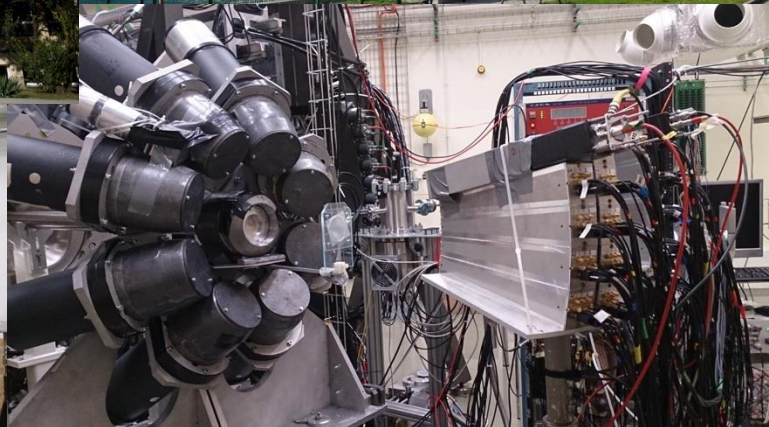




The Henryk Niewodniczański Institute of Nuclear Physics Polish Academy of Sciences (IFJ PAN) in Kraków - basic information





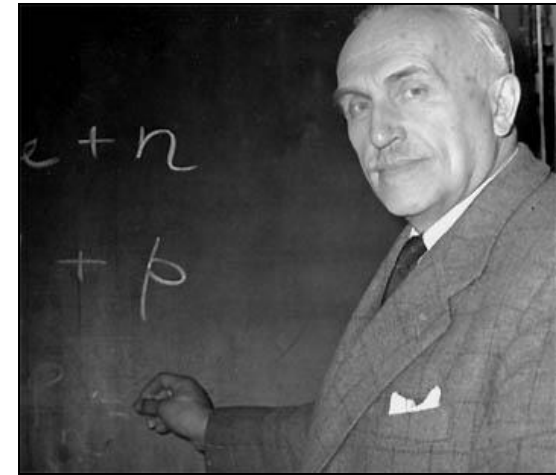
1955 – founding of IFJ as the institute where the first cyclotron is located. Administratively, it was a branch of the Institute of Nuclear Research.

1960 – IFJ becomes an autonomous institution



Prof. Marian Mięśowicz
(1907-1992)

1970 – Particle physics joins



Prof. Henryk Niewodniczański
(1900-1968)

1988 – The IFJ is named after its founder – Prof. Henryk Niewodniczański

2003 – IFJ gets the status of a research institute of the Polish Academy of Sciences



General Information about IFJ PAN

✓ **Personnel: 567:**

- Prof. **31**,
- Assoc. Prof. **58**,
- Ph.D. **93**,
- engineers **120**

✓ **Status:**

highest category among research institutions in Poland **A+**

Instytut kategorii 

„Centre of Excellence in Physics in Poland” (2012-2017)

