Proton beams at IFJ Krakow - present status and future developments

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Outline

1. Calibration needs for space dosimetry

2. Photons at IFJ
   - 300 kVp X-rays therapeutic lamp
   - Cs-137 calibration room
   - Theratron 780 Co-60
   - 6-18 MV X-rays (COOK Krakow)

3. Protons at IFJ
   2.5 MeV protons from Van de Graaff
   60 MeV from AIC-144 cyclotron

4. Project of the National Centre for Hadron Radiotherapy (60 -250 MeV protons with scanning beam)

5. Do we need a dedicated calibration protocol (calibration site?) for space dosimetry?

Calibration of space dosimeters

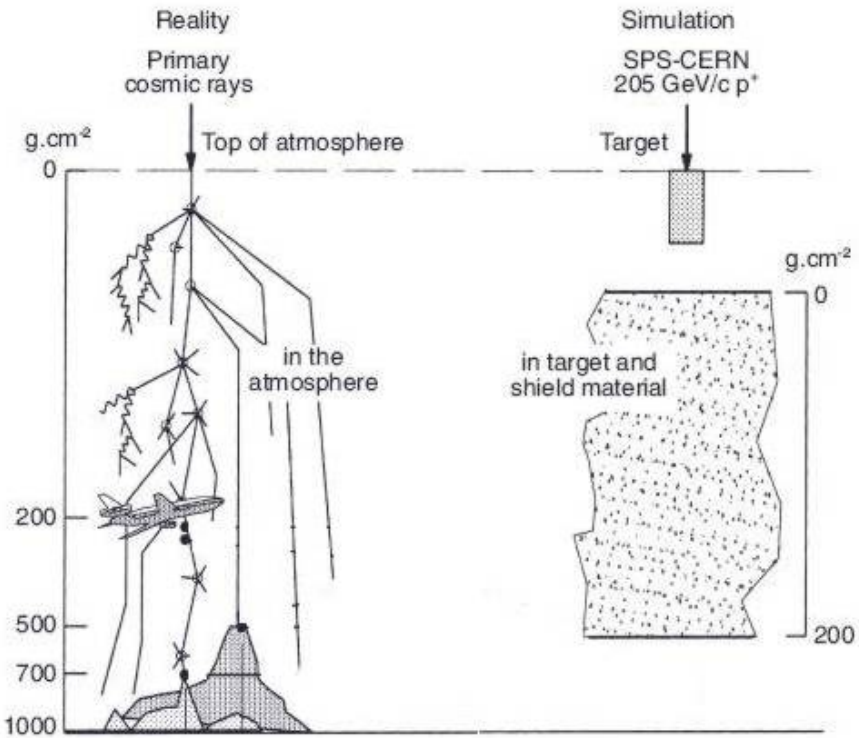
1. Primary and secondary fields complicated

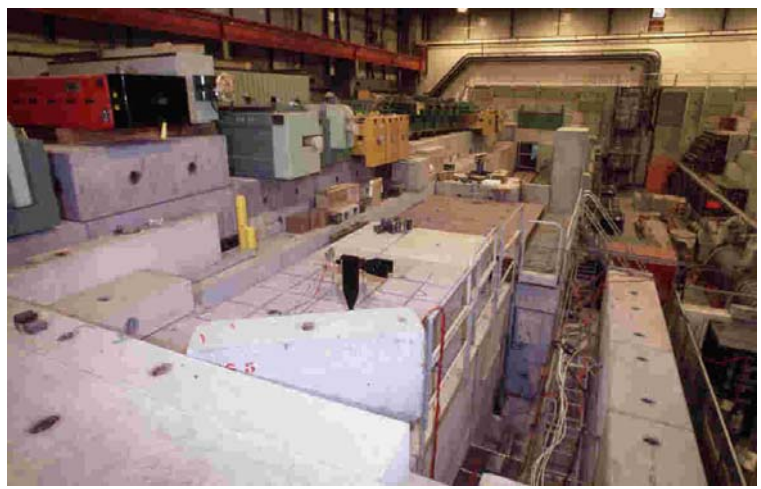
- **protons + heavy ions**
- **electrons**
- **neutrons**
- **gamma**
- **others**

