National Centre for Nuclear Research

in the Polish nuclear research landscape

Agnieszka Pollo

NATIONAL CENTRE FOR NUCLEAR RESEARCH ŚWIERK

Research sector in NCBJ

Nuclear Facilities Operations Department — Reaktor MARIA

Material Physics Department — LBM

Department of Fundamental Research

Department of Nuclear Techniques and Equipment

Complexity Center — Centrum Informatyczne Świerk

Radioisotope Centre POLATOM

Division of Nuclear Equipment — HITEC

Science and Technology Park

International Research Agenda NOMATEN

Scientific-and-Industry Centers

One of the largest research institutes in Poland

1170 employees, inc. 80 prof. & 185 PhD

Doctoral School: ~44 students

Hirsh Index 213

budget: ~100 M€

Scientific achievements:

~500-600 reviewed peer-reviewed papers yearly

150 different types of projects

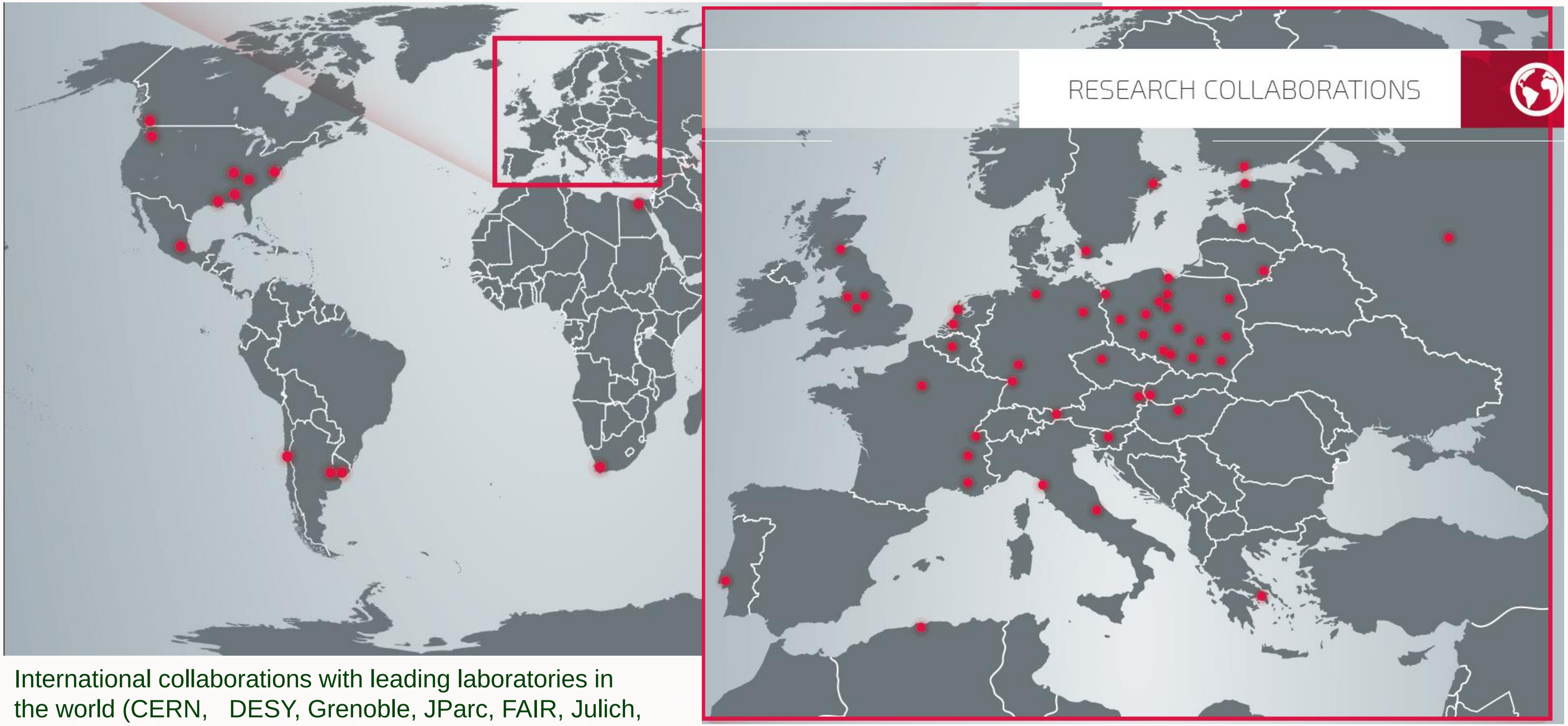
EU projects: success rate: 30%

NAWA POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

HR EXCELLENCE IN RESE

euraxess RESEARCHERS IN MOTION

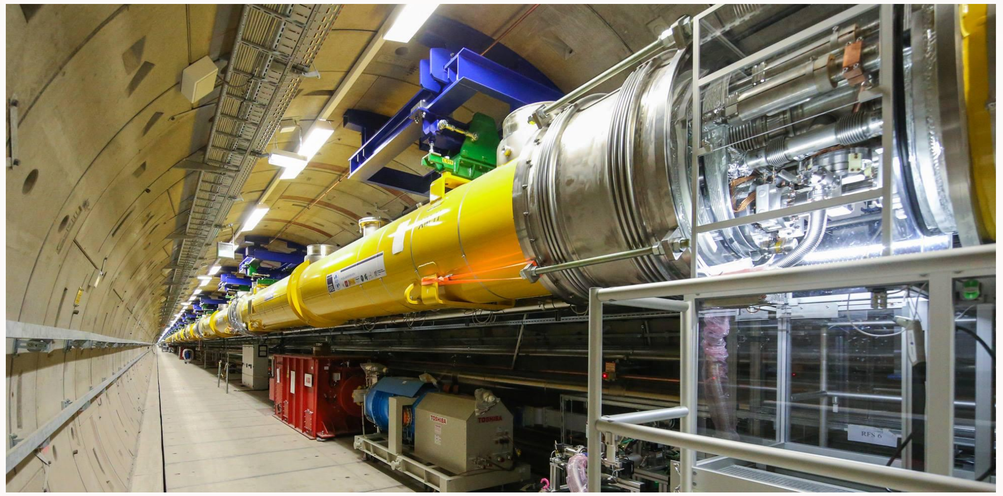
Research collaboration



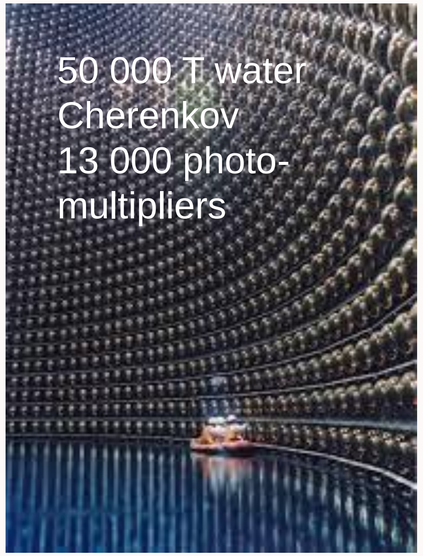
International collaborations with leading laboratories in the world (CERN, DESY, Grenoble, JParc, FAIR, Julich, ESS, T2K), cooperation in many universities around the world

CERN (CMS, LHCb, ALICE, COMPASS, NA61/Shine, GBAR)

DESY XFEL



T2K



NCBJ contribution:

- CMS muon trigger system
- LHCb „straw tube”
- Linac4 - accelerating structures
- GBAR - electron accelerator