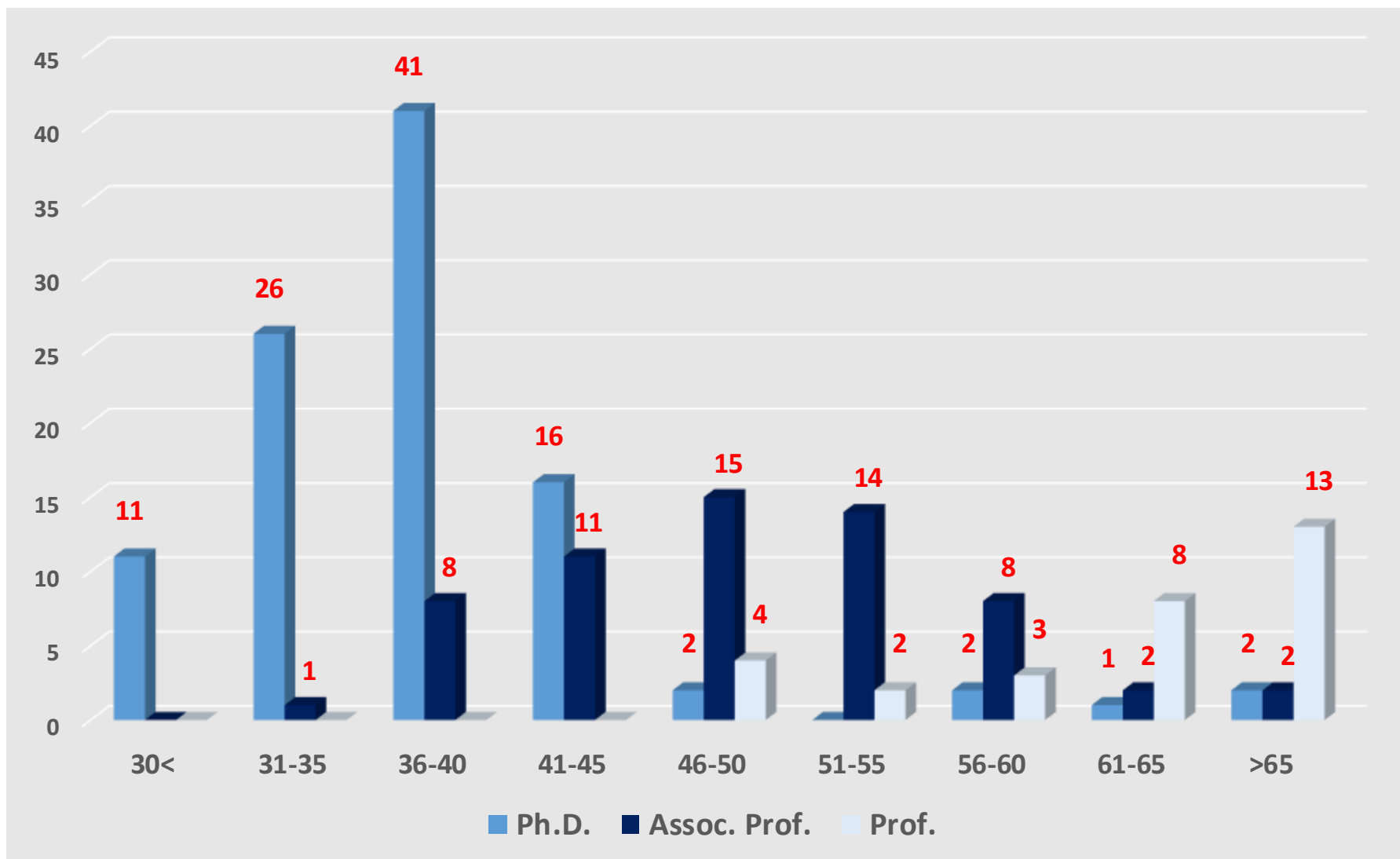
 Krajowy Naukowy Ośrodek Wiodący

EU distinction of “HR Excellence in Research”


HR EXCELLENCE IN RESEARCH

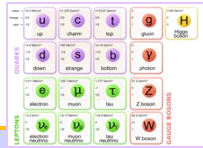


Age Profile of Researchers

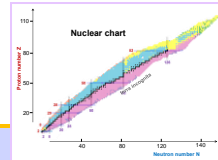




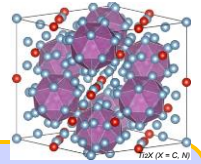
General Information about IFJ PAN



Division of Particle and Astroparticle Physics



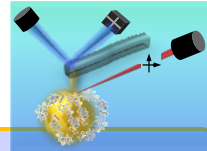
Division of Nuclear Physics and Strong Interactions



Division of Condensed Matter Physics



Division of Theoretical Physics



Division of Interdisciplinary Research



Division of Applications of Physics



Division of Scientific Equipment and Infrastructure Construction



Cyclotron Center Bronowice



4 Accredited Laboratories

Krakov School of Interdisciplinary PhD Studies

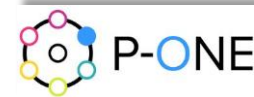




Staff: about **79** people

Major research topics:

- The ATLAS experiment
- The LHCb experiment
- The Belle II experiment
- Cosmic Ray Research (PierreAuger, CREDO)
- Neutrino studies (T2K, P-ONE)
- High energy Gamma-Ray Astrophysics (HESS, HAWC, CTA)
- Involvement in other projects
 - MUonE experiment at CERN
 - ATHENA experiment at future EIC
 - Physics feasibility studies for FCC
 - development of “Cloud Computing” and GRID computing infrastructures





Staff: about **45** people

Major research areas:

- **Nuclear structure** studies in function of temperature, spin and isospin (AGATA, PARIS, EXOGAM, GALILEO ...)
- **Nuclear reactions mechanisms** and hadron collisions (BINA, KRATTA, KATANA...)
- **Interactions of relativistic ions** at LHC and SPS energies (ALICE, NA61/SHINE)
- **Theoretical studies** of the structure and dynamics of many-body systems - nuclear and hadron physics
- **Research and development** of new detection techniques for nuclear physics (PARIS, AGATA, KATANA, KRAB....)

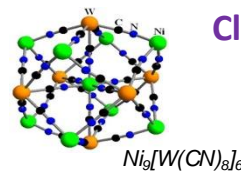




Staff: about **60** people

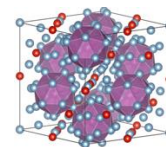
Major research topics:

- thin films of metals and alloys, nanoparticles, carbon coatings
- liquid crystals
- new magnetic materials
- glasses
- polymers
- molecular matter
- ion transport simulations
- neutron scattering techniques
- calculations of the structure and dynamics of materials

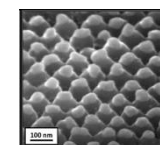


Classical and molecular magnetics

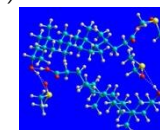
Superconducting materials



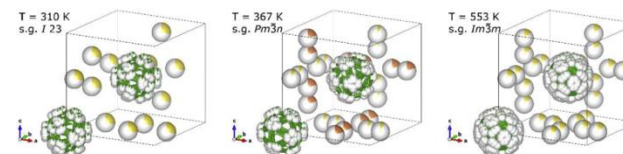
Tl_2X ($X = C, N$)



Low-dimensional systems



Soft matter

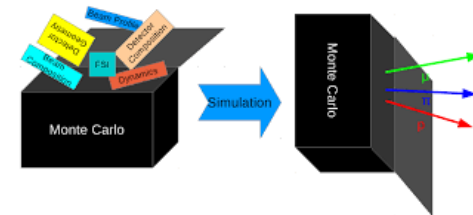
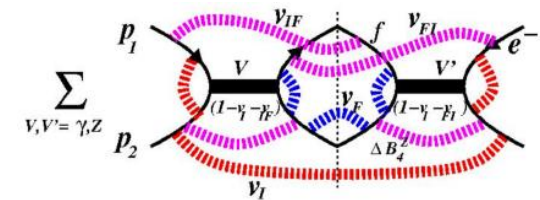
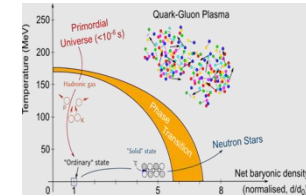
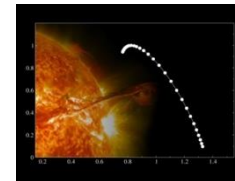


Ion conductors

Staff: about **34** people

Major research topics:

- Theory of structure of matter
- Particle Theory
- Theory of complex systems
- Mathematical physics





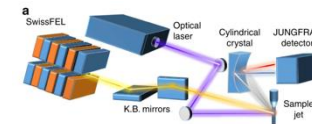
Staff: about **40** people

Major research topics:

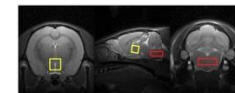
- spectroscopic imaging of cells and tissues for diagnostics and therapy
- mechanical and rheological properties of cells and tissues
- effects of exposure of biological samples to ionizing radiation



Research using the techniques of vibrational micro- and nanospectroscopy



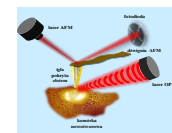
Research with the use of X-ray spectroscopy at Free Electron Laser facilities



Research with the use of NMR tomography



Studies of biological materials with atomic force microscopy



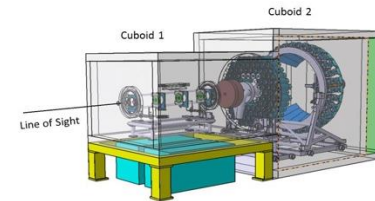
AFM-IR technique



Staff: about **45** people

Major research topics:

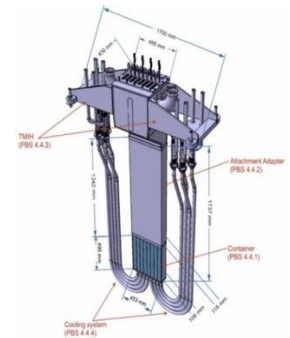
- **neutron transport**
- **neutron** and ion **diagnostics** for tokamaks and stellarators
- **medical physics** for proton therapy
- **space dosimetry**, thermo- and optically stimulated luminescence, retrospective dosimetry
- **low-level radioactivity measurements** in environment: α , β , γ spectroscopy
- **mass spectrometry** (Arctic, glaciers, etc.)



HRNS (High Resolution Neutron Spectrometer) for ITER



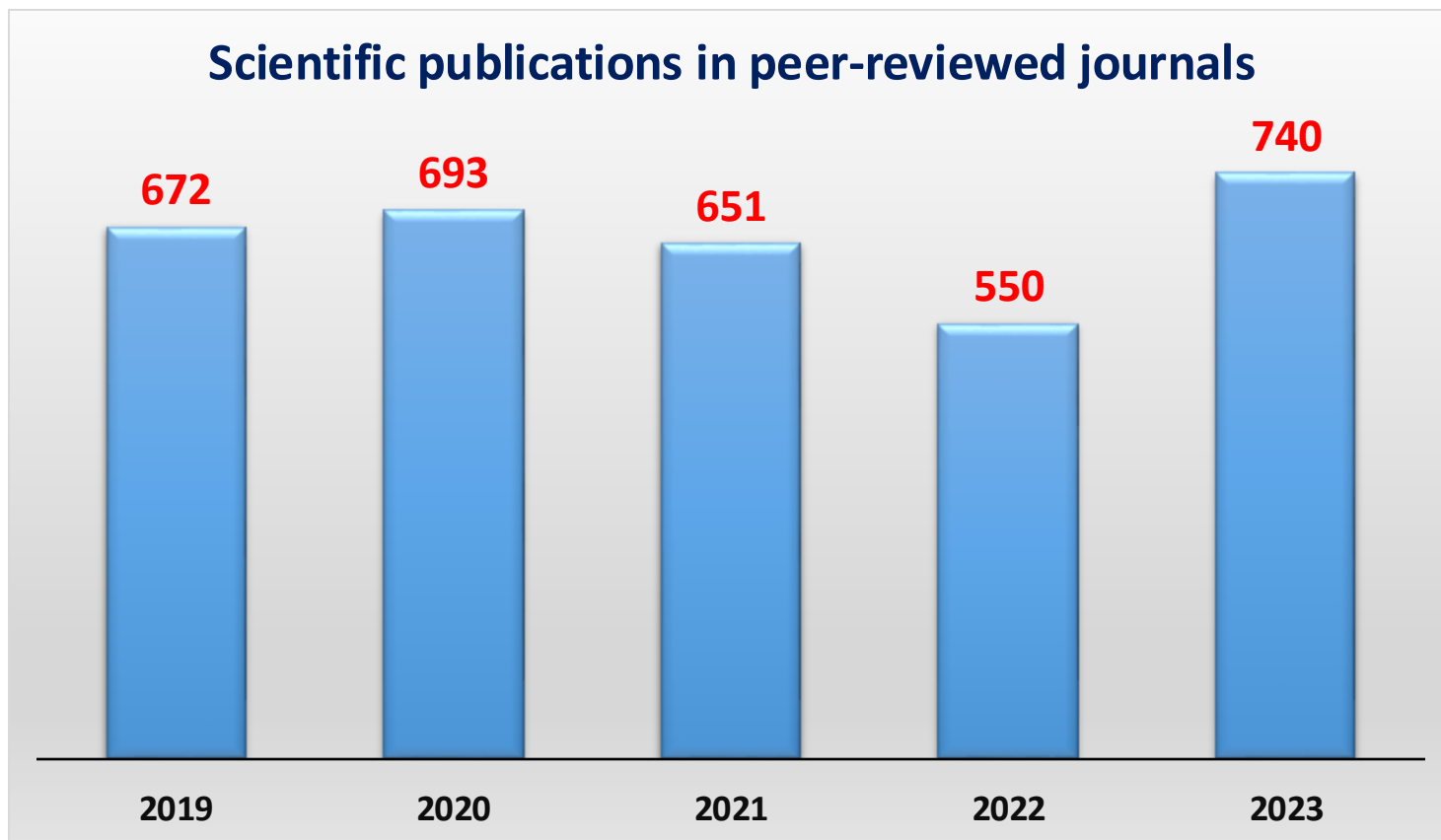
Studies of cosmic rays exposition of astronauts (on the Moon's orbit)