2. There is no single one relevant calibration field for space dosimetry

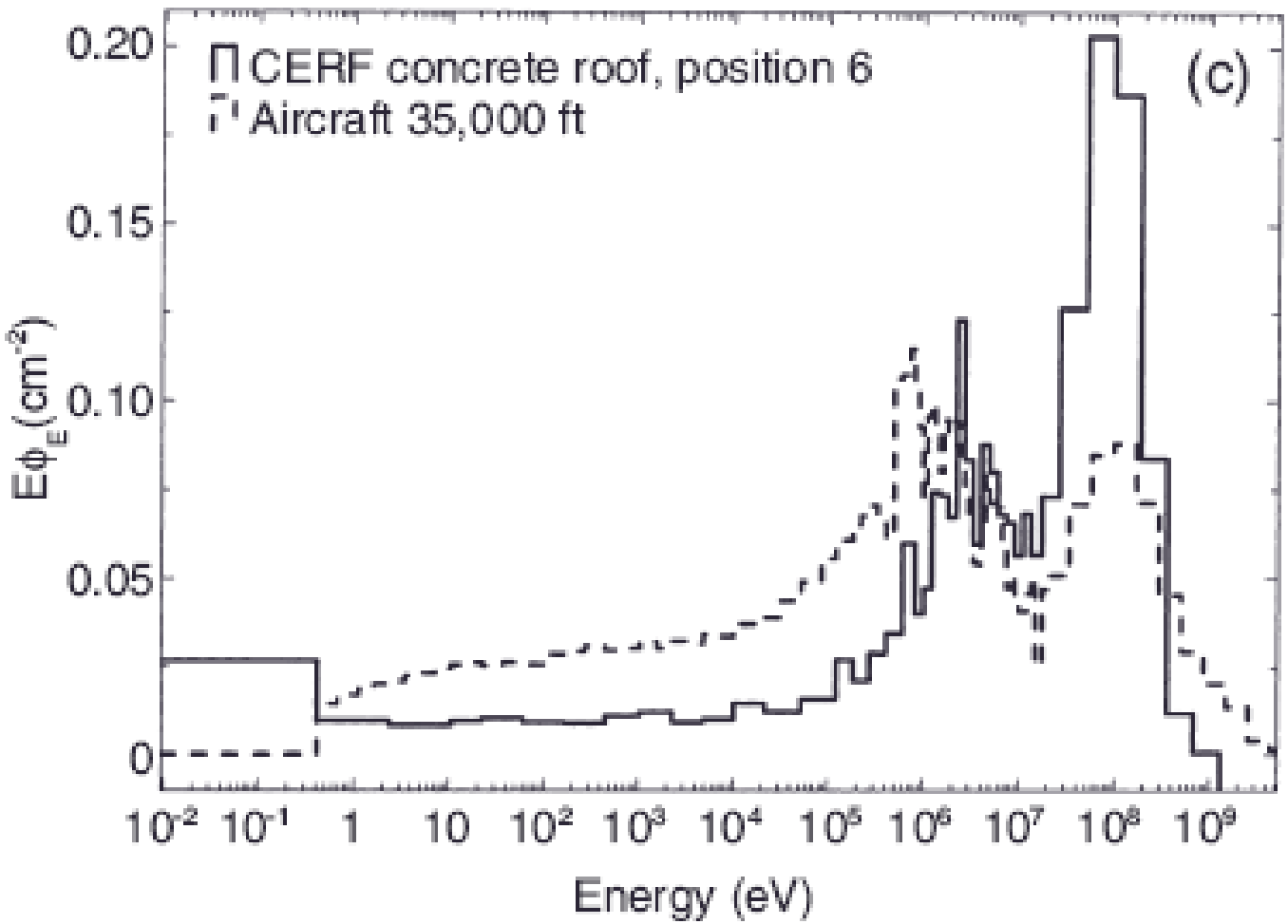
3. No specific protocol

CERF calibration field for aircrew dosimetry





CERF calibration field for aircrew dosimetry



Calibration laboratory

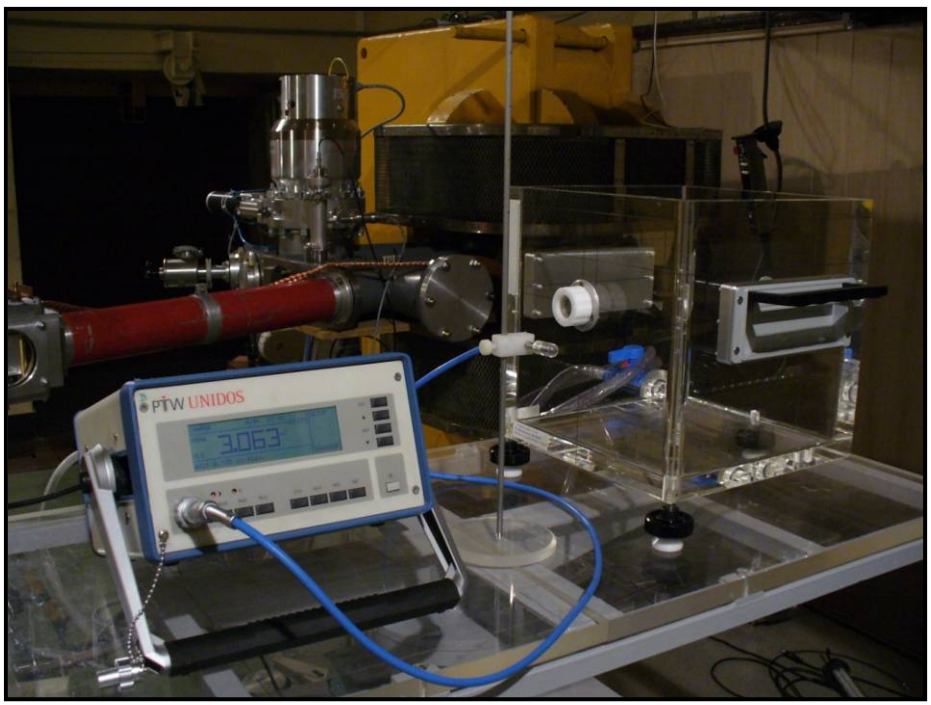
Cs-137 : 100 nGy/h – 1 Gy/h

Philips 300 kVp –X-rays ;
1 Gy/min

Traceability: Polish Main Office of Measurements

THERATRON 780E

^{60}Co γ-rays
Dose rate 0.5 -2 Gy/min
Traceability: Secondary Standard Laboratory, Centre of Oncology Warszawa (->IAEA)