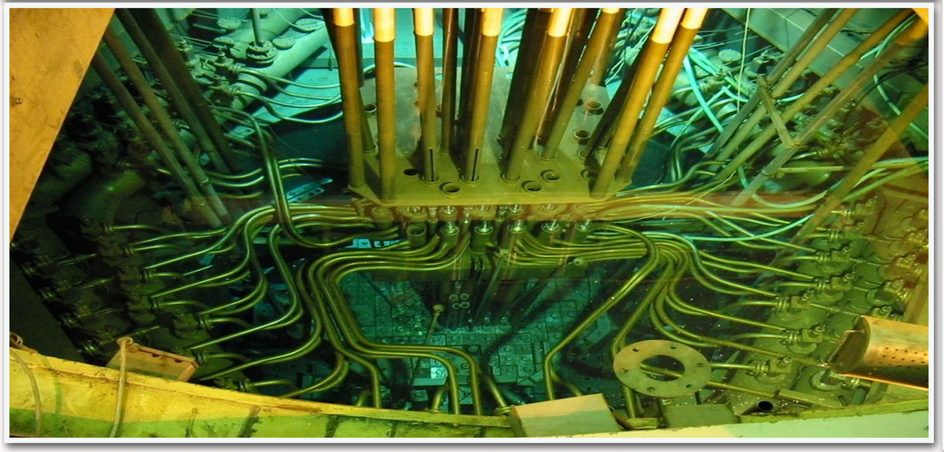
Computing Centre Świerk

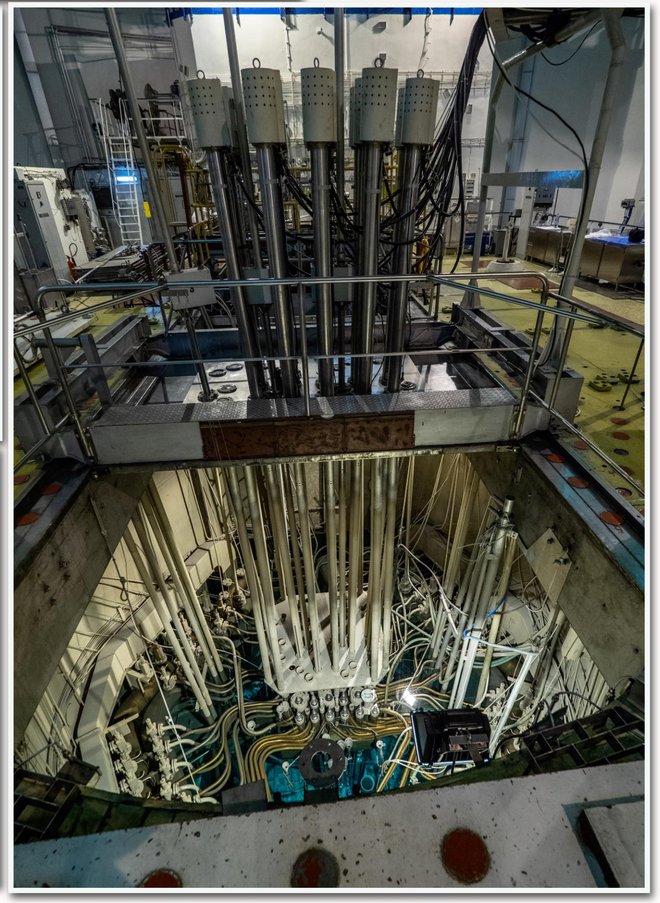
Centrum Informatyczne Świerk

Thermal and flow calculations,
Material sciences computations
Molecular dynamics,
Data analysis for CERN :
Tier-1
in Worldwide LHC Computing Grid (WLCG)
(and soon CMS)
Astrophysics
MC calculations

~ 80 000 cores

Nuclear research reactor MARIA





Reaktor MARIA

- built in 1974
- modernized 1999 - till now
- pool type
- H_2O, Be moderated
- 30 MW thermal power
- neutron flux:
  - thermal $4 \cdot 10^{14}$ n/cm^{2}s
  - fast $2 \cdot 10^{14}$ n/cm^{2}s

One of the best neutron sources!

- Curium
- POLATOM-NCBJ

Radioisotopes
for 400k patients a week!