Start-up Monitoring Module for IFMIF-DONES



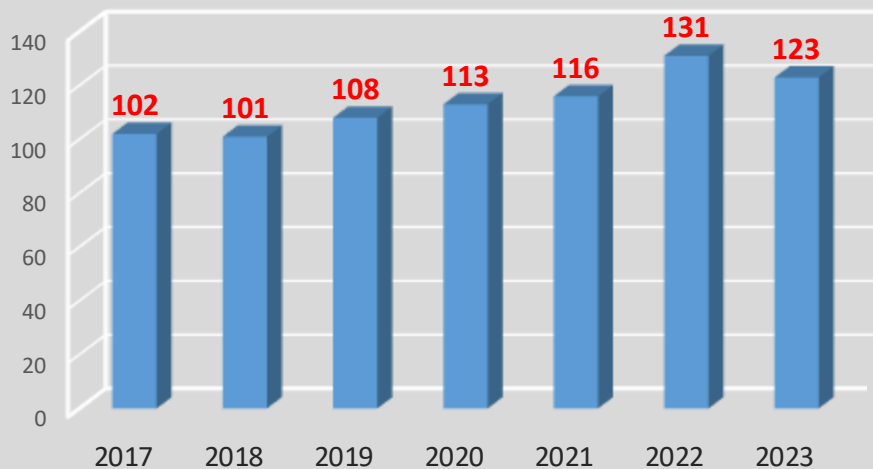
Medicines as markers of radioactive pollution



