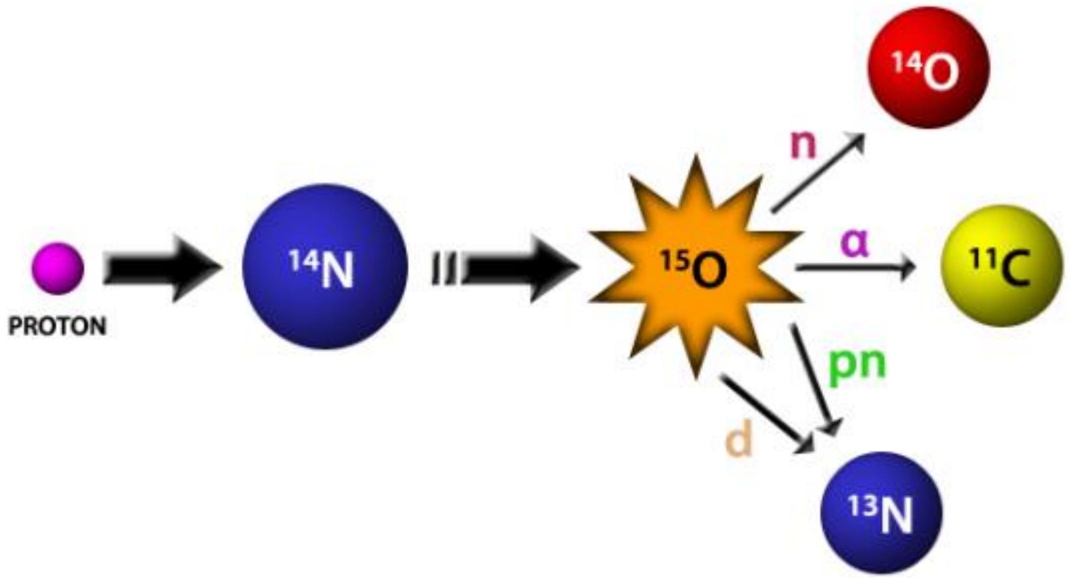
Medicine
- Imaging
- Isotope production
- Cancer Radiotherapy

Environment
- Radioactive waste treatment

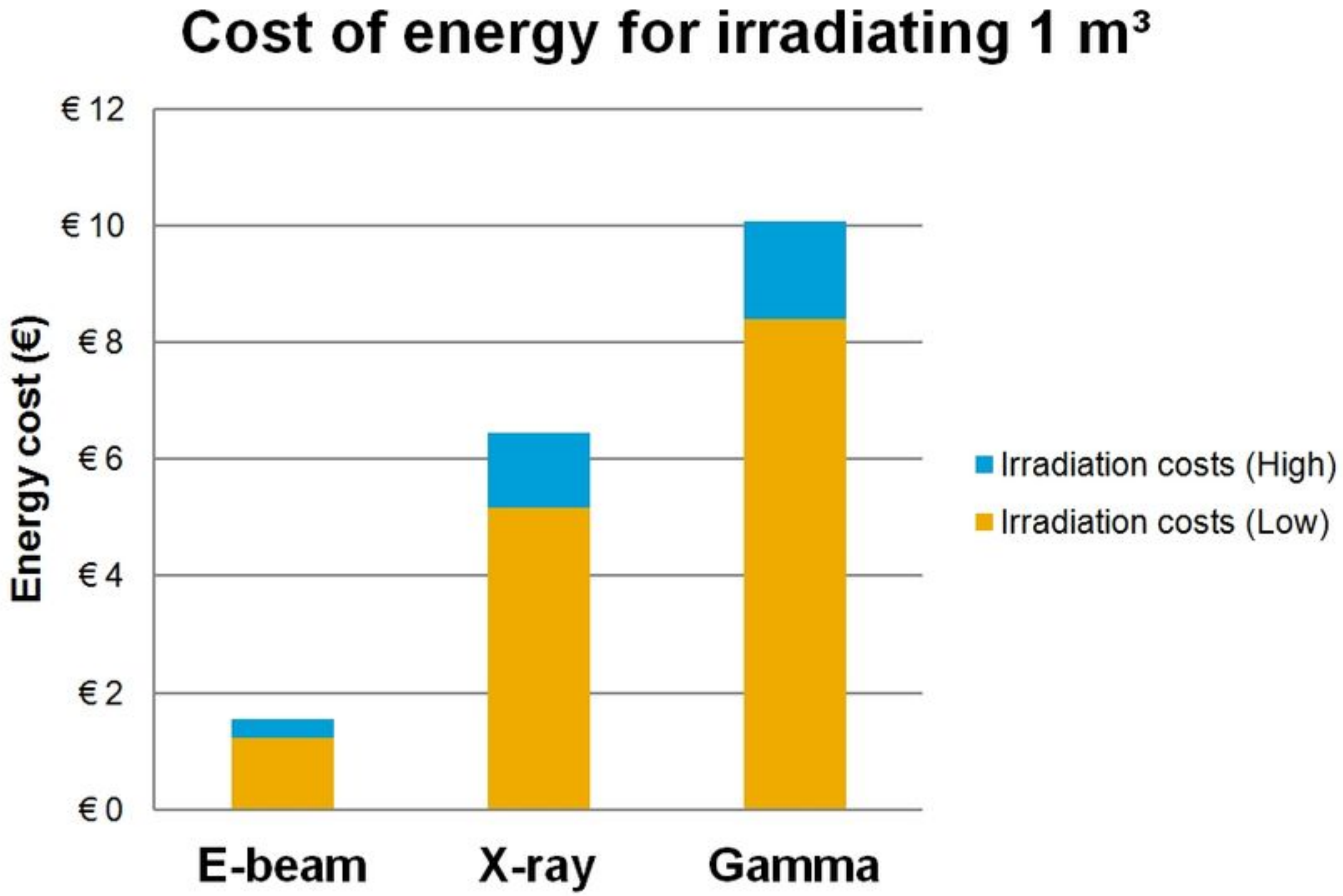
Energy Production
- Controlled nuclear fusion

