

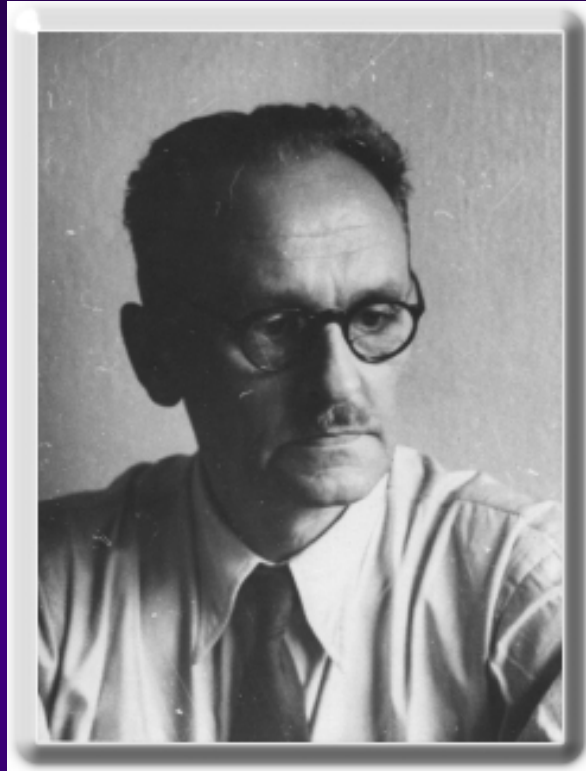


COLLIMATION AND RADIATION PROTECTION

Experience at the Soltan Institute for Nuclear
Studies POLAND



Sławomir Wronka, 10-Dec-08r



Prof.
Andrzej Sołtan
(1897-1959)

Organizer and
the first Head
of the Institute

SINS is an unit of the Świerk
Research Center





Nuclear Centre „Świerk”

- ▣ **IPJ – The Andrzej Soltan
Institute for Nuclear Studies**
- ▣ **IEA - Institute of Atomic Energy**
- ▣ **ZUOP - Department of Radioactive Waste
Management**
 - **44 ha area**
 - **1000 people**
 - **30 km from Warsaw centre**



Nuclear Center „Świerk”



2008-12-10

Slawomir Wronka, Institute for Nuclear Studies, Świerk



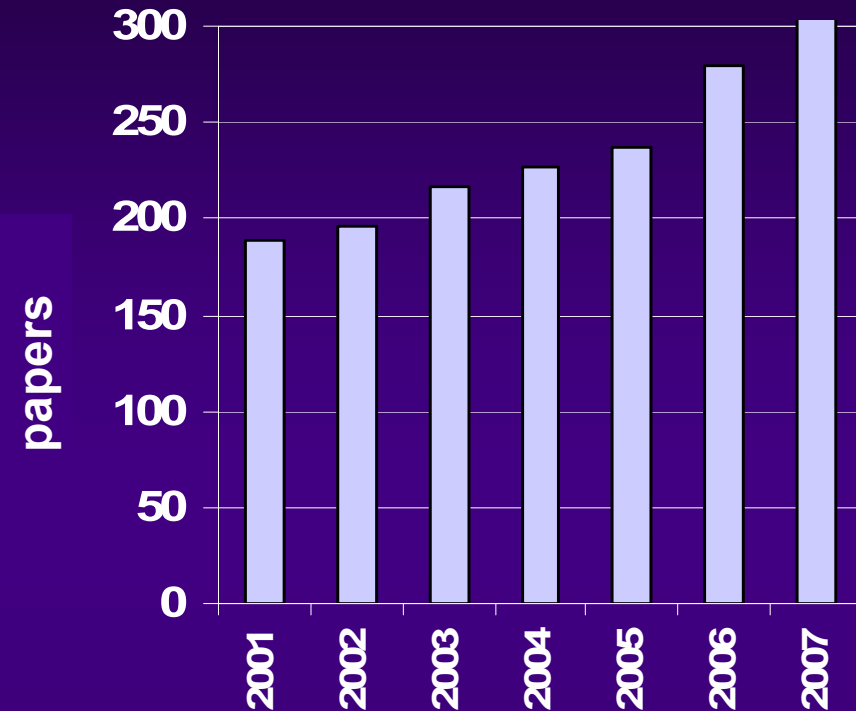
IPJ staff: 460 people

139 researchers, including

- ▣ 23 professors
- ▣ 23 PhD hab.
- ▣ 54 PhD
- ▣ ~300 papers in 2007

Non-research units:

- ▣ Department of Training and Consulting: 6 people
 - 6500 high school students visiting per year
- ▣ Department of Nuclear Equipment: 106 people
 - Commercial production unit
- ▣ Transport Division: 45 people





Research departments

- ▣ **Nuclear Reactions**
- ▣ **Interdisciplinary Applications of Physics**
- ▣ **Detectors and Nuclear Electronics**
- ▣ **Laboratory for Astroparticle Apparatus**
- ▣ **Plasma Physics and Technology**
- ▣ **High Energy Physics**
- ▣ **Cosmic Ray Physics**
- ▣ **Material Studies**
- ▣ **Accelerator Physics and Technology**



International projects

- ▣ **CERN: Compass, NA48, Alice, CMS, LHCb, NA61**
- ▣ **DESY: ZEUS, HERMES, FLASH, XFEL**
- ▣ **Brookhaven: RHIC**
- ▣ **GSI Darmstadt: FAIR**
- ▣ **Julich: WASA, ANKE**
- ▣ **Karlsruhe: Kascade, Kascade Grande, LOPES**
- ▣ **GANIL Caen: SPIRAL**
- ▣ **Kamioka, Japan: T2K**
- ▣ **Polkowice-Sieroszowice?: LAGUNA**
- ▣ **Greifswald: Stellarator Wendelstein 7-X**
- ▣ **Cadarache: ITER**
- ▣ **Satellite missions: POLAR, GRIPS**

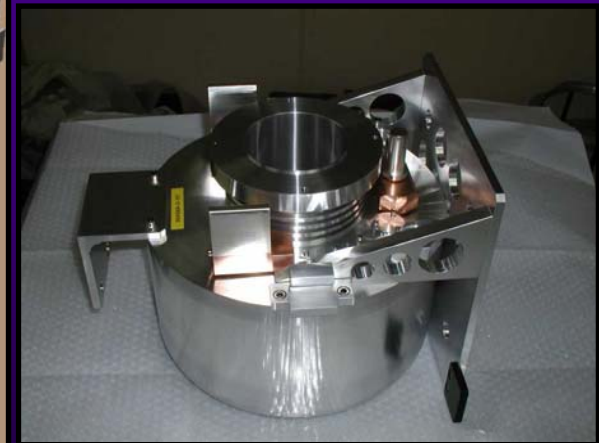
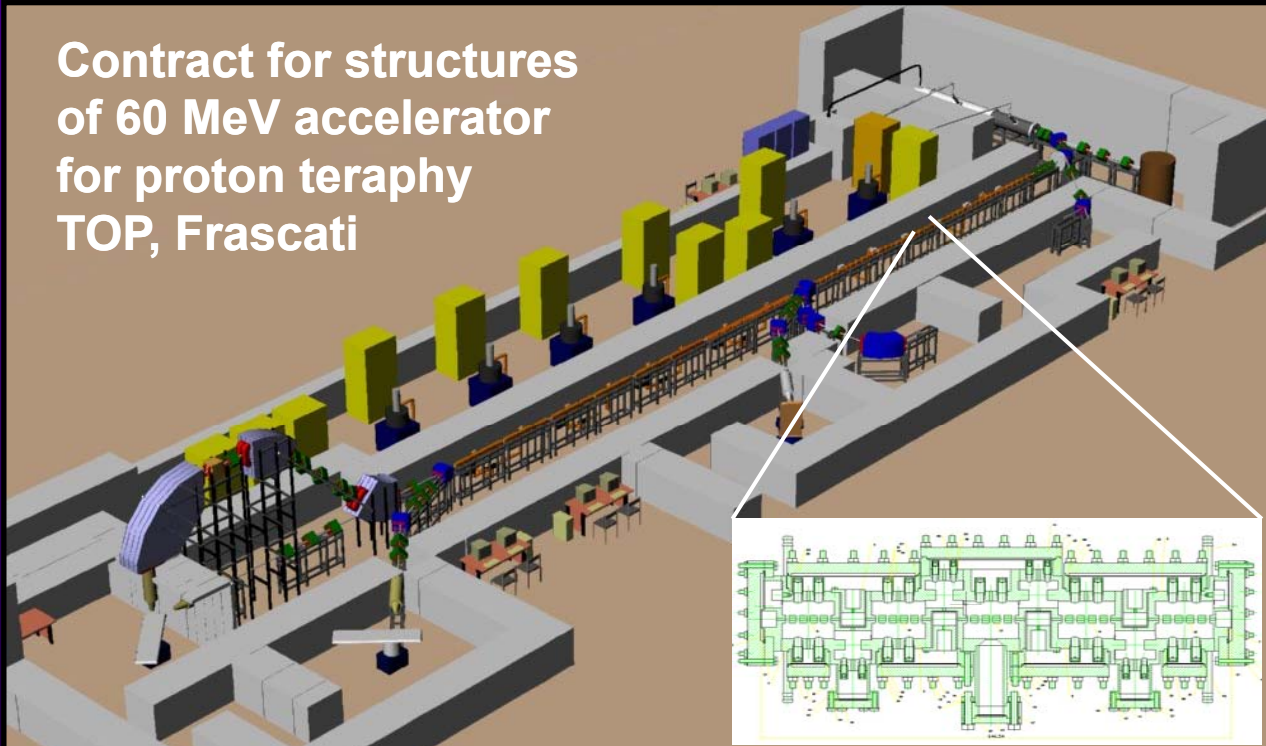