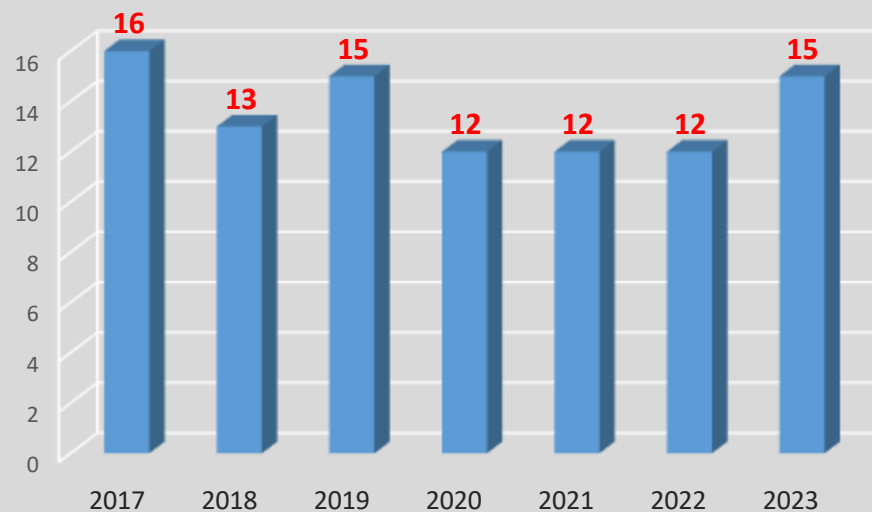


International and Polish Grants (2017-2023)

**National grants
(NCN, NCBiR, FNP, MEiN, NAWA)**



**International grants
(EU, F4E, VF, SNF)**





Cyclotron Centre Bronowice (CCB)