IREAP

Produção de radio isotopos para aplicações médicas


PROTON
^{14}N
^{15}O
n
^{14}O
α
^{11}C
pn
d
^{13}N

Conservação de produtos alimentares

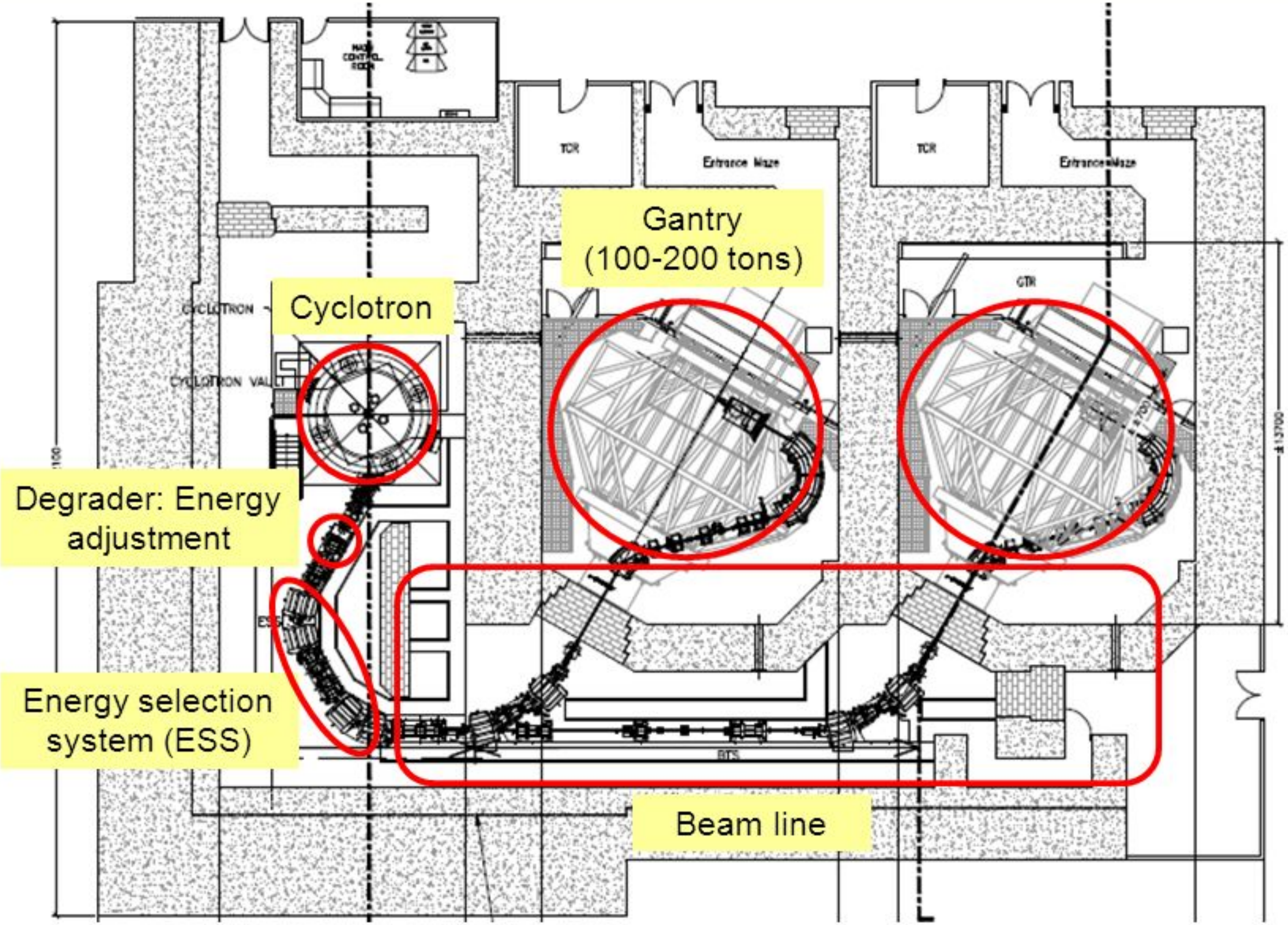


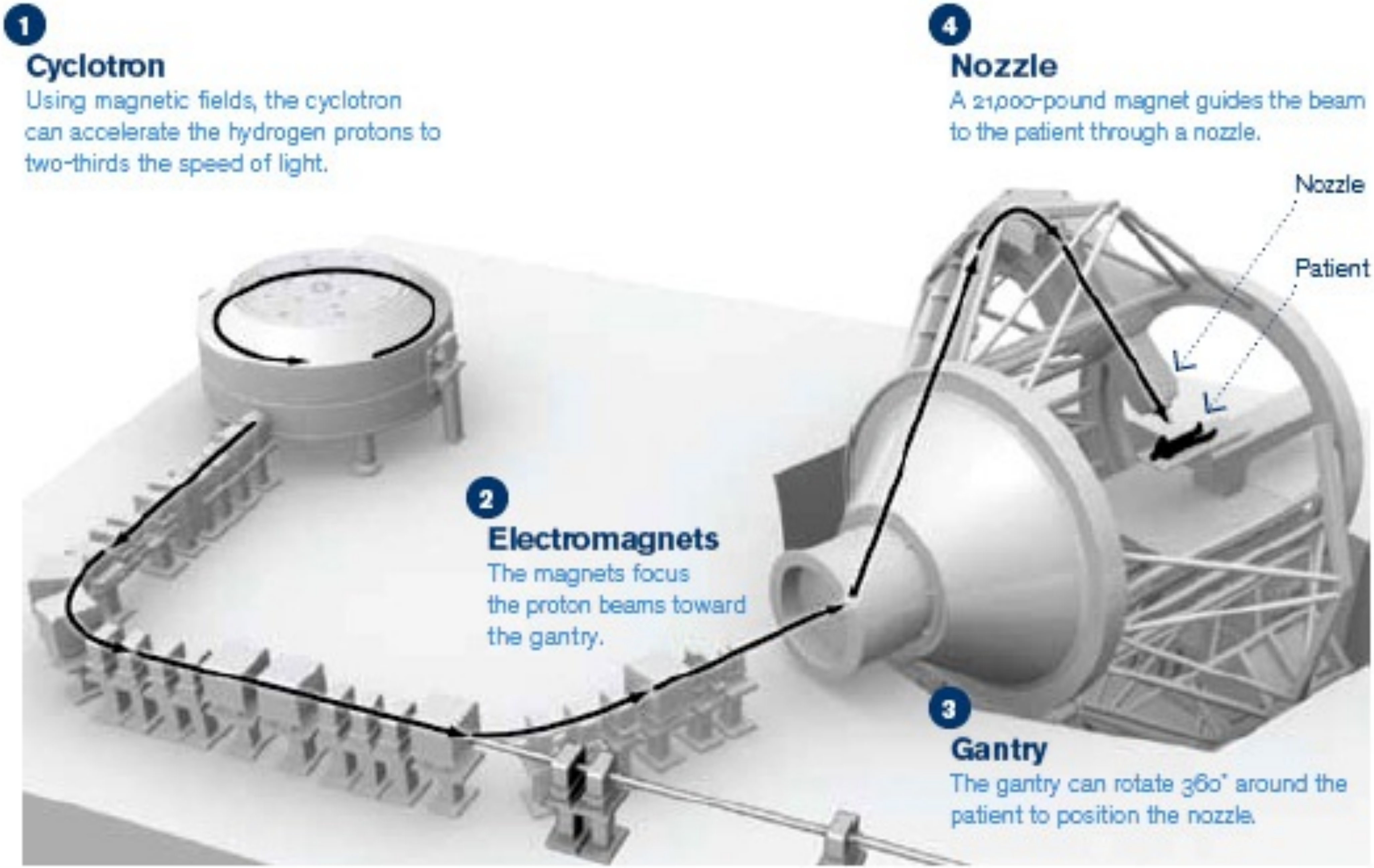
Assumptions

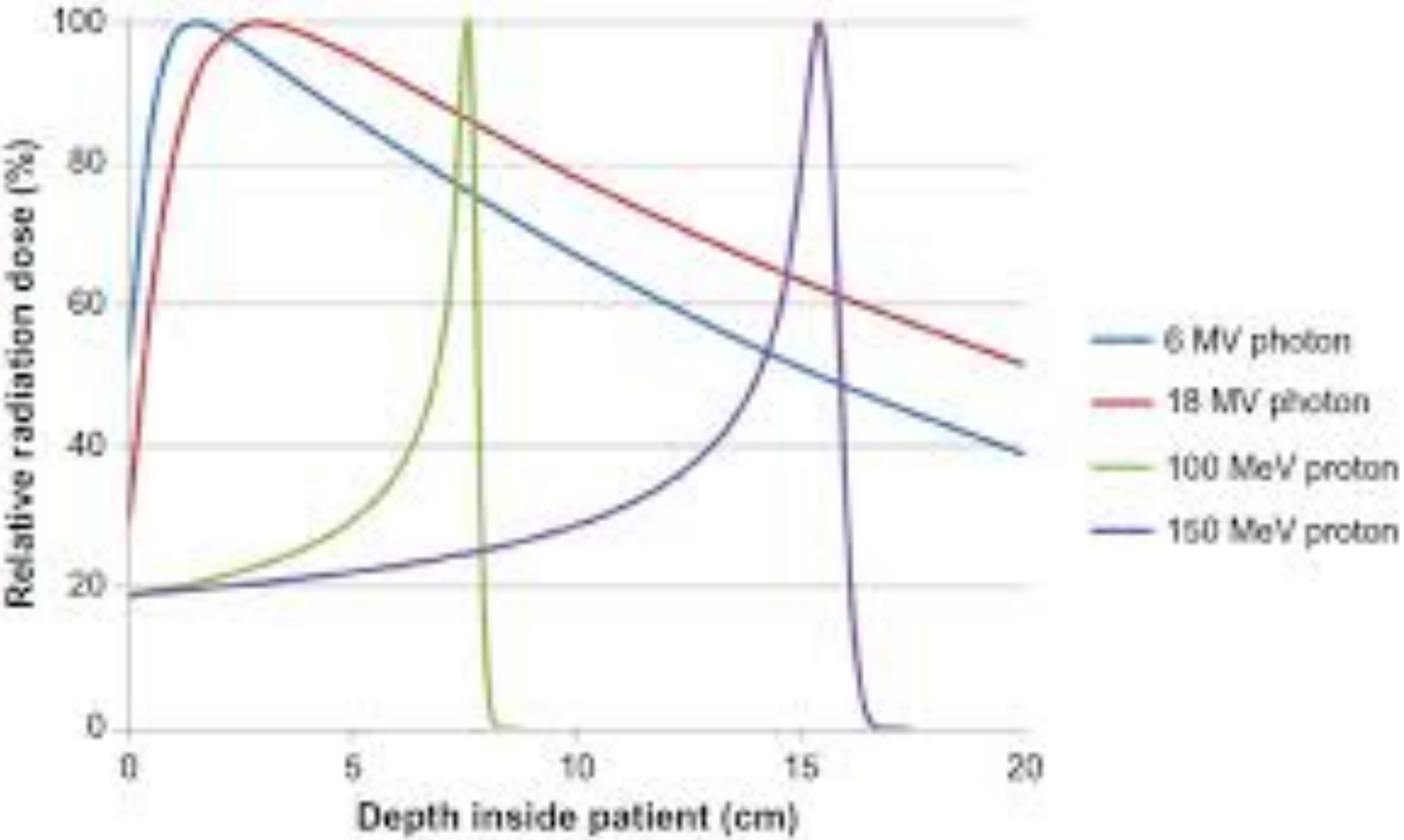
- Electricity range : 0.08 – 0.1 €/kWh
- Co-60 range: 2.5 – 3 CAD/Ci
- Pallet configuration
- 4.4 MCi = 124.000 m^3/y @ 25kGy