Accelerator technologies

Prototype warm cavities
1.3 GHz for Tesla-FEL,
DESY, Hamburg



Contract for structures
of 60 MeV accelerator
for proton therapy
TOP, Frascati

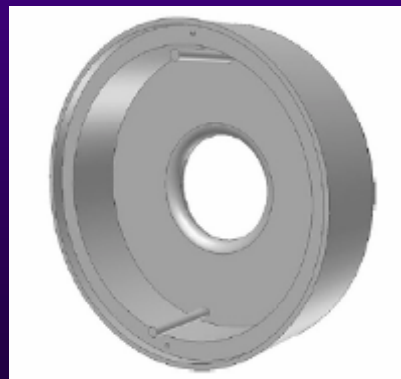
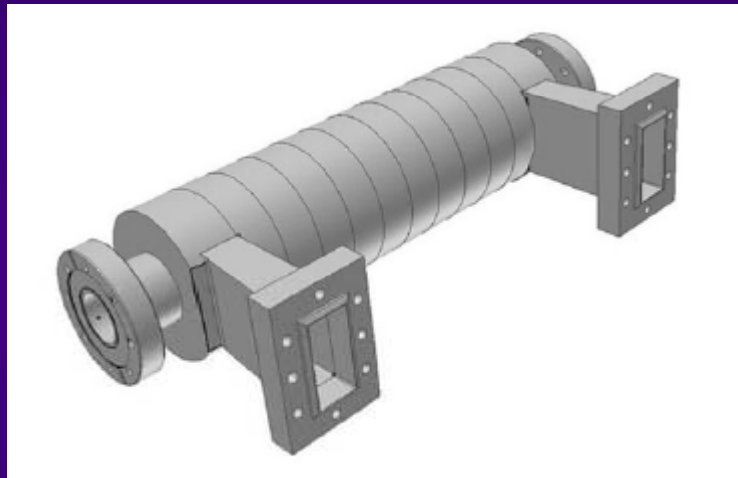


Accelerator target for
Isolde, CERN, Geneva



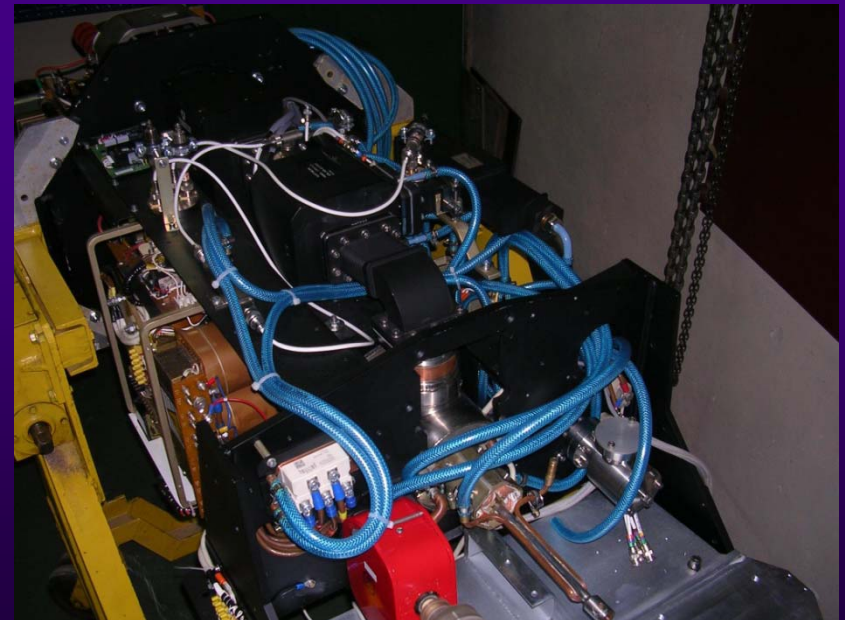
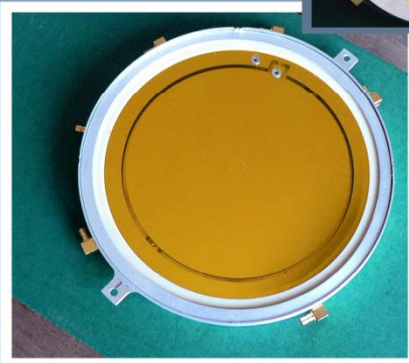
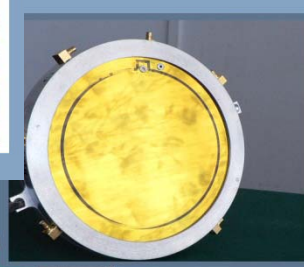
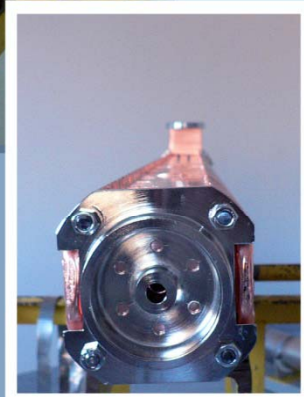
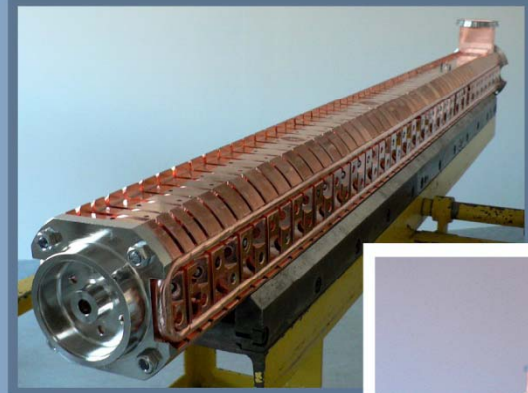
Accelerator technologies

