The Henryk Niewodniczański Institute of Nuclear Physics Polish Academy of Sciences

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Instytut kategorii A+

HR EXCELLENCE IN RESEARCH

World University Rankings 2023

Discover the world's top 2000 universities

CWUR

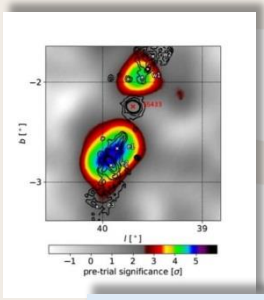
Place 670 (3.3%)

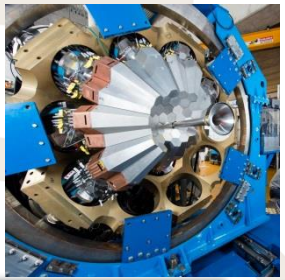
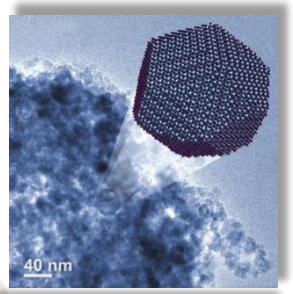
Dariusz Bocian

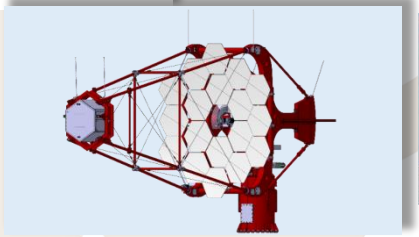
Scientific & Technical Director

General Information about IFJ PAN

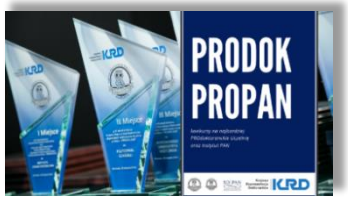
- **Personnel: 561; Prof. 30, Assoc. Prof. 61, Ph.D. 101, engineers 117**
- **Scientific Divisions:**
  - Division of Particle and Astroparticle Physics
  - Division of Nuclear Physics and Strong Interactions
  - Division of Condensed Matter Physics
  - Division of Theoretical Physics
  - Division of Interdisciplinary Research
  - Division of Applications of Physics
- **Researcher Departments:**
  - Cyclotron Centre Bronowice
  - Division of Scientific Equipment and Infrastructure Construction
  - Four accredited laboratories
- **Education:**
  - International Ph.D. Studies
  - Interdisciplinary Doctoral Studies
  - Kraków Interdisciplinary Doctoral School
- **Scientific output: > 650 publications annually**