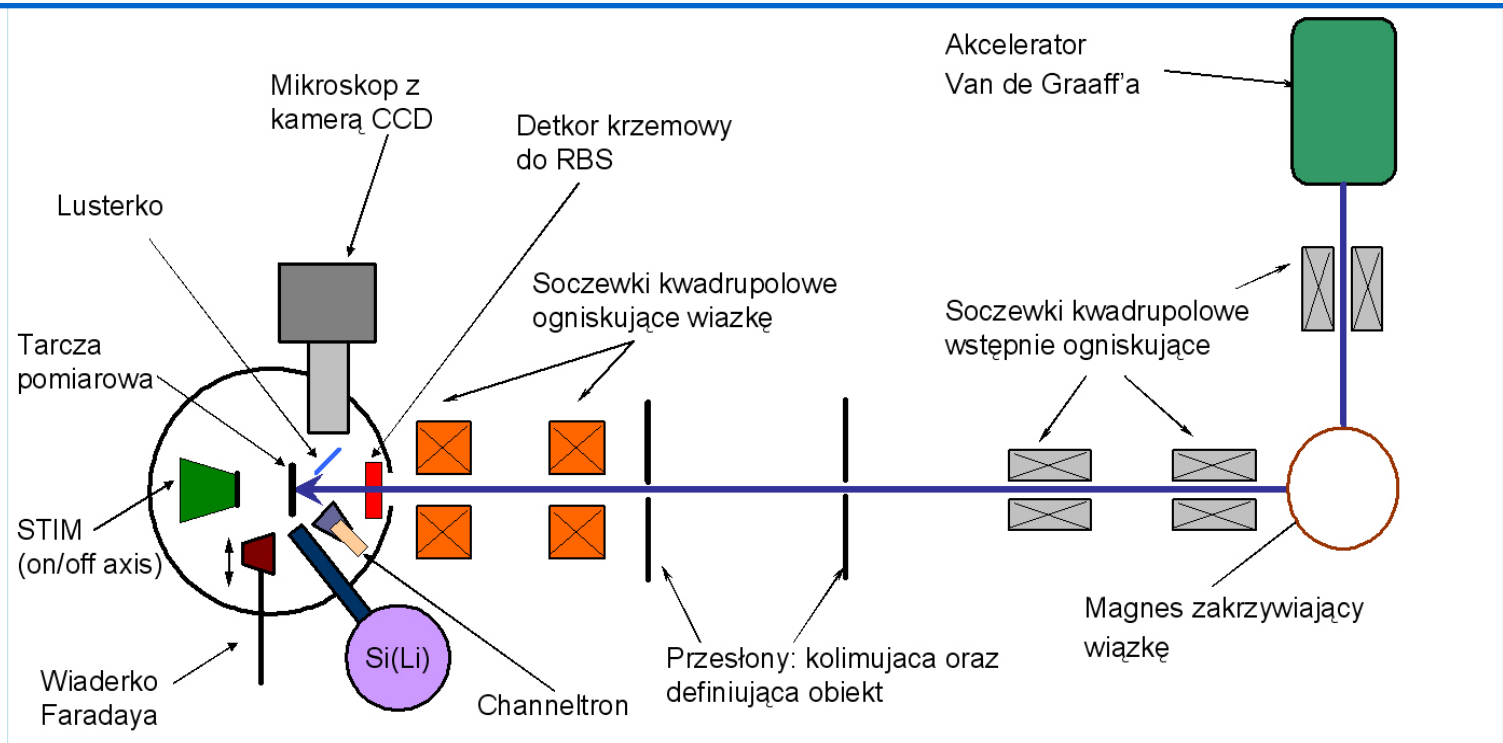
Van de Graaff accelarator

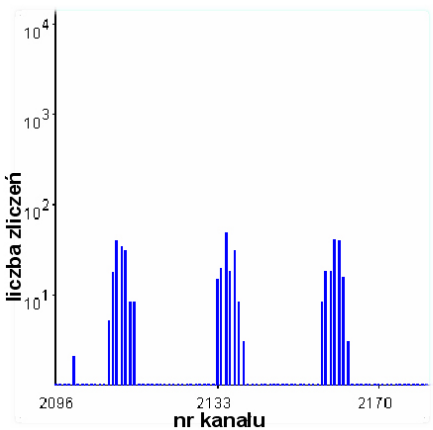
Beams: 2.5 MeV p

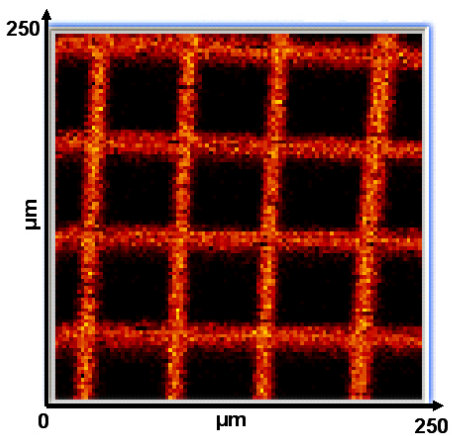
2 μm beam spot at 100 pA

Applications: μbeam, single proton irradiation