Staff: about 50 people



Cyclotron PROTEUS C-235 proton beam 70-230 MeV



Two scanning gantries

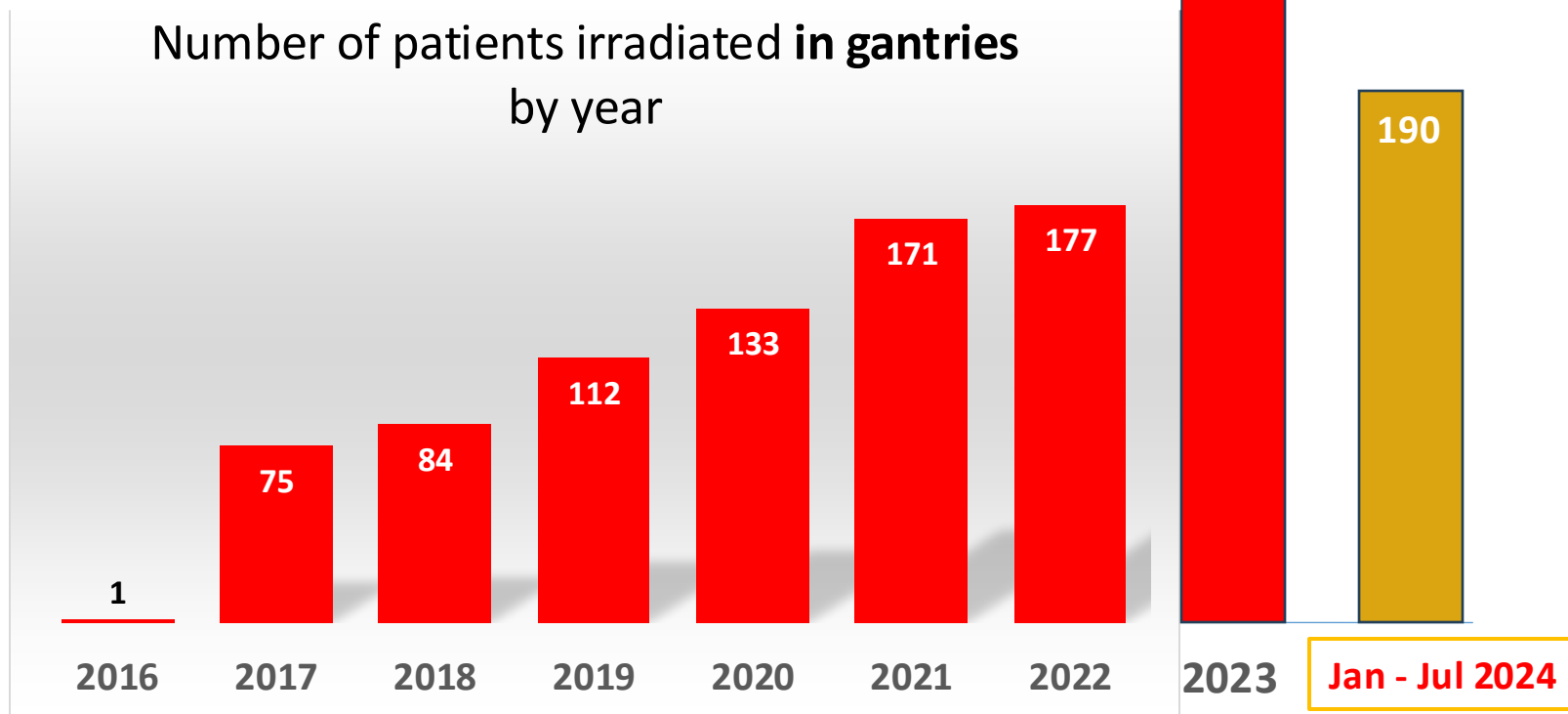


Experimental hall



Number of patients irradiated in the whole operation time **2016 – July 2024**

- irradiation in gantries: **1255** (including ~120 children)
- ocular patients with eye melanoma: **372**





Applied research at the AIC-144 60 MeV proton cyclotron

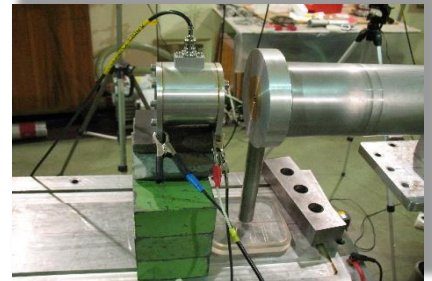


Eye line for precise irradiation

- dose rate: 0.001 – 1 Gy/min
- beam field size: ≤ 40 mm;
- Typical flux: $10e8 - 10e9$ p/cm²·s;

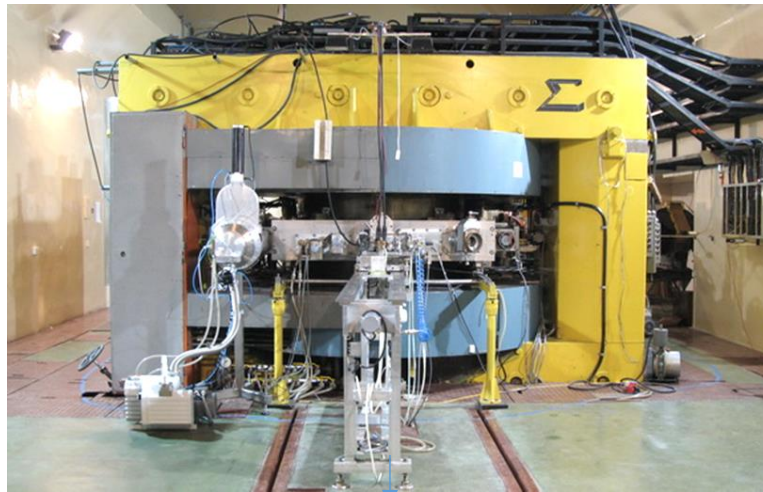
Line for isotope production

- proton current: $< 100nA$;



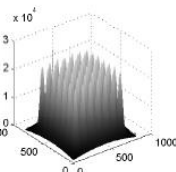
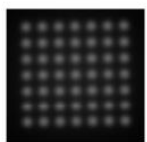
Experimental room: high beam intensity

- proton current: 2nA – 100nA;
- Dose rate up to 50 Gy/s
- irradiation field $d < 12$ cm;

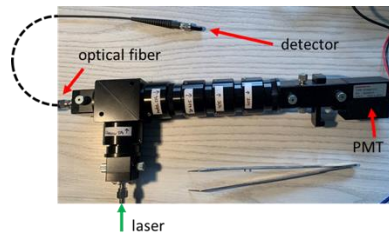


AIC-144 Cyclotron:

energy 60 MeV; RF 26,26 MHz; beam current 80 nA



Proton grid therapy – to reduce side effect sof treatment



Testing of detectors and dosimeters



Testing of electronics for space flights



Staff: specialists/engineers/technicians: **40**
Phd/assoc. prof.: **5**

Constructions of large external research infrastructures and advanced plans of local research base
(cryogenics, vacuum, precise mechanics, quality aspects, test of magnets, RF systems installations and tests,...)