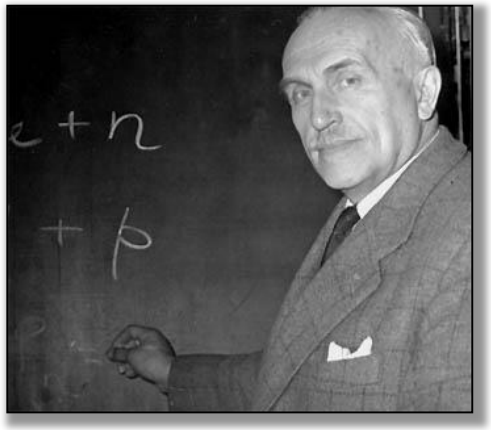









Genesis and History

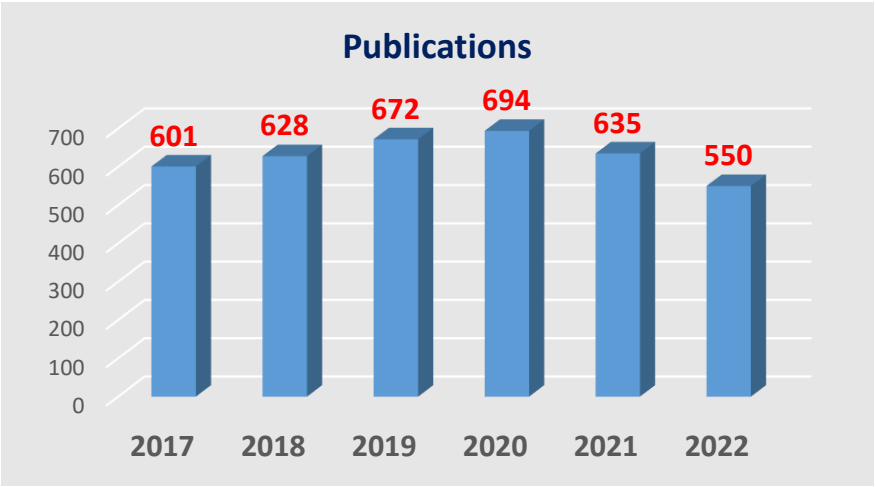


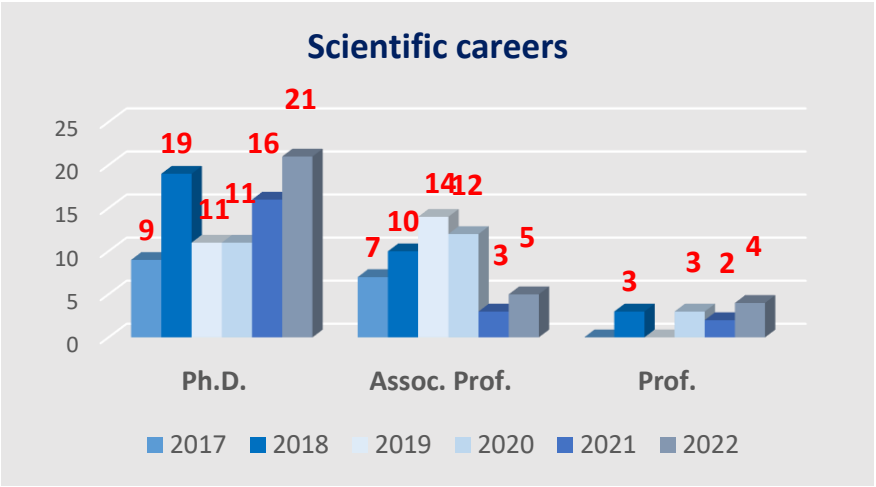
(Fot. Archiwum of the IFJ PAN)

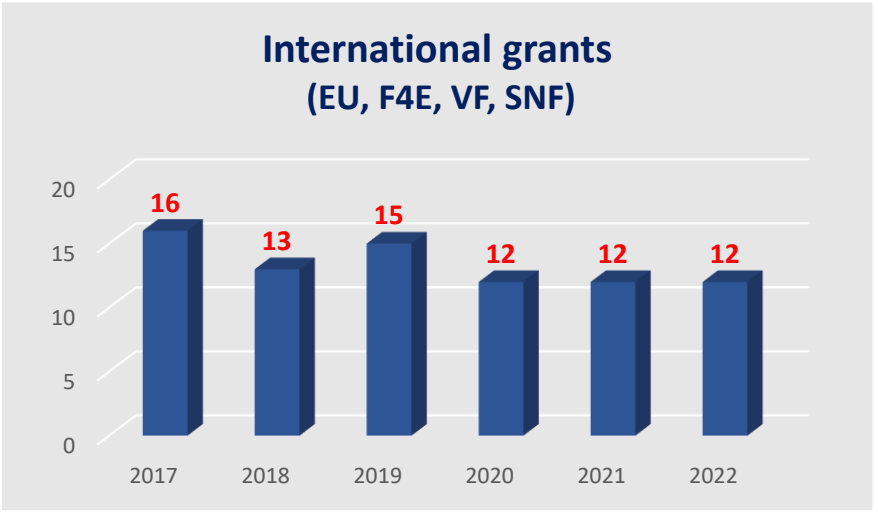
- **1955 – foundation of the IFJ – as a branch of the Institute of Nuclear Research – Prof. Henryk Niewodniczański (1900-1968)**