- ▣ 3 GHz deflector for CERN CTF3 combiner ring





Accelerator technologies





**Sterilization
Radiotherapy
Radiography**

2008-12-10



Hitec-Świerk

**Accelerators
for industry
and medicine**



Slawomir Wro



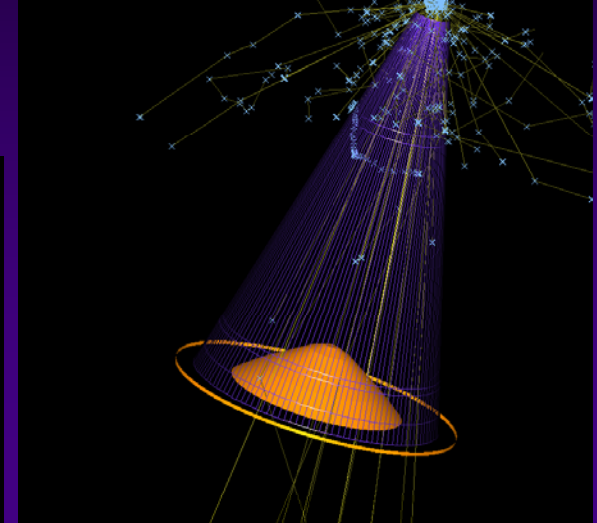
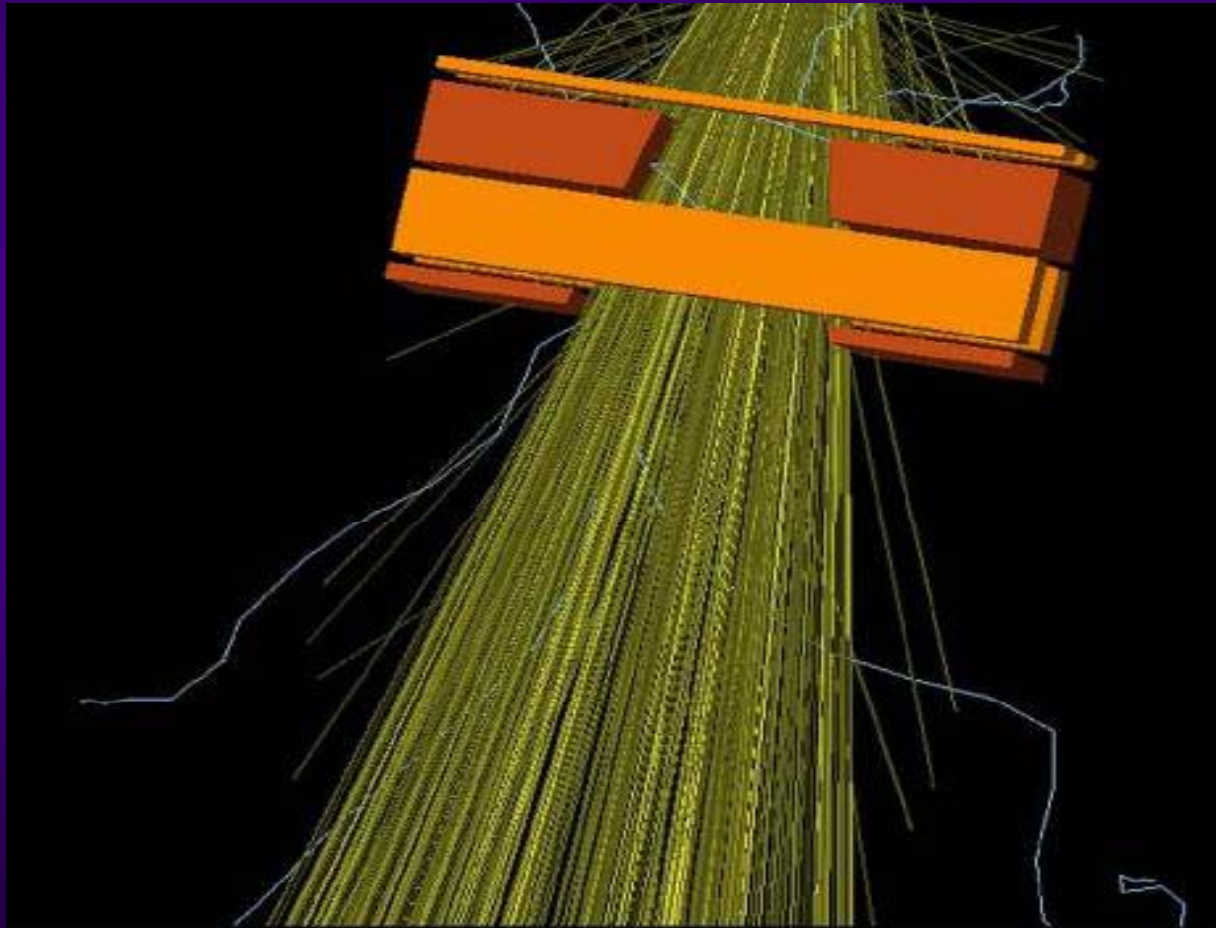


Research & Development

- Designing and manufacturing of different collimators for e^- , n and γ/X beams up to 25MeV
- Calculations, simulations and designing of shelters, radiation centers etc.