Van de Graaff accelarator - μbeam



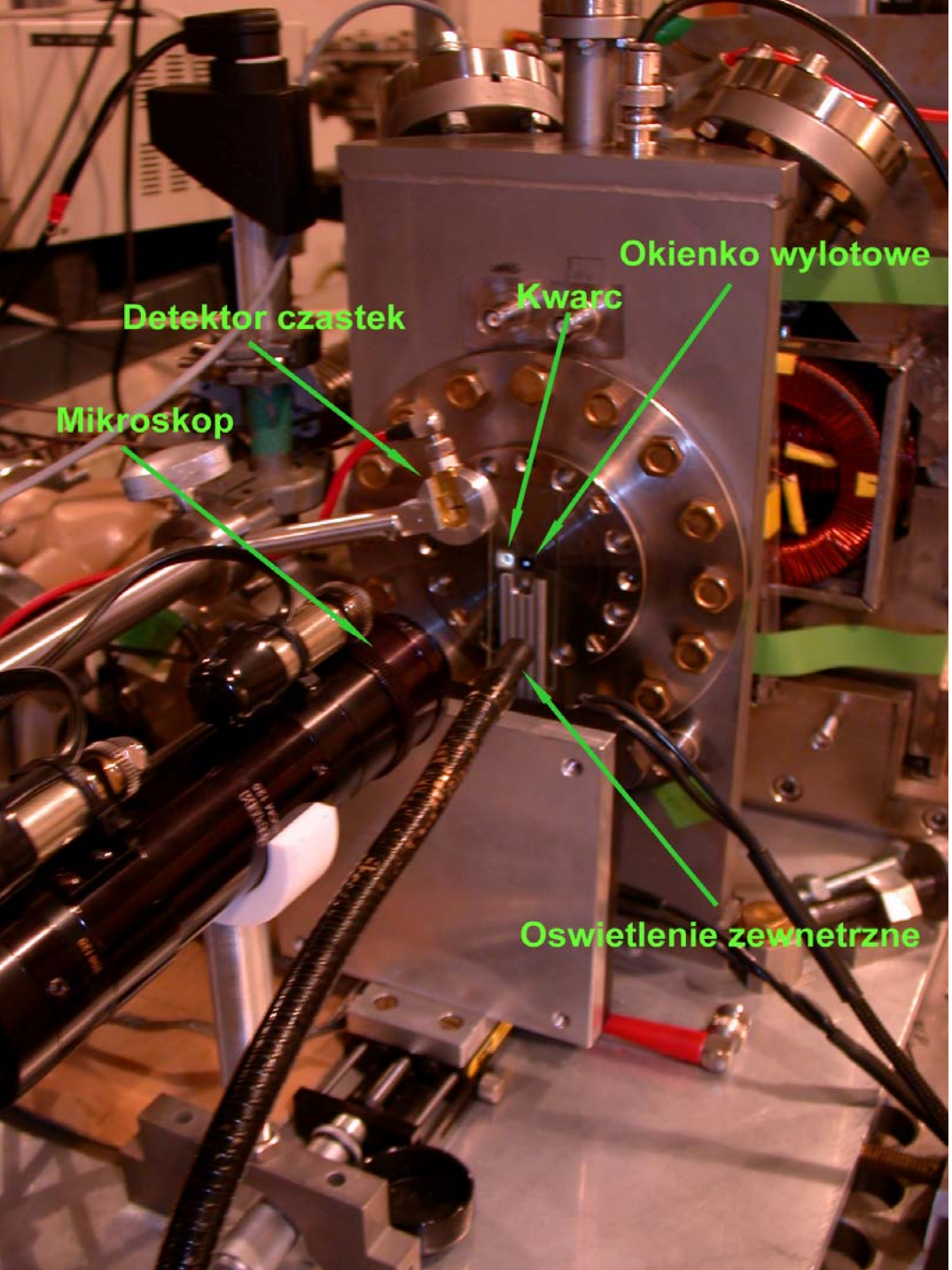


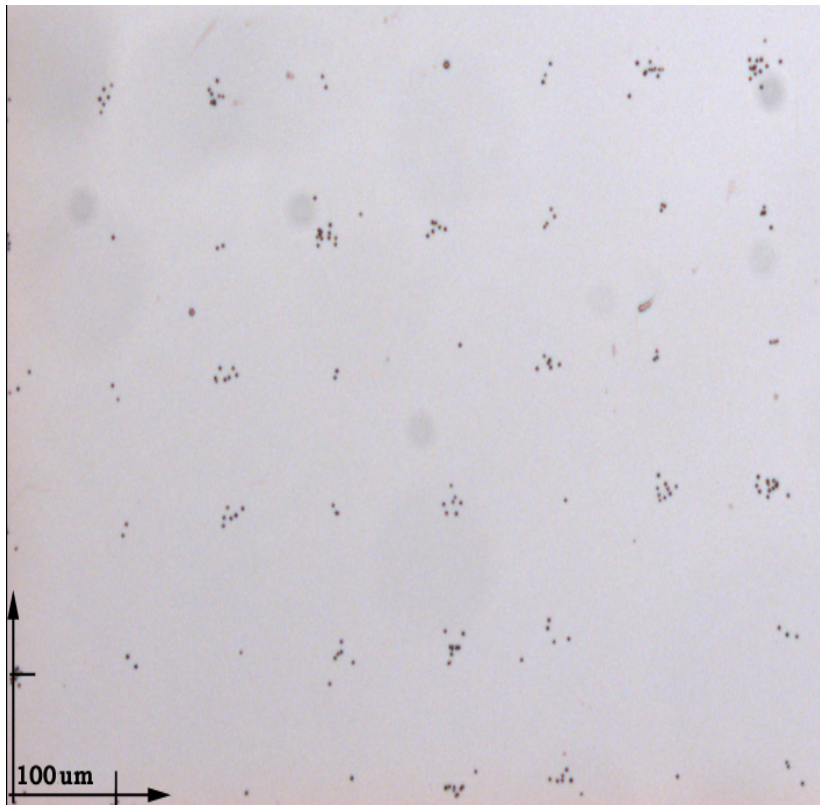


2 μm beam spot at 100 pA

Single Proton Irradiation faclility at IFJ

2.5 MeV protons