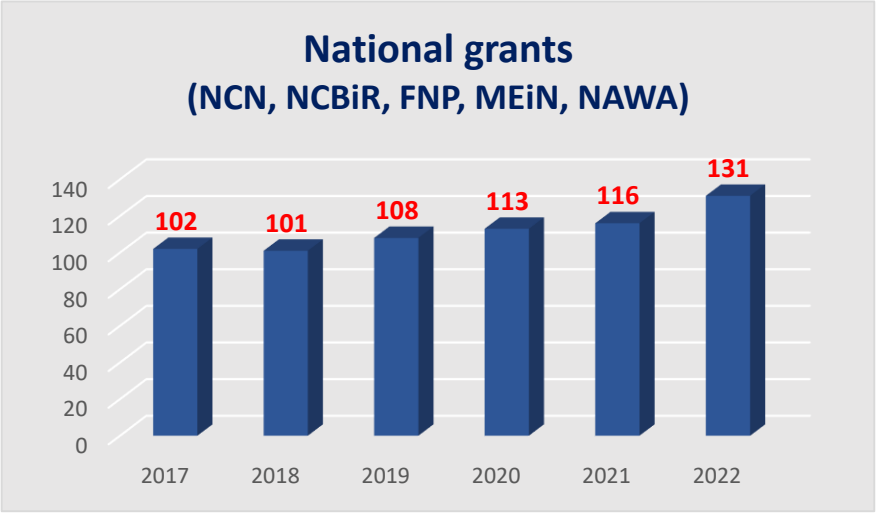
- **1960 – IFJ as a standalone unit**
- **1970 – Particle physics enters – Prof. Marian Mięsowicz (1907-1992)**
- **1988 – IFJ gets the name of its patron – Henryk Niewodniczański**
- **2003 – IFJ gets the status of a Research Institute of Polish Academy of Sciences**

Scientific Activity (2017-2022)









Participation of IFJ PAN in projects aimed at the Development of Innovation and Cooperation of European Technological Infrastructures for Accelerators and Magnets

TIARA – Test Infrastructure and Accelerator Research Area (2 lata, 2011-2013)

In Poland, the project was carried out by a consortium of 7 scientific institutions: the Henryk Niewodniczański Institute of Nuclear Physics of the Polish Academy of Sciences, the AGH University of Science and Technology, the Cracow University of Technology, the Andrzej Sołtan Institute of Nuclear Problems, the Warsaw University of Technology, the Lodz University of Technology, the Wrocław University of Technology.

AMICI – Accelerator and Magnet Infrastructure for Cooperation and Innovation (2017-2019)

In Poland, the project was carried out by the Henryk Niewodniczański Institute of Nuclear Physics of the Polish Academy of Sciences

i.FAST – Innovation Fostering in Accelerator Science and Technology (2021-2025)

In Poland, the project is executed by the Henryk Niewodniczański Institute of Nuclear Physics of the Polish Academy of Sciences

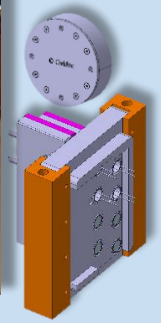
FuSuMaTech - Future Superconducting Magnet Technology (2017-2019, 2021-2025)

In Poland, the project is executed by the Henryk Niewodniczański Institute of Nuclear Physics of the Polish Academy of Sciences

Scientific & Engineering Activity

Tests for ITER

(feedthrough, diamod detectors)



Test stand built at the IFJ PAN

Surface Scintillator Detector (SSD) for Pierre Auger

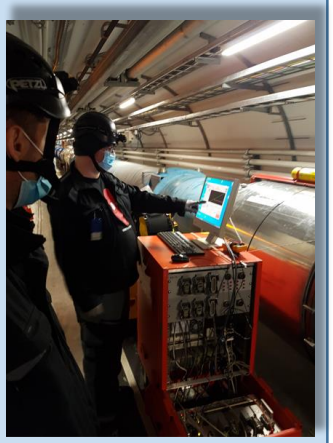
225 pieces

Batch of 15 SSDs ready to move to Argentina

Installation of SIS100 (GSI)