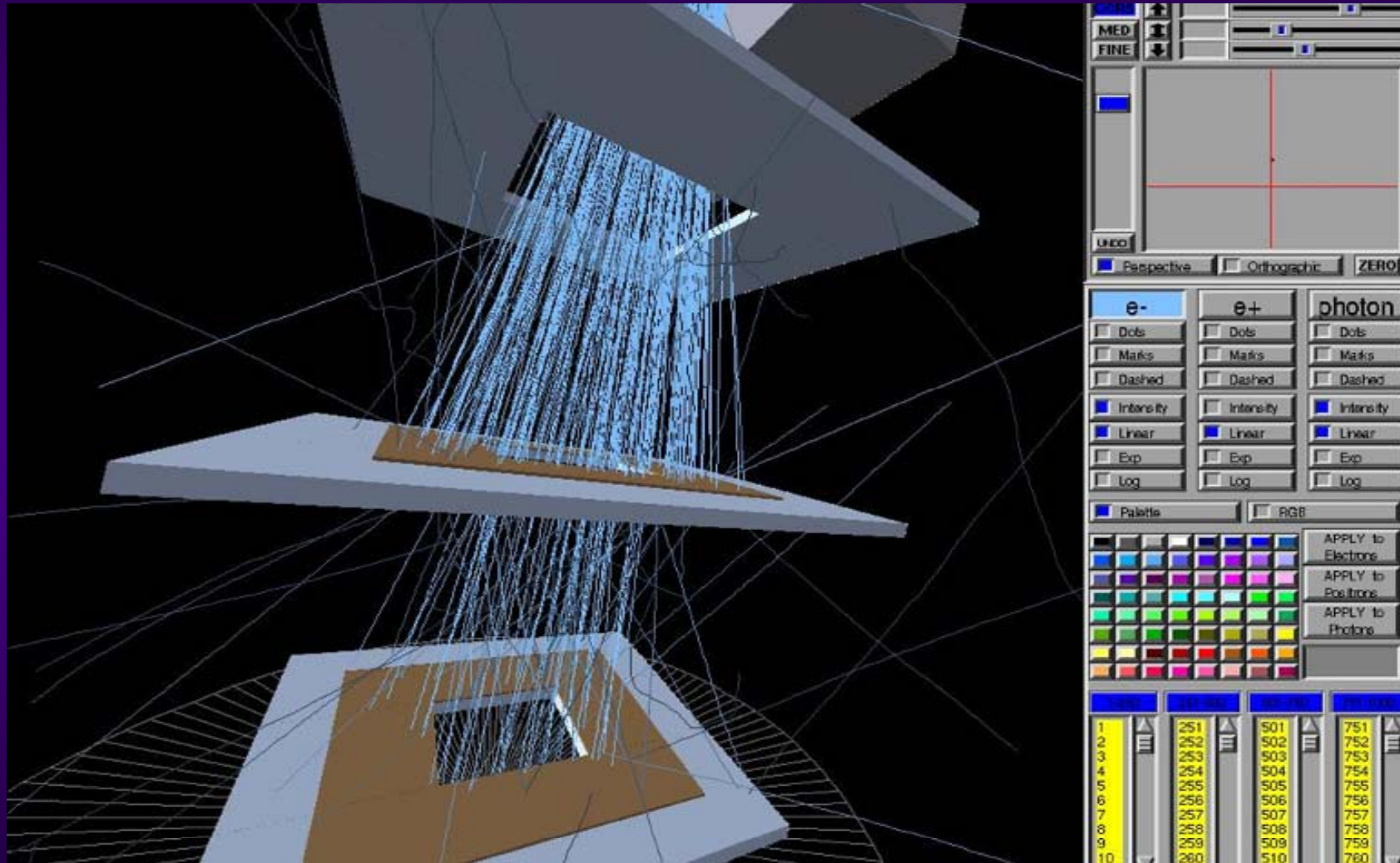


Calculations and design



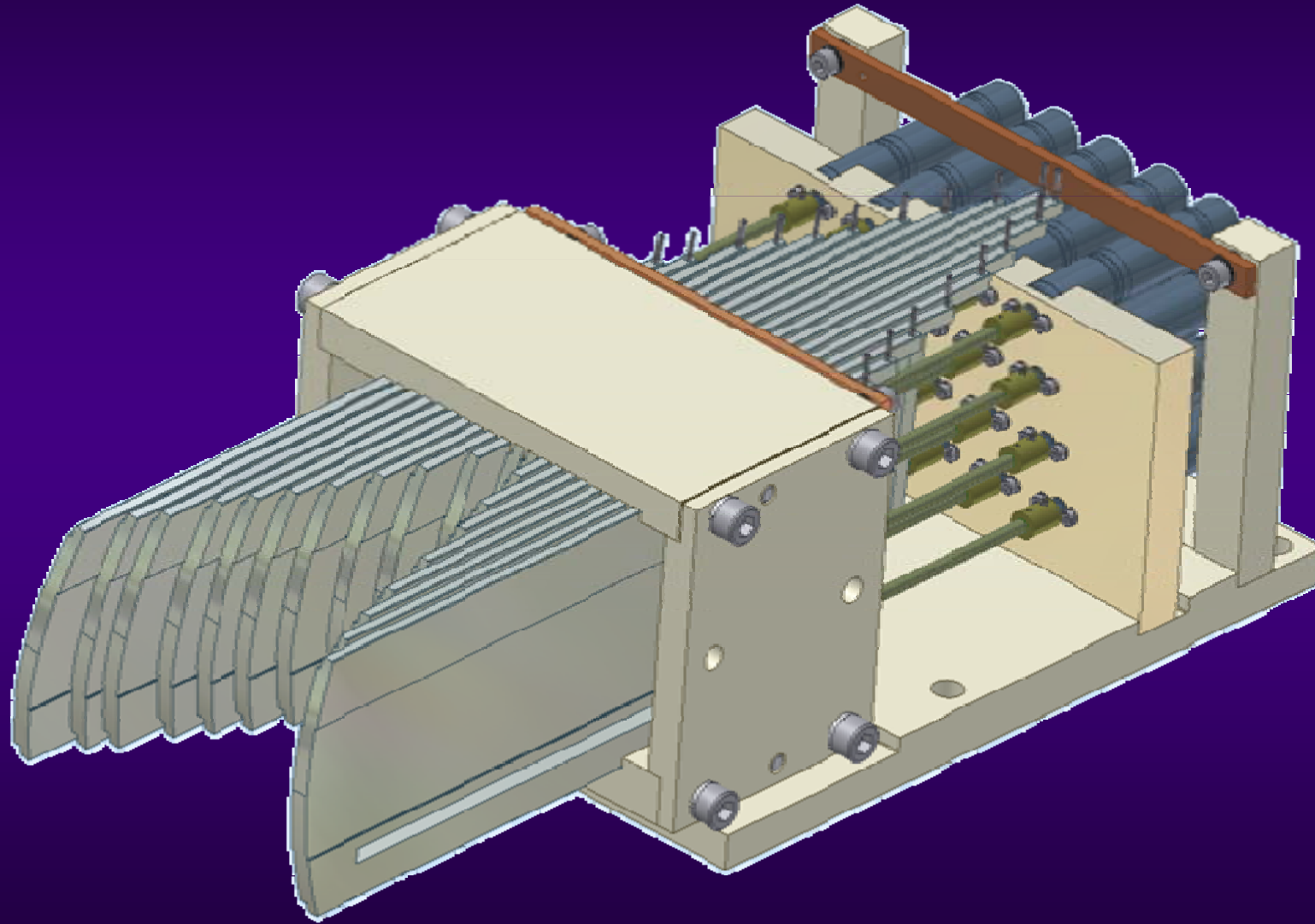


Calculations and design



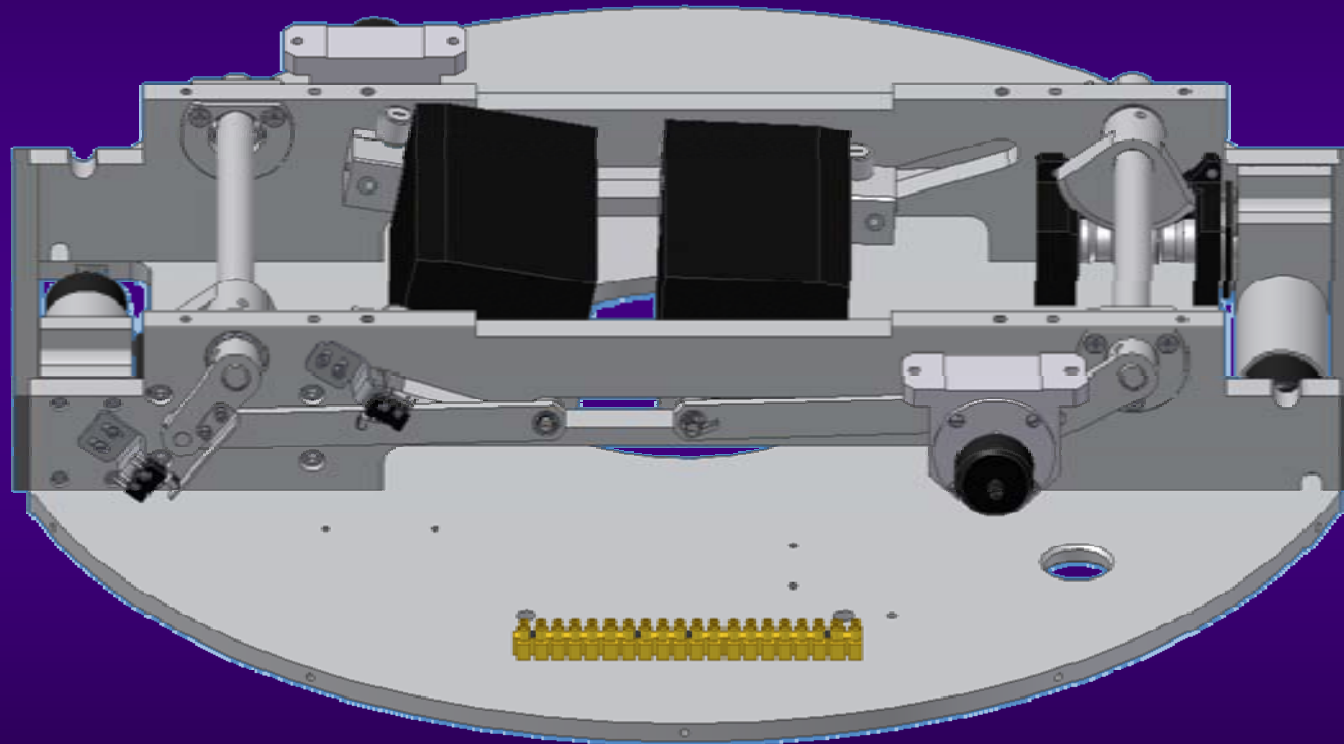


Calculations and design



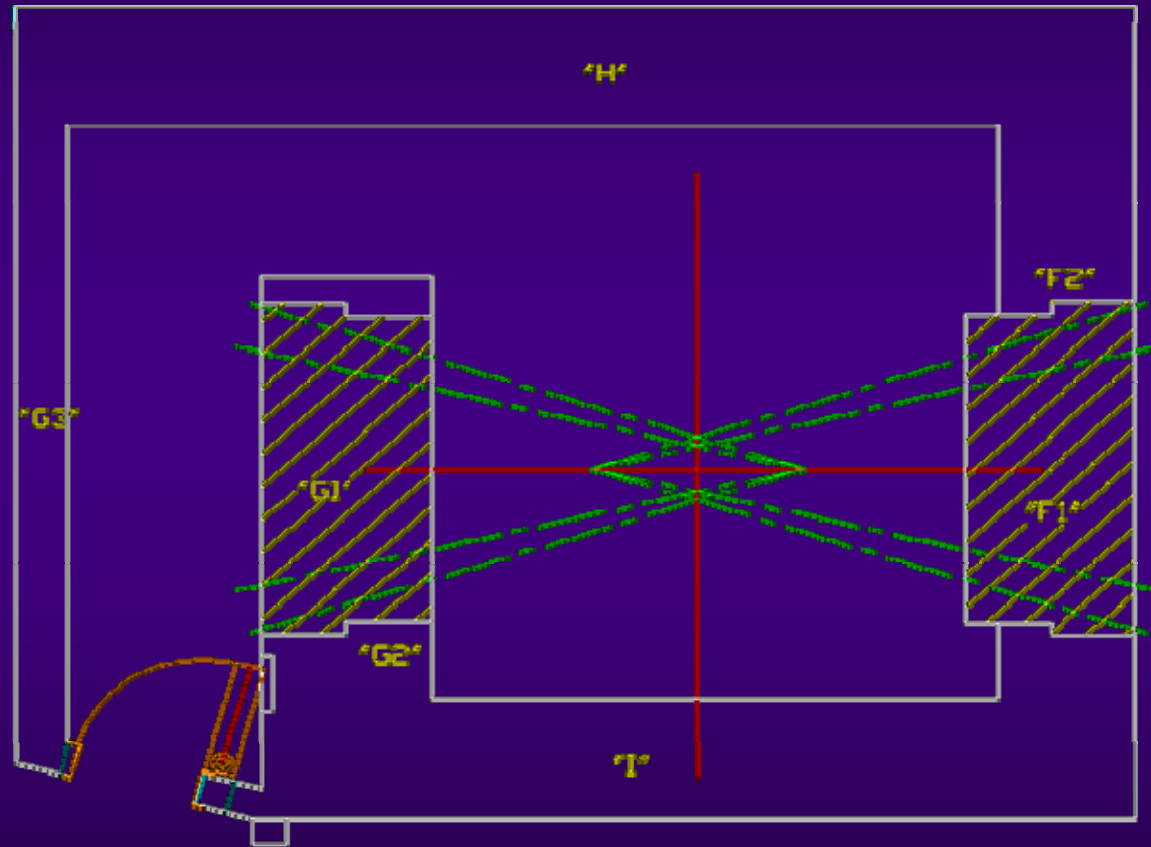


Calculations and design