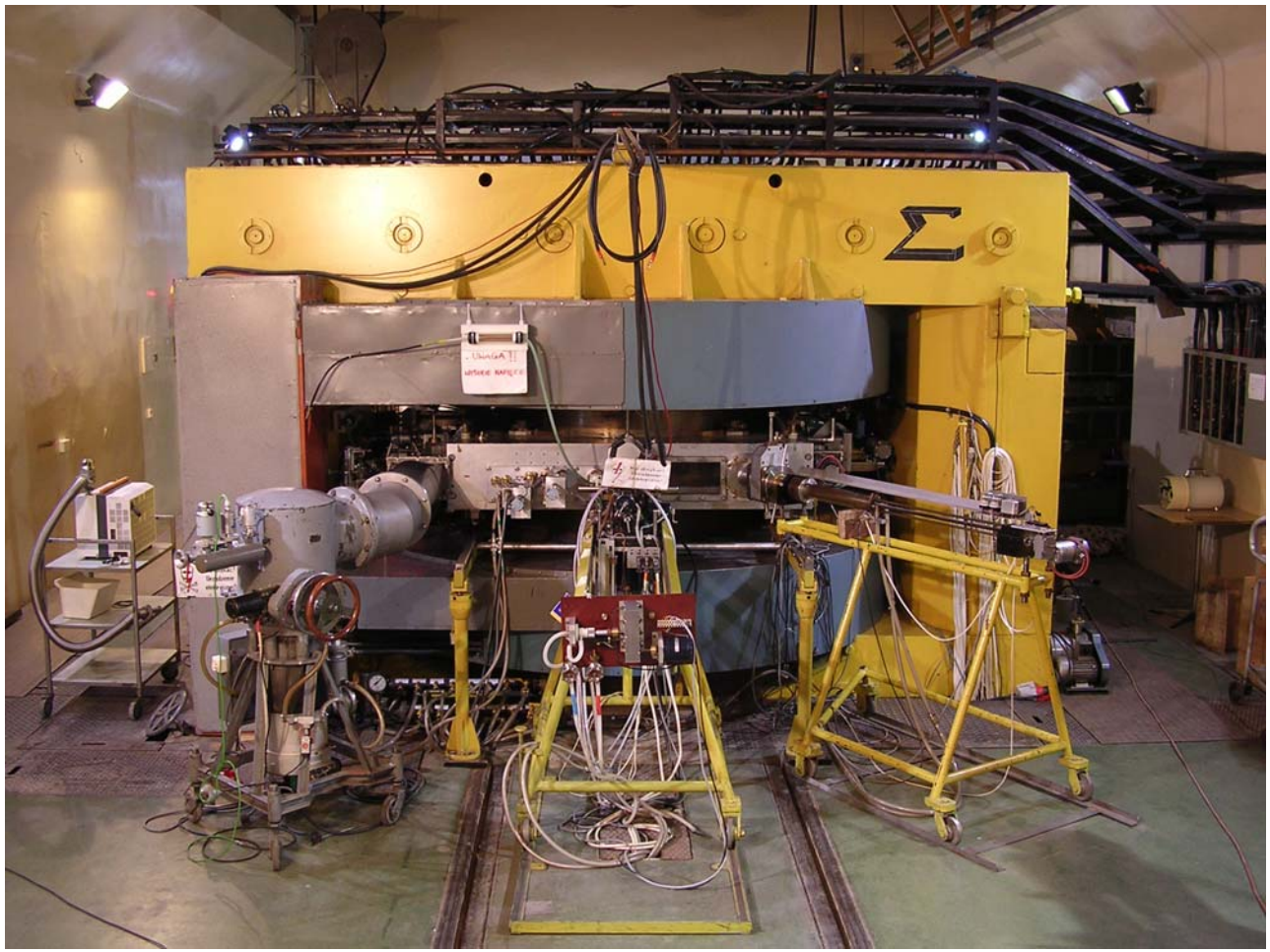




CR-39

AIC-144 cyclotron

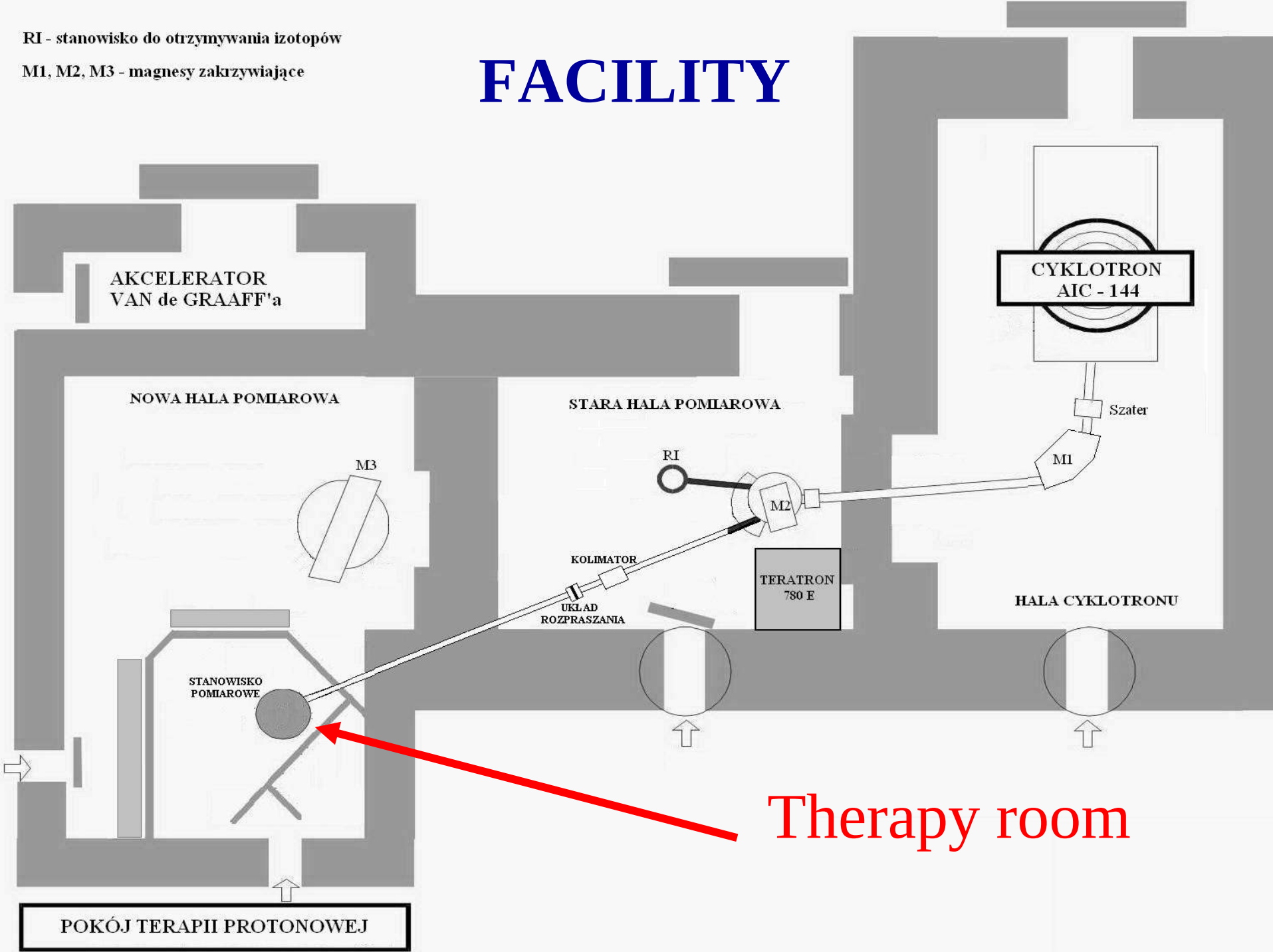
- **isochronous**
- **developed at IFJ**
- **60 MeV protons**
- **internal 10 μA**
- **extracted 2 μA**