Luz de sincrotrão

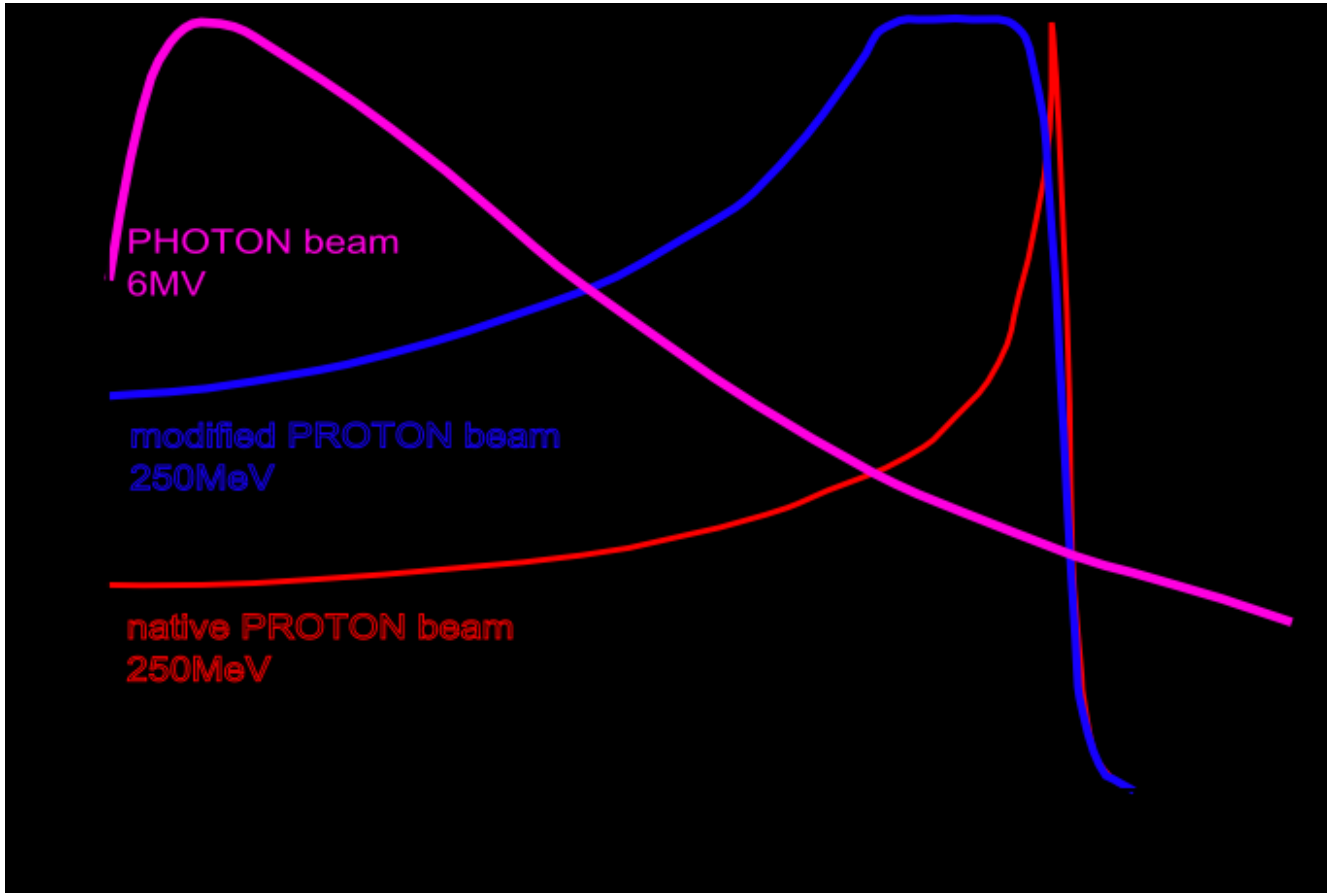
Cyclotron-based proton therapy facility




1
Cyclotron
Using magnetic fields, the cyclotron can accelerate the hydrogen protons to two-thirds the speed of light.
4
Nozzle
A 21,000-pound magnet guides the beam to the patient through a nozzle.
Nozzle
Patient
2
Electromagnets
The magnets focus the proton beams toward the gantry.
3
Gantry
The gantry can rotate 360° around the patient to position the nozzle.



Relative radiation dose (%)
100
80
60
40
20
0
0
5
10
15
20
Depth inside patient (cm)
6 MV photon
18 MV photon
100 MeV proton
150 MeV proton


PHOTON beam
6MV
modified PROTON beam
250MeV
native PROTON beam
250MeV

Cancers treated with proton therapy

Proton therapy is useful in the following situations:

Tumors that are near important parts of the body. For example, tumors near the eye, brain, and spinal cord.

Childhood cancers of the eye, brain, and spinal cord. Proton therapy lessens the chance of harming healthy, developing tissue.

Proton therapy also may be used to treat these cancers:

Central nervous system cancers, including chordoma, chondrosarcoma, and malignant meningioma

Eye cancer, including uveal melanoma or choroidal melanoma

Head and neck cancers, including nasal cavity and paranasal sinus cancer and some nasopharyngeal cancers

Lung cancer

Liver cancer

Prostate cancer

Spinal and pelvic sarcomas, which are cancers in the soft-tissue and bone

Noncancerous brain tumors

Ciência é Paz

SESAME

MEMBERS AND OBSERVERS OF SESAME