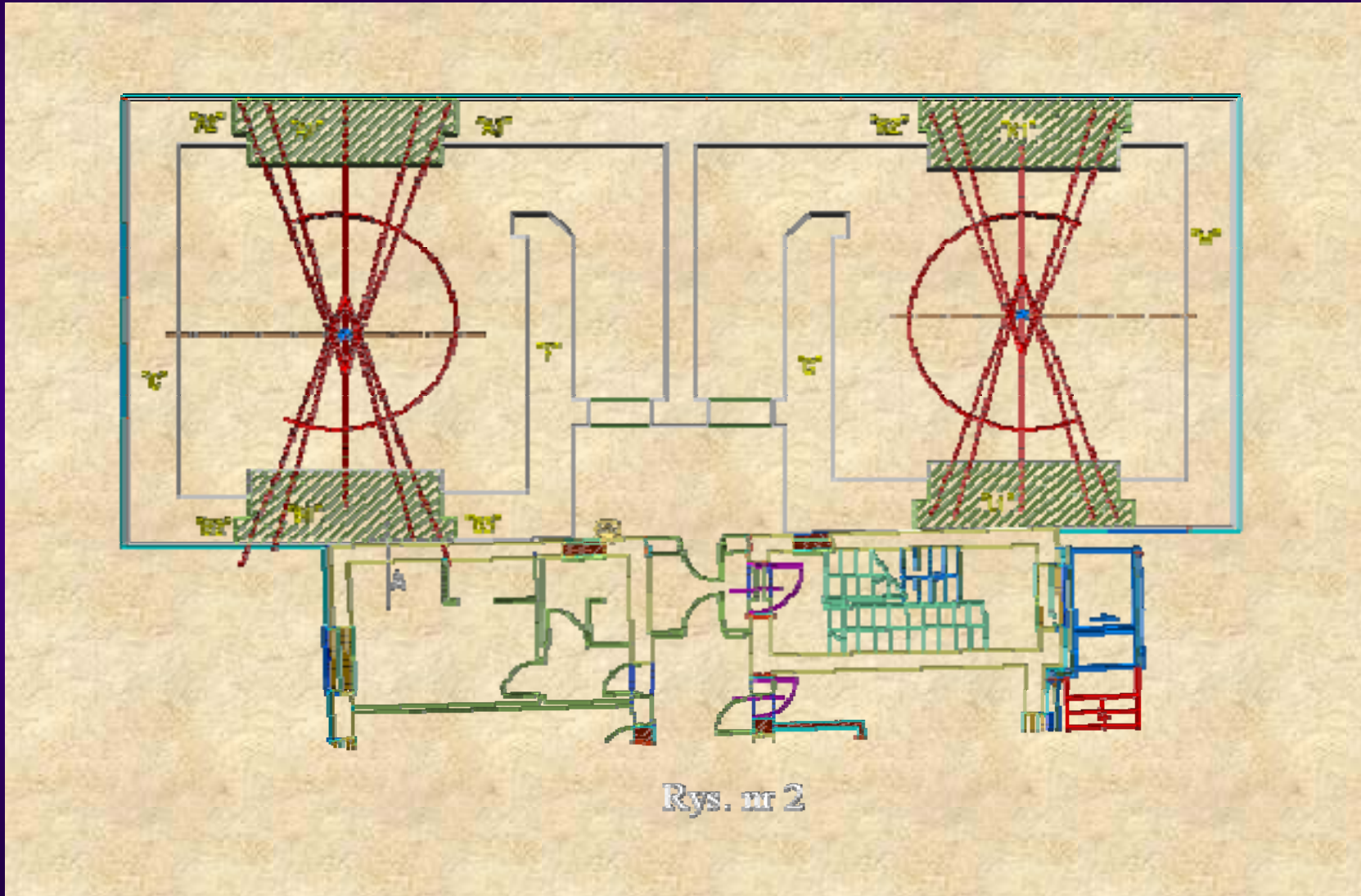
Calculations and design



Rys. nr 1



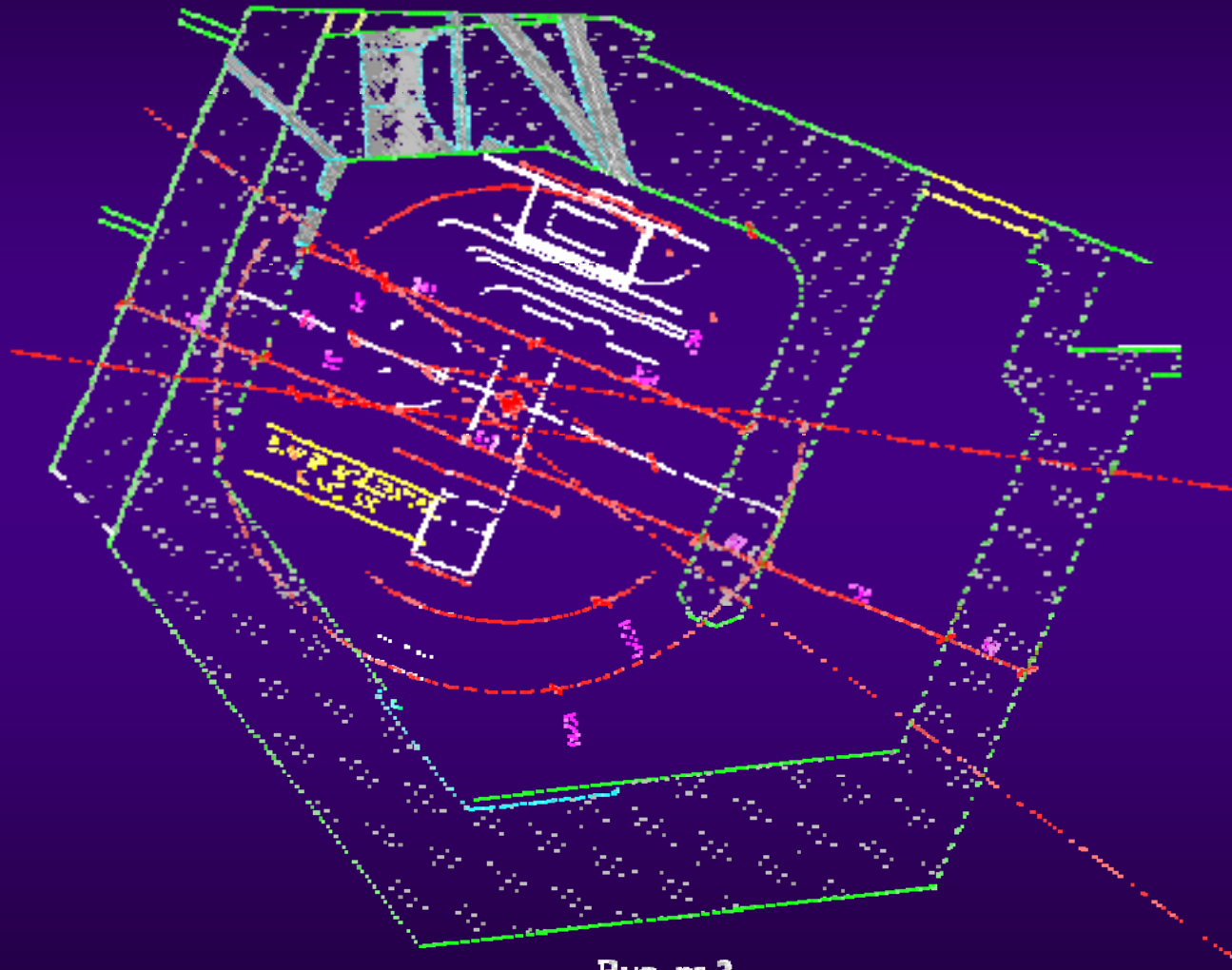
Calculations and design



Rys. nr 2



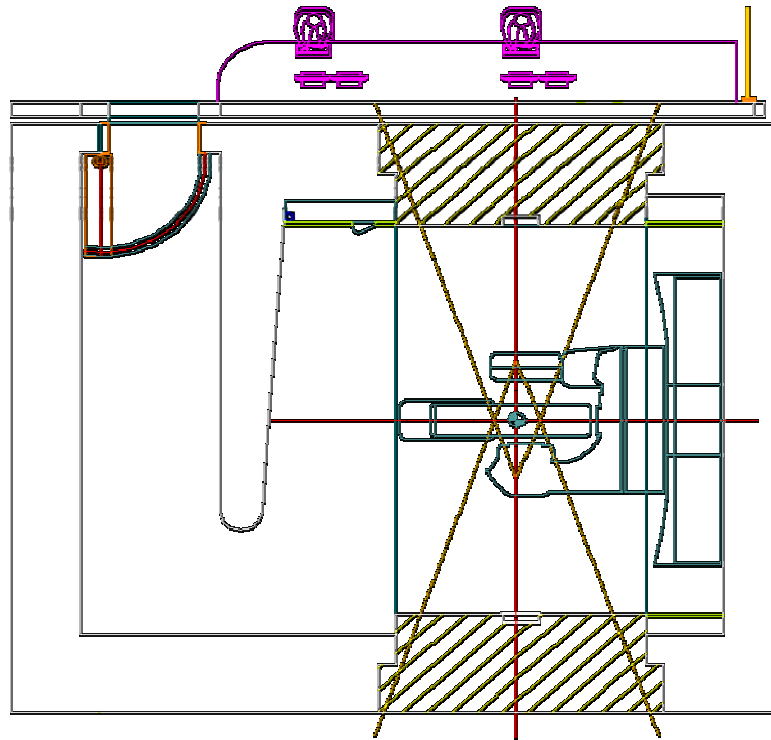
Calculations and design



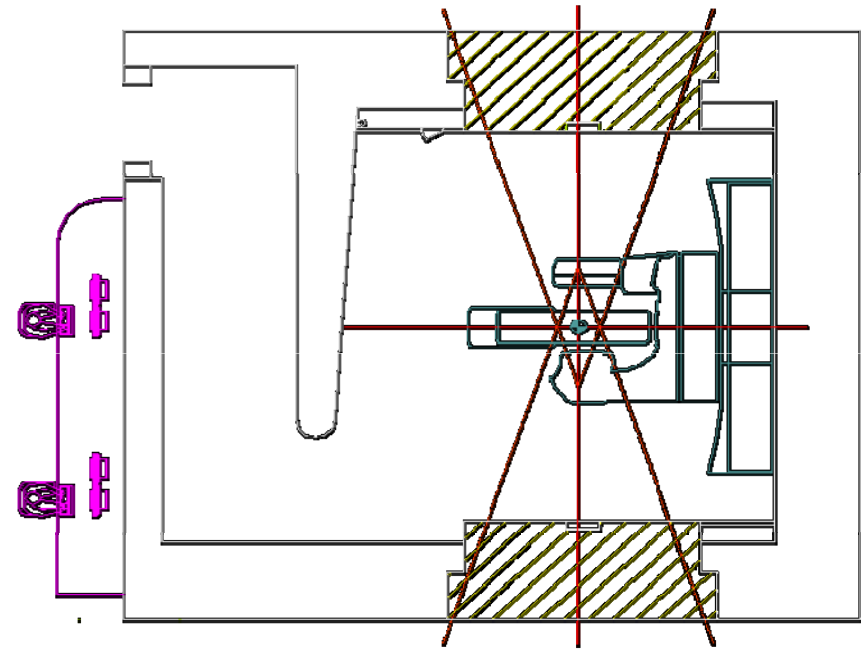