RI - stanowisko do otrzymywania izotopów

M1, M2, M3 - magnesy zakrzywiające

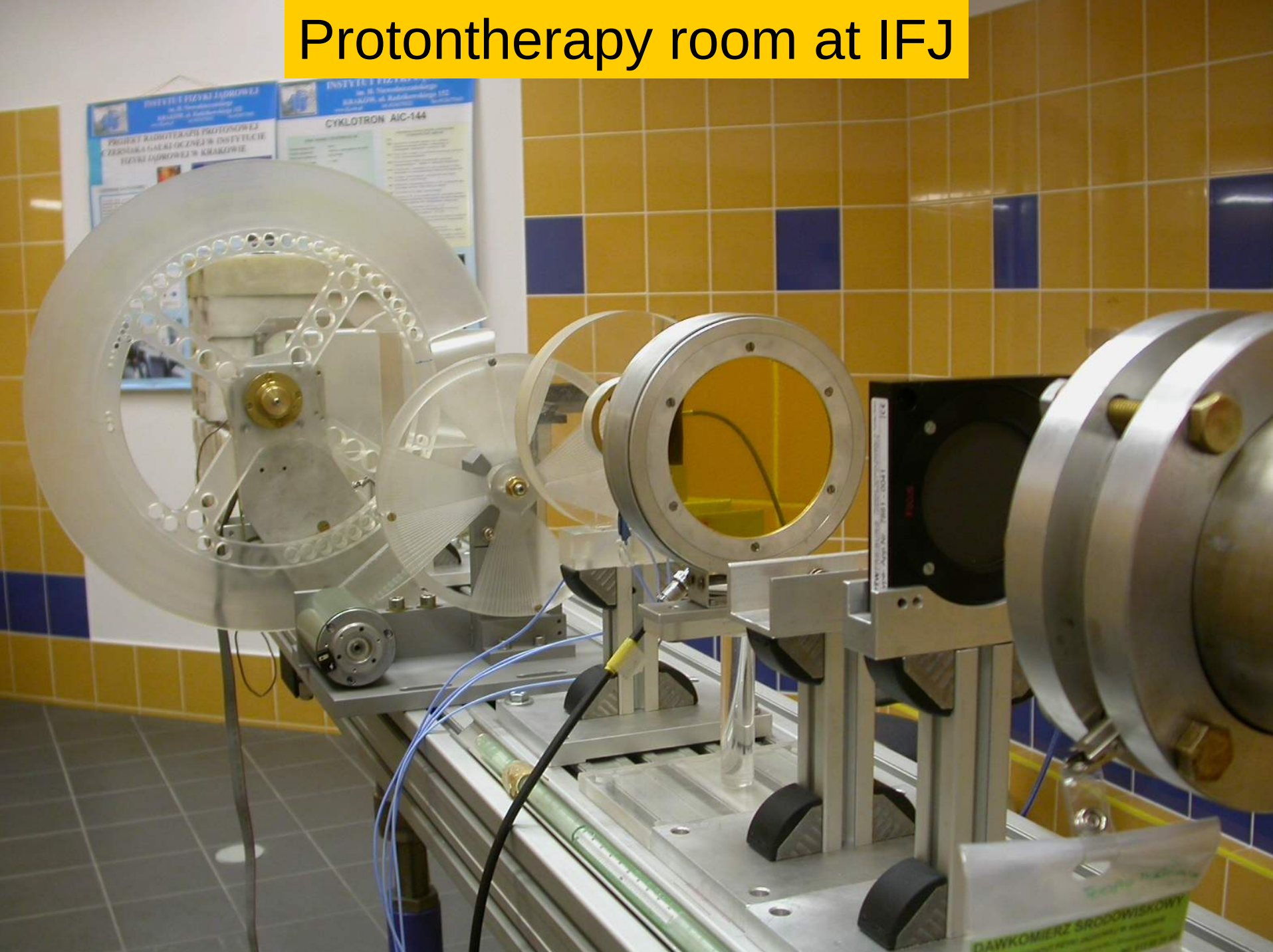
FACILITY



Therapy room

Protontherapy room at IFJ

Protontherapy room at IFJ



Dosimetric equipment

Markus chmber
PTW 23343

Farmera chamber
PTW 30010

Dosimetric diode
PTW 60012

Unidos dosemeter PTW 10001

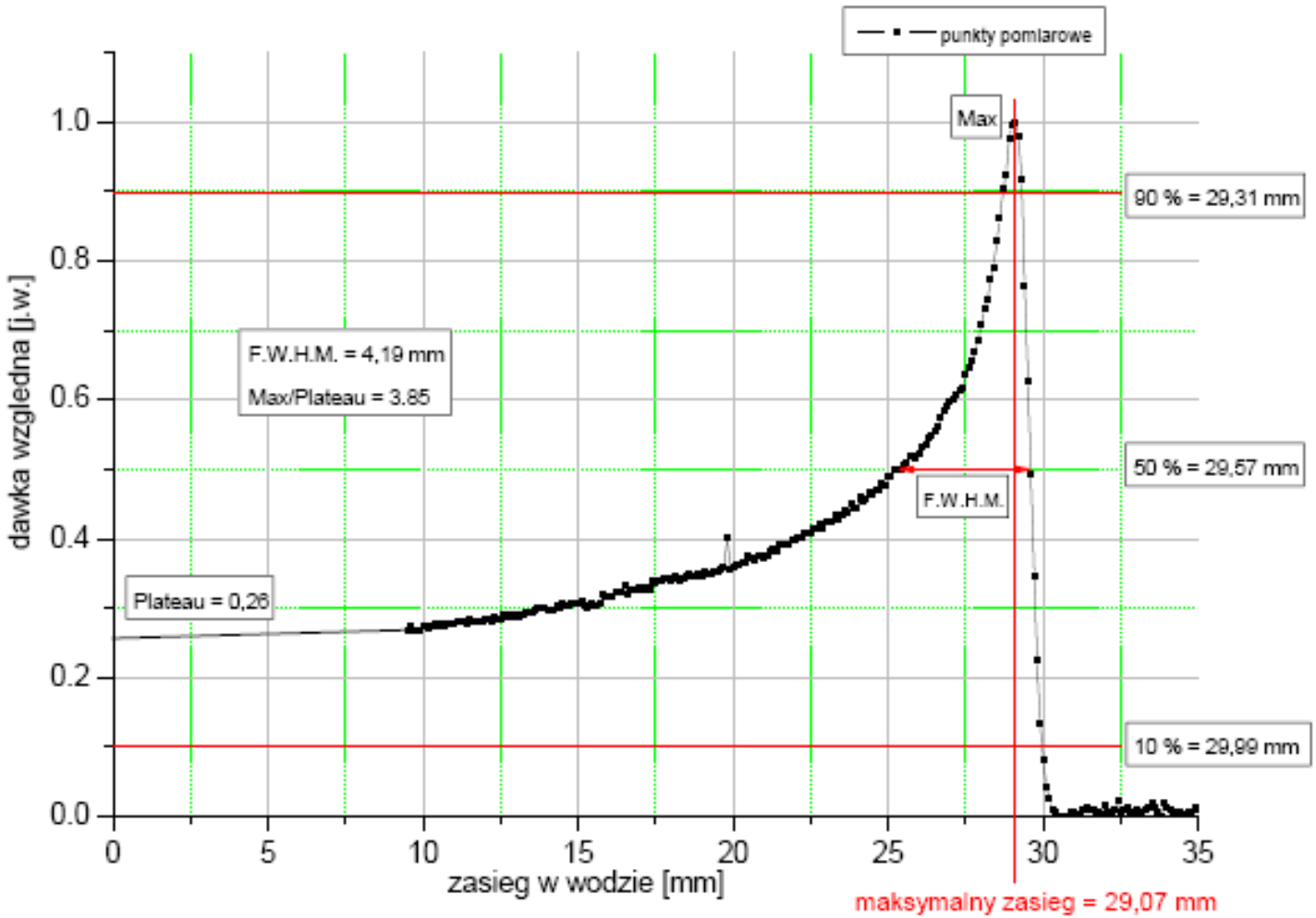
Transsmision chamber
PTW 7862

Thimble chamber
PTW 31002

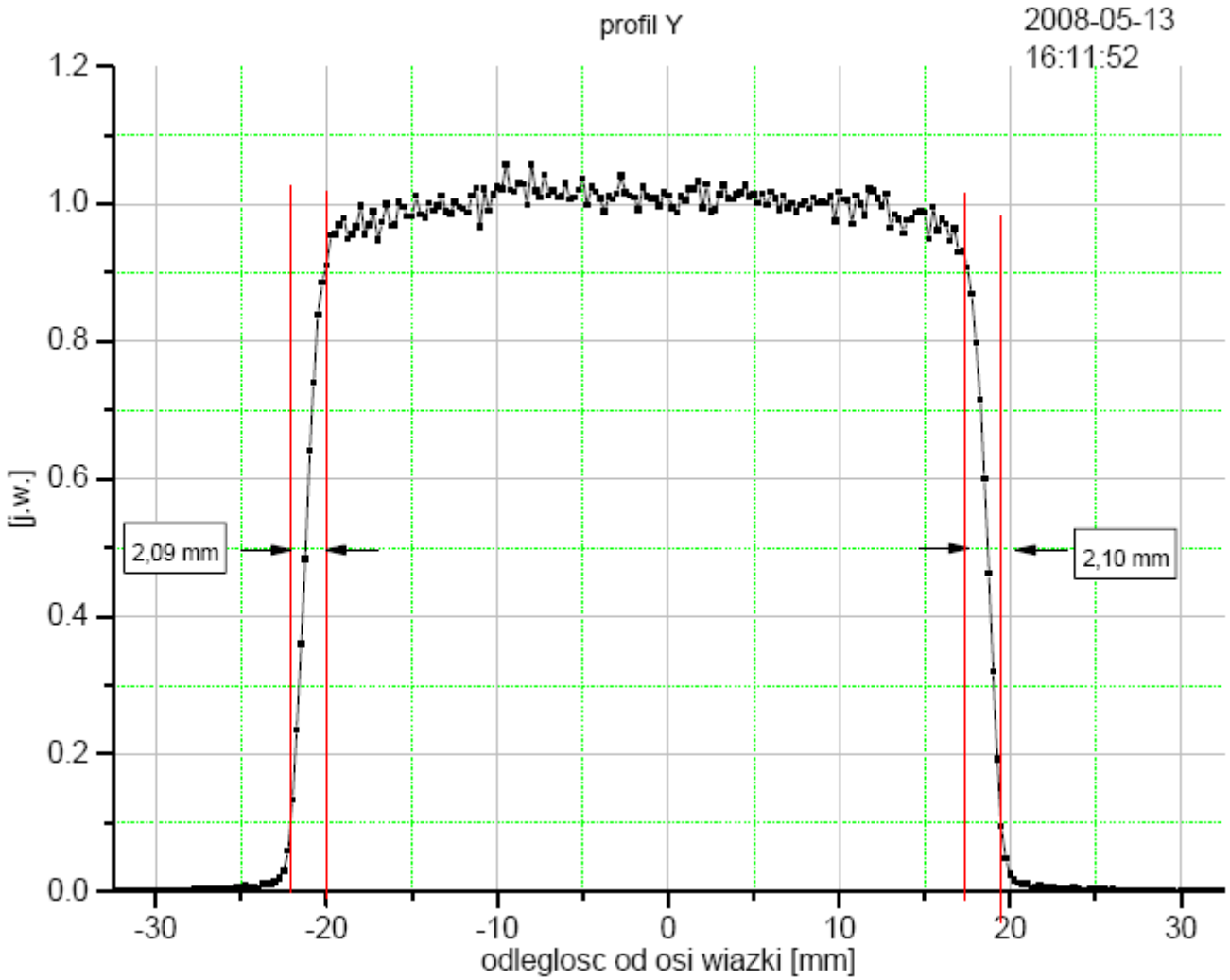
Unidos dosemeter PTW T-10021

Depth-dose distribution

- **Range in water - 29 mm**
- **Energy at the izocenter 58 MeV**



Beam profile



Y - profile for 40 mm beam diameter