The current (2017) Members of SESAME are Cyprus, Egypt, Iran (Islamic Republic of), Israel, Jordan, Pakistan, the Palestinian Authority, and Turkey.

Current Observers (2017) are Brazil, Canada, China (People's Republic of), the European Union, France, Germany, Greece, Italy, Japan, Kuwait, Portugal, Russian Federation, Spain, Sweden, Switzerland, the United Kingdom, and the United States of America.

SESAME PHASE-1 BEAMLINES

The selection of SESAME's seven Phase 1 beamlines was based on input from five scientific workshops and the early Users' Meetings in which several hundred Middle East scientists participated, on 70 proposals received, and joint meetings of the Scientific Advisory Committee of SESAME and the now defunct Beamlines Advisory Committee of SESAME.

These beamlines are the following:

1. BASEMA (**B**eamline for **A**bsorption **S**pectroscopy for **E**nvironmental and **M**aterial **A**pplications), a beamline for XAFS/XRF (X-ray Absorption Fine Structure/X-ray Fluorescence) spectroscopy, the 'day-one' beamline to be ready in March/April 2017
2. EMIRA (**E**lectro**M**agnetic **I**nfrared **RA**diation) for IR (Infrared Spectromicroscopy), is the second 'day-one' beamline, in this case that to start operations in April/May 2017
3. SUSAM (**S**ESAME **US**ers **A**pplication for **M**aterials Science) or MS (Materials Science), to be completed at the end of the third quarter of 2017
4. MX (Macromolecular Crystallography), the beamline to be completed in 2019
5. Soft X-ray Beamline
6. SAXS/WAXS (Small Angle and Wide Angle X-ray Scattering)
7. Tomography Beamline