Contribution to LHC

QC for interconnections of LHC magnets



Dedicated measuring apparatus built at the IFJ PAN

Local infrastructure: test stand for S.C. wires and magnets

Under commissioning

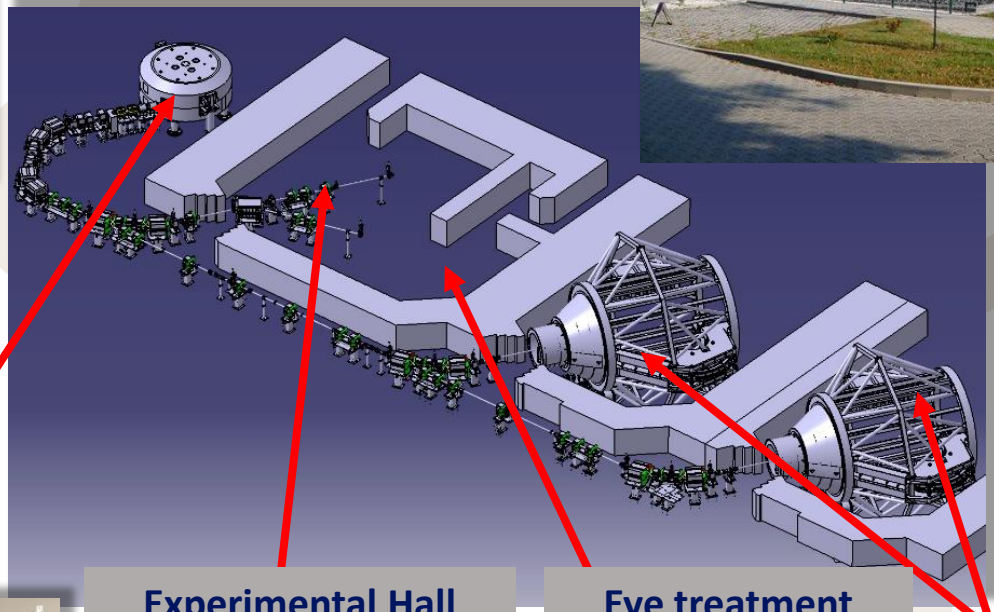
Cyclotron Centre Bronowice (CCB)

Construction 2010-2015;
the 1st patient: Oct. 2016

- **918** patients finished irradiation in gantries
- **348** occular patients with eye melanoma

(by August 2023)

Start of operation : 2005-2010
Treatment of first patient with eye melanoma



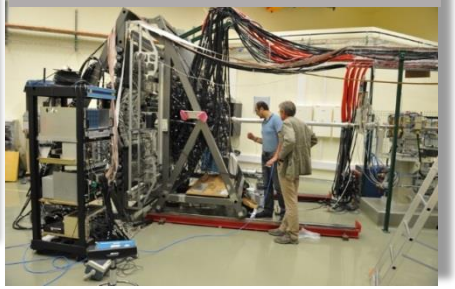
Proteus-235 cyclotron IBA

Staff: about 50 people

Two dedicated scanning gantries

70-230 MeV, I_{beam} = 1-500 nA

Experimental Hall

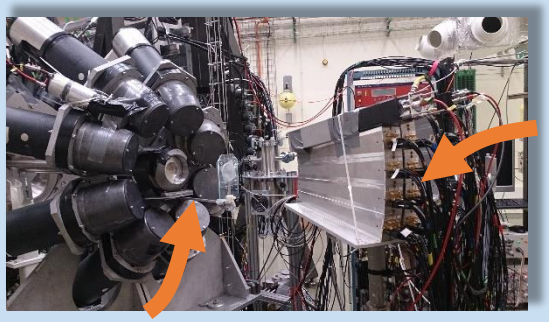


Eye treatment

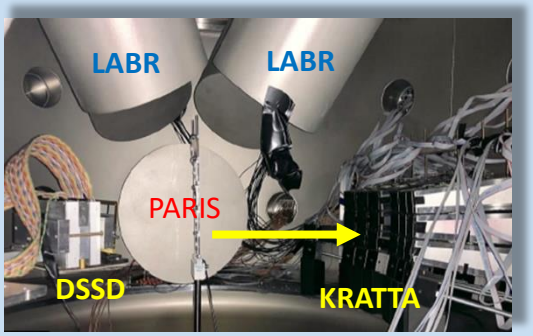
Fundamental Research at the Cyclotron Center Bronowice

Proton beam (230 MeV) from the Proteus-235 Cyclotron at the Cyclotron Centre Bronowice

Studies of resonance excitations of nuclei

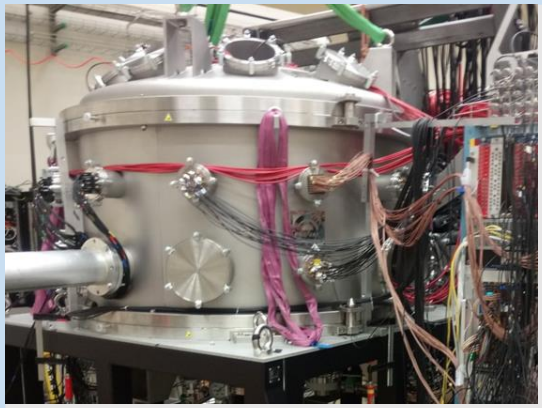


detector HECTOR
Measurements of gammas)