Last decade engagements: 536 FTE (person-years)



SIS100 at FAIR



Klystrons at ESS



QC for LHC magnets



Laboratory of Individual and Environmental Dosimetry (LADIS)

- ❖ Measurements of individual and environmental doses by thermoluminescence method
- ❖ **235 000** measurements in 2023, **11 000** institutions in Poland and Europe



Laboratory of Calibration of Radiation Protection Instruments

- ❖ Calibration of up to **2300/yr** survey meters (γ -rays)
- ❖ Calibration of **240/yr** survey meters (α , β surface emission)



Laboratory of Radiometric Expertise

- ❖ **350** measurements, calibrations and expert opinions for external customers in 2023

Laboratory of Radioactivity Analyses

- ❖ Laboratory is an ingredient of the national network of radioactive contamination monitoring
- ❖ **~100/yr** commercial measurements of concentration of ^{40}K , ^{228}Th , ^{226}Ra , ^{238}Pu , $^{239+240}\text{Pu}$, $^{134,137}\text{Cs}$, ^{99}Tc , ^{131}I ,



Małopolska Researchers' Night



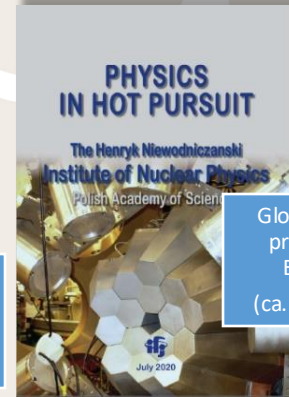
"Physics Couch" discussion series



Shows "Fascinating Physics" for children and teenagers



Musical spectacle "At the intersection of two infinities"



Global scientific press service: EurekAlert (ca. 15 per year)

Festival of Science and Art in Krakow

Scientific Picnic of the Polish Radio and Copernicus Science Centre

Scientific Picnic of the Polish Academy of Sciences

Visits of high school students to laboratories at IFJ PAN

IFJ PAN Open Day for students

Małopolski Festival of Innovation

QuickPhysX and QuizFiz contests

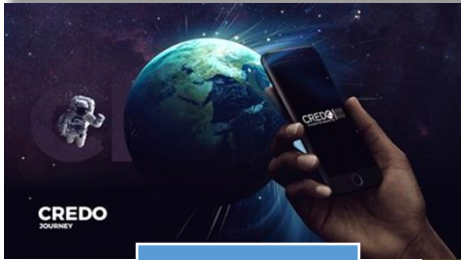
Silesian Science Festival in Katowice

Particle Physics Summer Student Program at IFJ PAN

Int. Masterclasses - Hands on Particle Physics for high school students

Making popular science movies on research carried out at IFJ PAN

Activity in social media: Facebook, Twitter and YouTube



"Particle Hunters" contest with the CREDO Detector application



Children's Day at IFJ PAN





Krakow School of Interdisciplinary PhD Studies (established in 2019)

- 1. The Henryk Niewodniczański Institute of Nuclear Physics PAN**
- 2. Jerzy Haber Institute of Catalysis and Surface Chemistry PAN**
- 3. Jerzy Maj Institute of Pharmacology PAN**
- 4. Mineral and Energy Economy Research Institute PAN**
- 5. Strata Mechanics Research Institute PAN**
- 6. Institute of Metallurgy and Materials Science PAN**
- 7. Faculty of Materials Science and Ceramics AGH**
- 8. Faculty of Physics and Applied Computer Science AGH**



Education in the School prepares for obtaining the doctoral degree and is conducted in the following disciplines:

- physical sciences,
- chemical sciences,
- medical sciences,
- pharmaceutical sciences,
- material engineering
- environmental engineering, mining and energy.

108 PhD students, including 21 foreigners



**Thank you for your attention
and
enjoy the Workshop at our Institute**