Project on the National Centre for Hadron Radiotherapy

-NCRH- is on the list of the projects funded by EU Structural Funds with 25 M€

- Pre-agreement signed with Ministry of Science in Oct. 2007

-The decision for locaction of the new facility obtained in May 2008

- Agreement to be signed to the end 2008

- Facility ready 2013

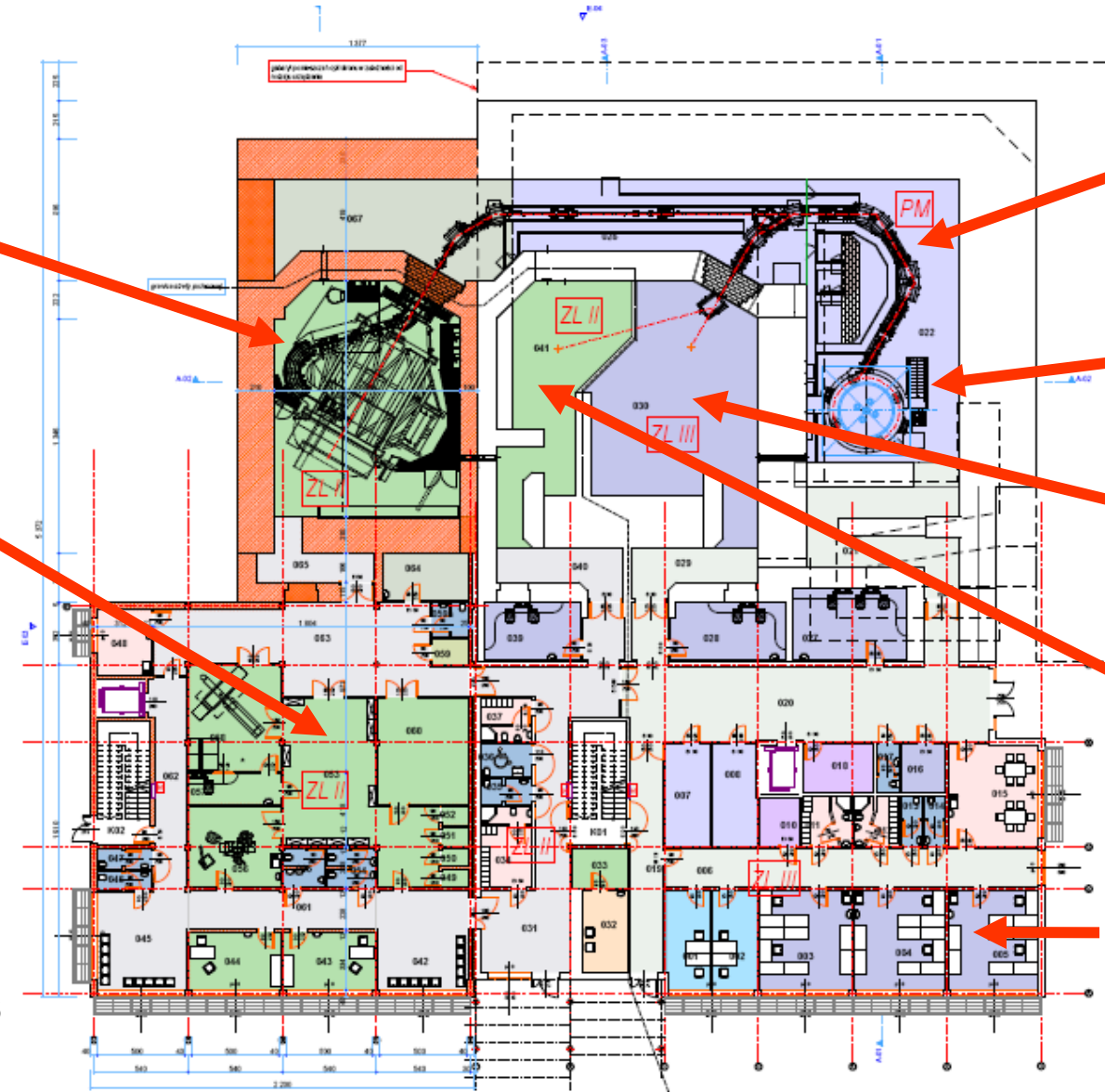
Cyclotrons considered

IBA -235 MeV cyclotron

The Proteus-235 Cyclotron

Accel -250 MeV superconducting cyclotron, power 450 kW

Outline of the NCRH- Phase 1 facility with the gantry



Outline of the NCRH- Phase 1 facility with the gantry

New ion facilities in Europe..

Protons...++ Facilities

- PSI (Eros Pedroni)

- St. Petersburg (Dmitri Seliverstov, Grigory Feofilov)

- IFIMED / Valencia (Jose Barnabeu)

-- Nordic

- CPO, Rinecker, Essen, Trento ...

Ions Facilities

- HIT (Thomas Haberer, Udo Weinrich)

- CNAO

- Med-Austron (Erich Griesmaier)

- ETOILE (Jacques Balosso, Marcel Bajard)

- Marburg (Gerhard Kraft)

- MAASTRO / The Ned. (Madelon Pijls-Johannesma)

- BHTC / Belgium (Germaine Heeren, Roger De Croock)

Summary

1. **Proton and γ-ray calibration available at IFJ for WRIMIS participants**

2. **In 2013 60 to 250 MeV proton beams will be available at IFJ , including scanning beams.**

3. **Shall we consider to develop a dedicated calibration site? Within the FP7? ESA?**