Rys. nr 3



Calculations and design



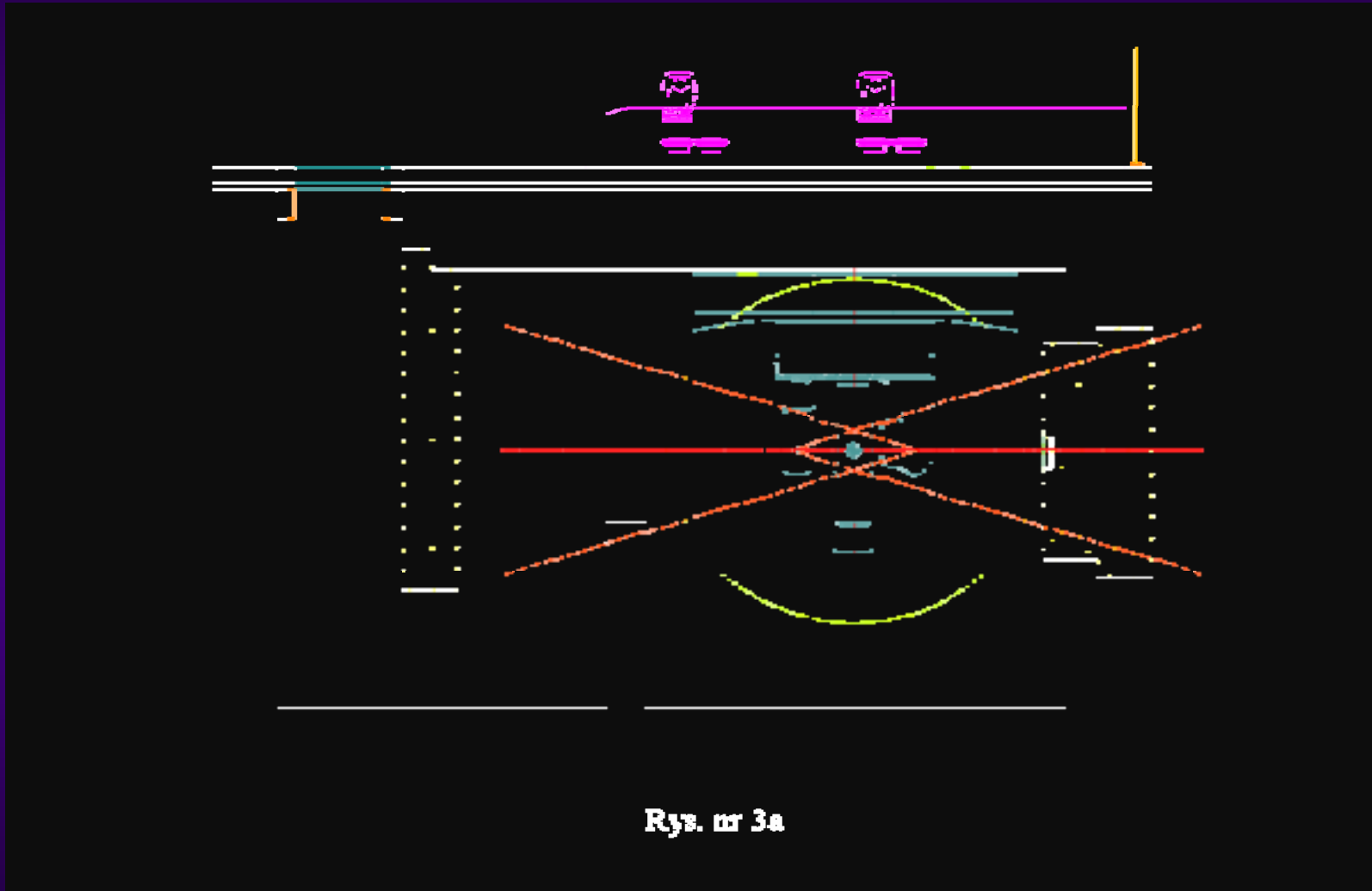
Rys. nr 3a



Rys. nr 3b

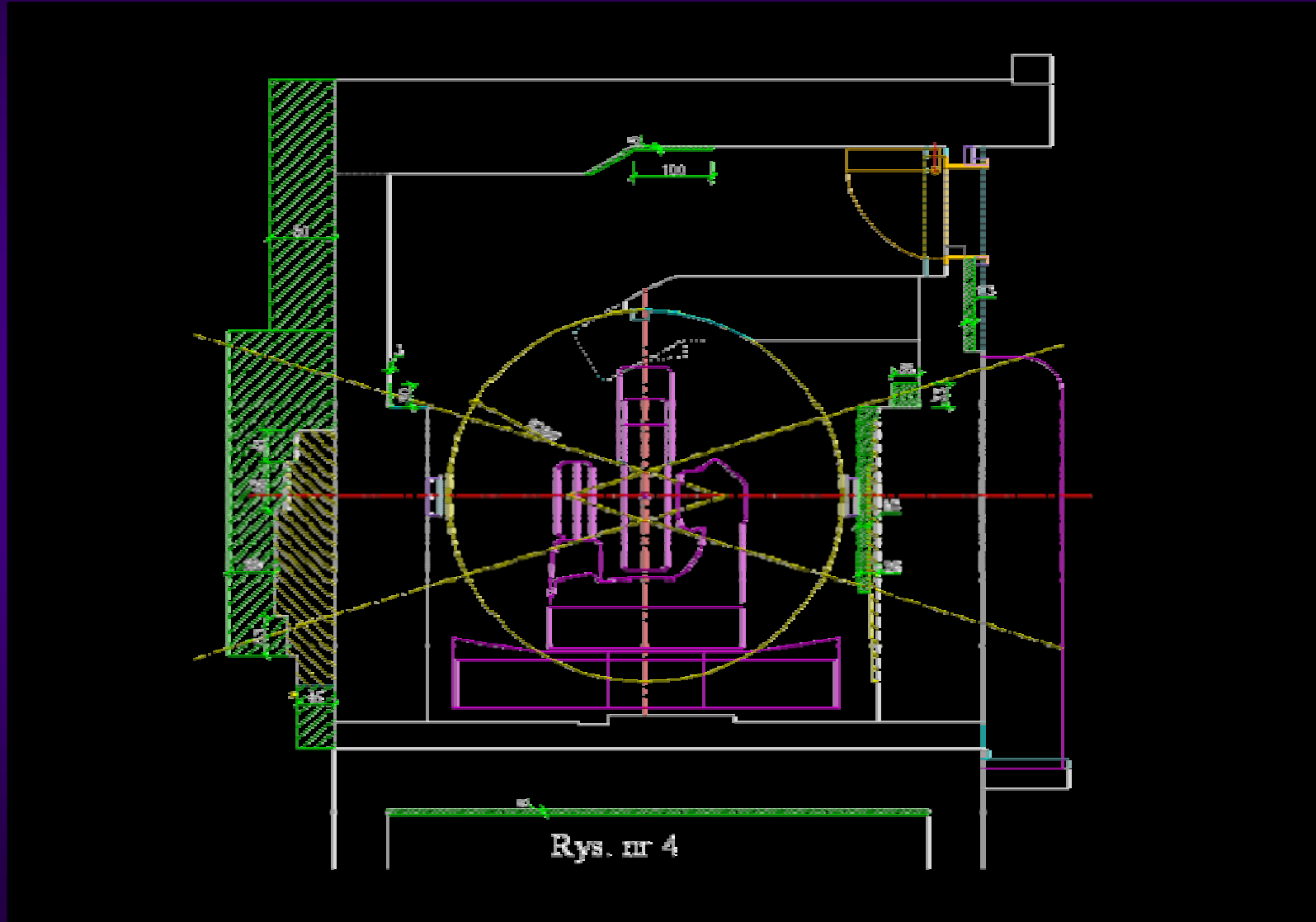


Calculations and design





Calculations and design





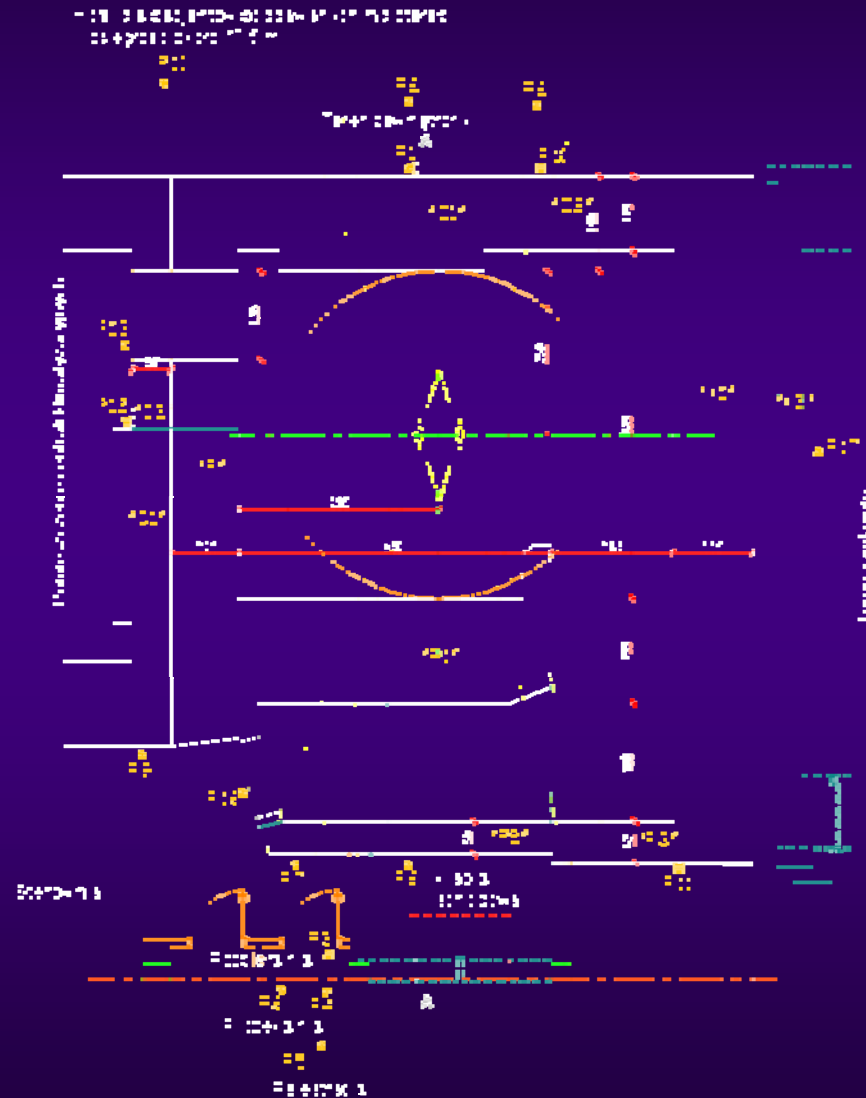
Calculations and design

Materials typically used in projects:

- **Standard concrete** $\rho = 2.0 \div 2,6 \text{ g/cm}^3$
- **Dense concrete** $\rho = 3,1 \div 3,4 \text{ g/cm}^3$
- **Magnetite concrete** $\rho = 3,2 \div 4,0 \text{ g/cm}^3$
- **Lead**
- **Steel**
- **Paraffin**
- **Polyethylene**