Detectors inside the scattering chamber

Detector KRATTA
Measurement of proton's inelastic scattering

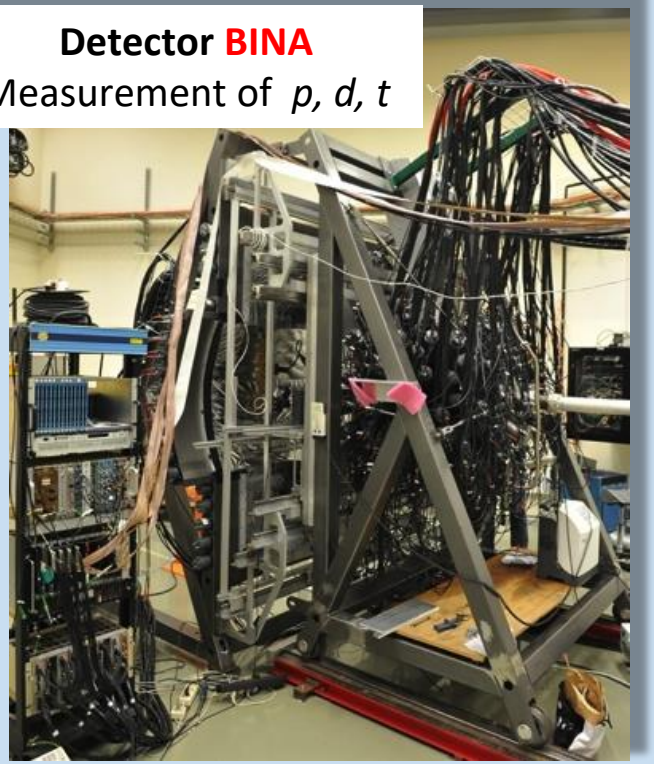


„Big" scattering chamber

PARIS and LaBr3
high-energy γ-ray array

Studies of triple nucleon dynamics

Detector BINA
Measurement of *p, d, t*

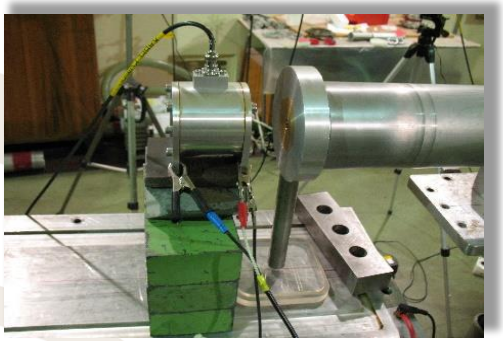


Applied research at the AIC-144 60 MeV proton cyclotron

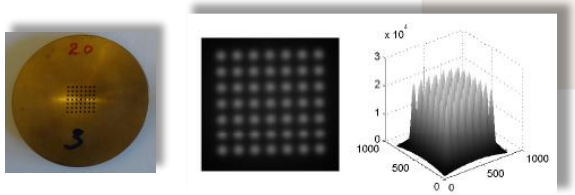
Eye line for precise irradiation
- dose rate: 0.001 – 1 Gy/min
- beam field size: ≤ 40 mm;
- Typical flux: 10e8 – 10e9 p/cm2·s;

Line for isotope production
- proton current: < 100nA;

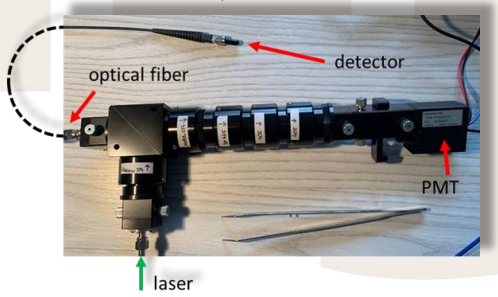
AIC-144 Cyclotron
- energy 60 MeV; RF 26,26 MHz;
- beam current 80 nA



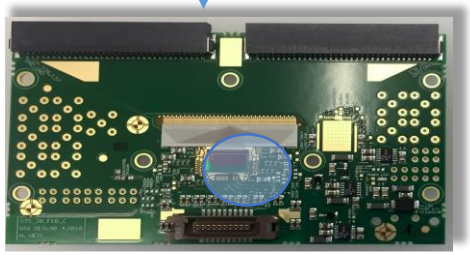
Experimental room: high beam intensity
- proton current: 2nA – 100nA;
- Dose rate up to 50 Gy/s
- irradiation field d < 12 cm;



Proton grid therapy – to reduce side effect sof treatment



Testing of detectors and dosimeters



Testing of electronics for space flights

Staff: 10 people

Scientific and Engineering Experience

Major partners in the world