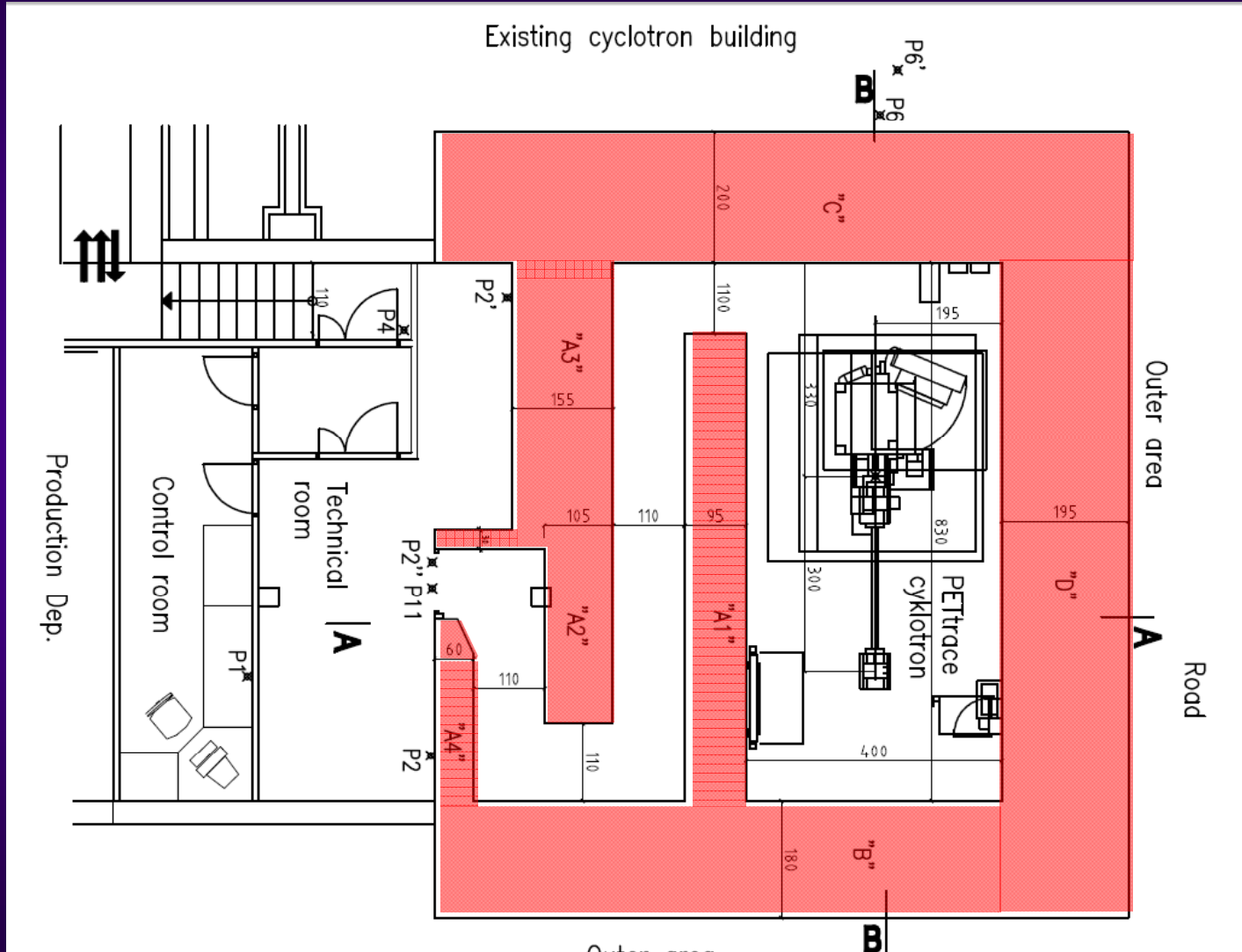


Calculations and design



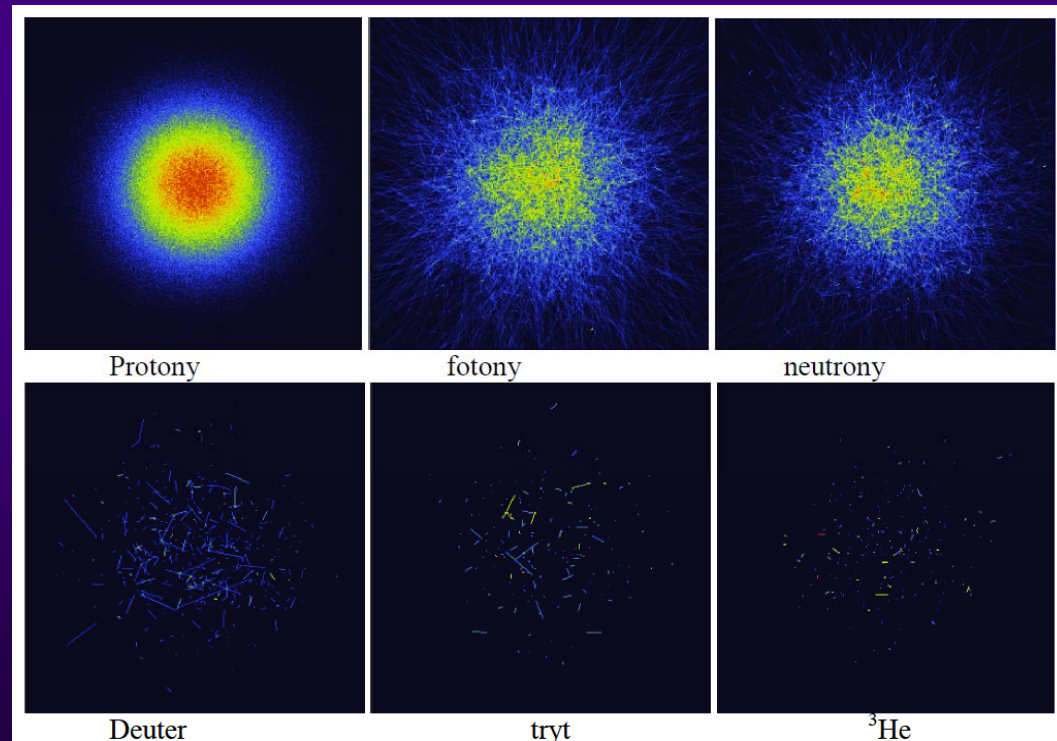
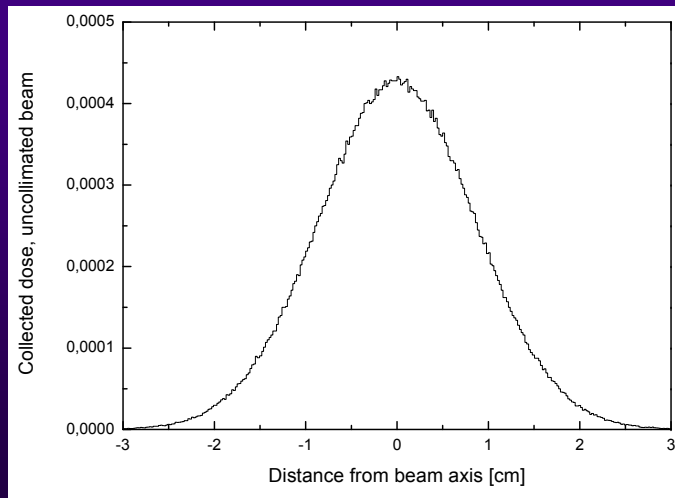
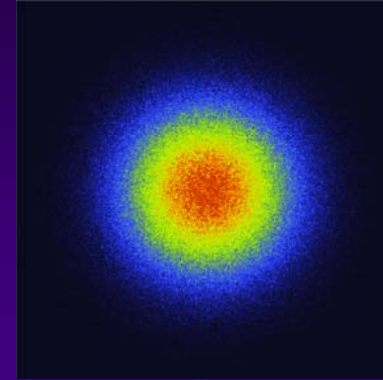
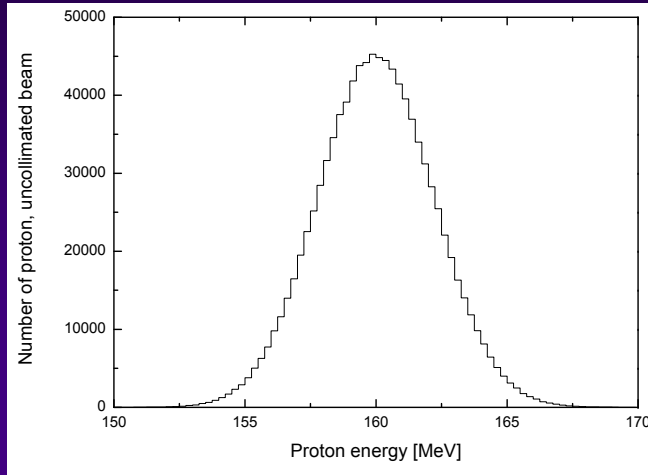


PET cyclotron



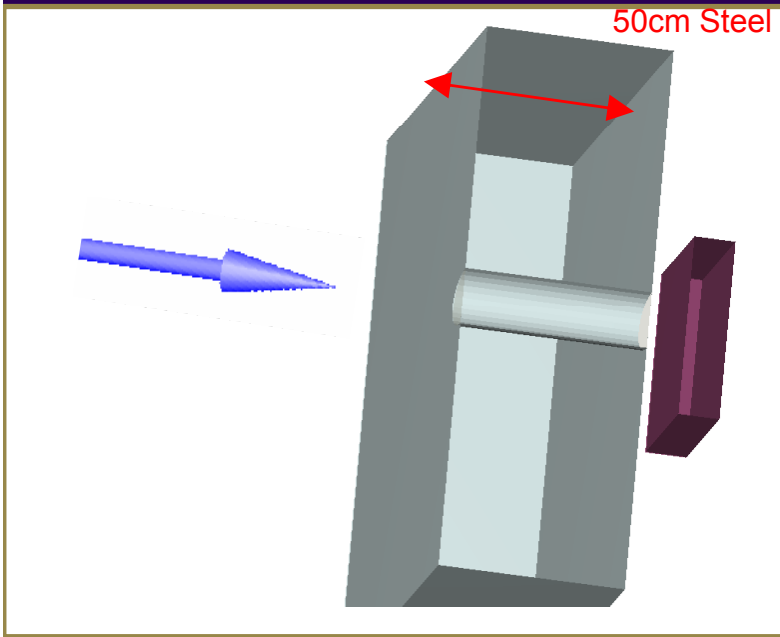


Fluka simulations

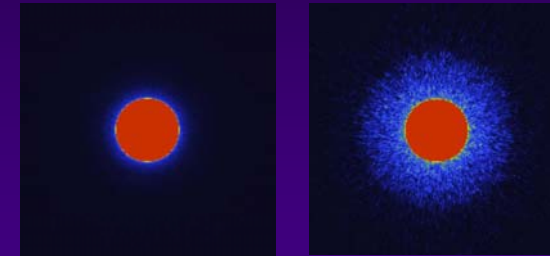




Fluka simulations

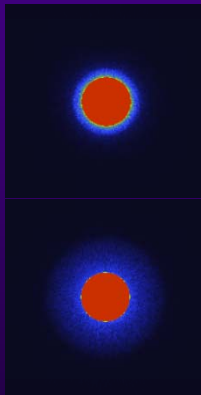


Total dose

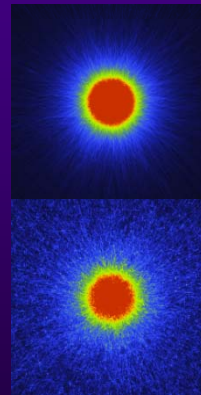


50cm

15cm



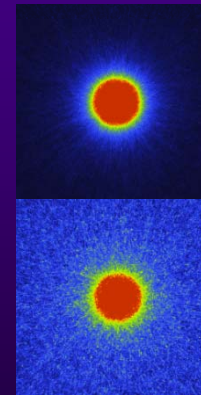
Protons



photons

50 cm

15 cm



neutrons