Nuclear research reactor MARIA – steering room

Radiopharmaceuticals with marketing authorisation

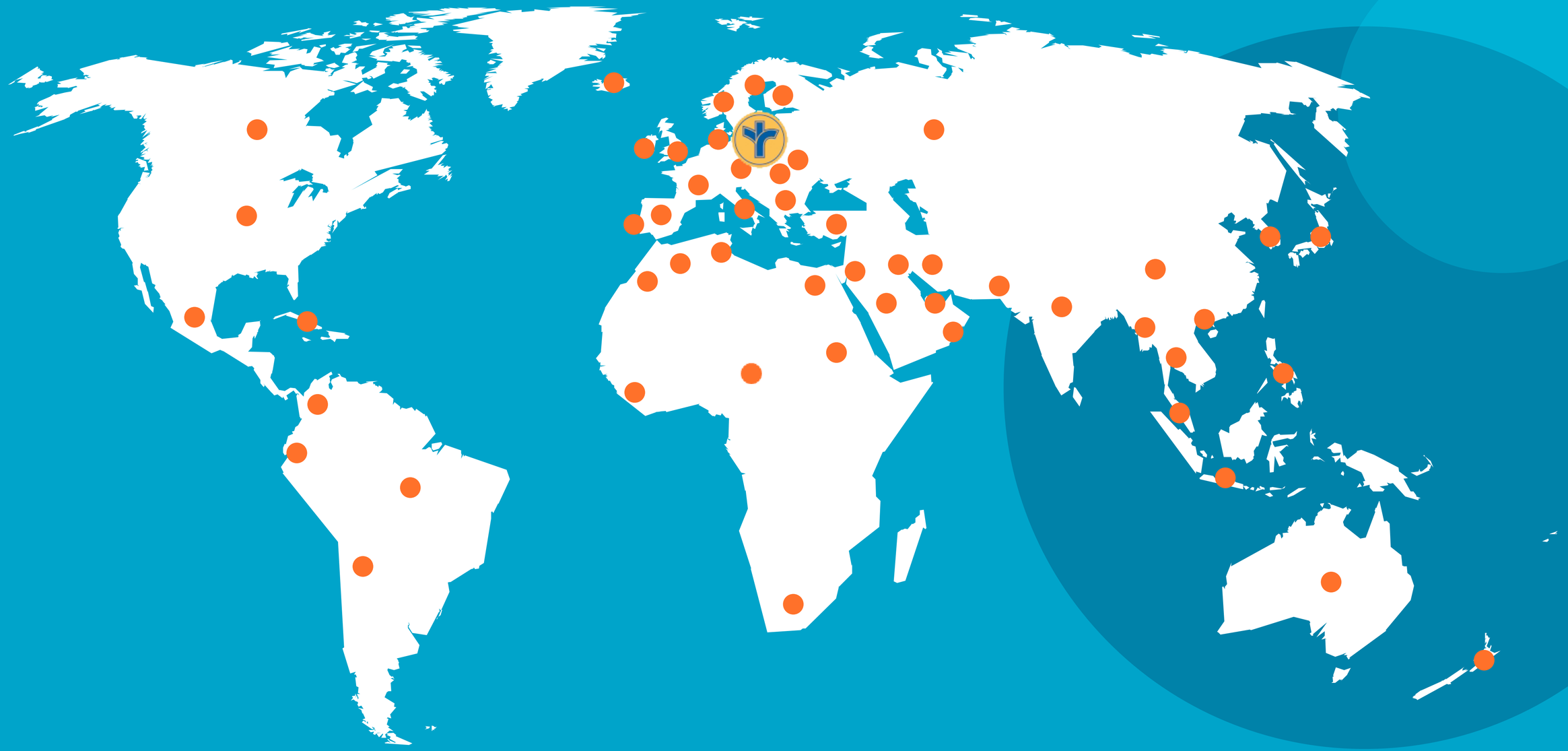
Quality Assurance System certified:

ISO: PN-EN ISO 9001:2015-10
cGMP and GLP

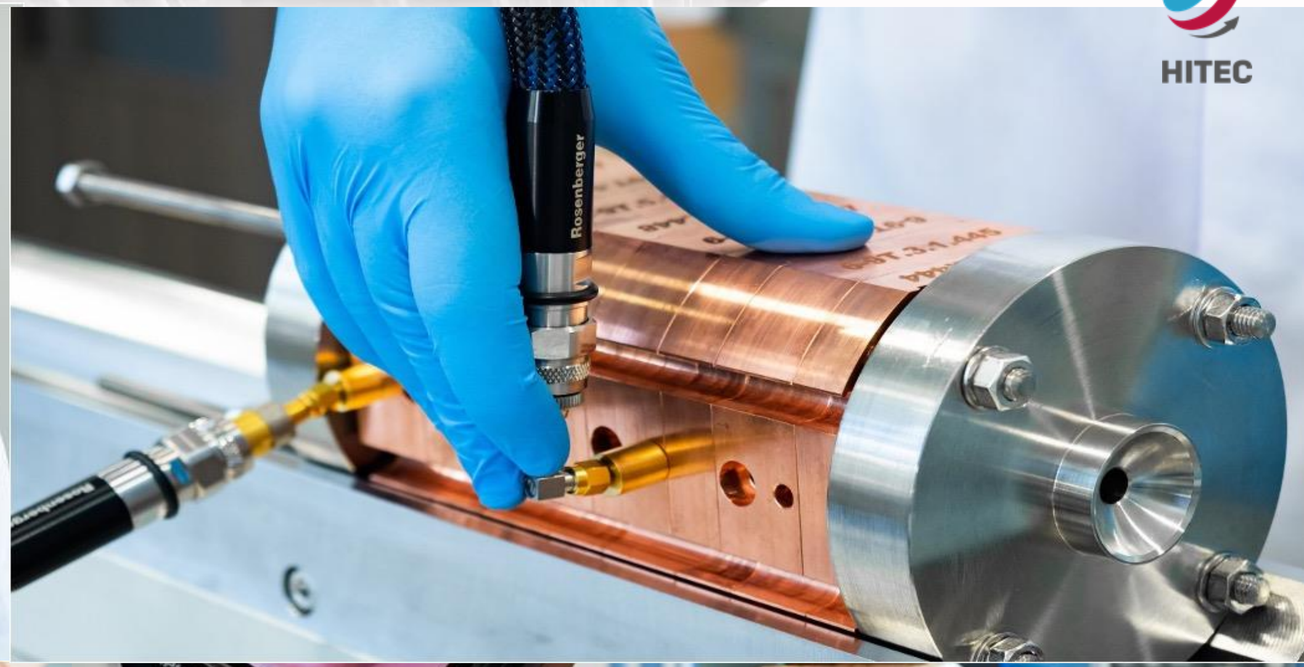
POLATOM

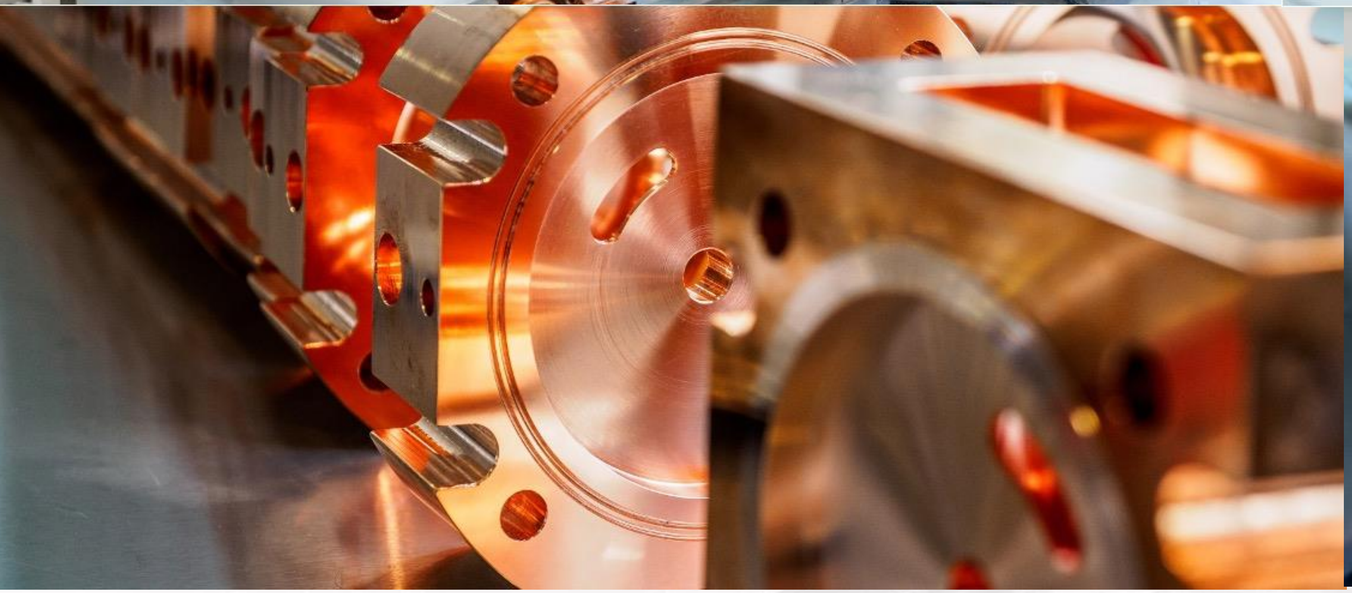
Export to 80 countries
100% Polish market (except PET)
Medicines for 17 million patients a year

WE ARE ALL OVER THE WORLD

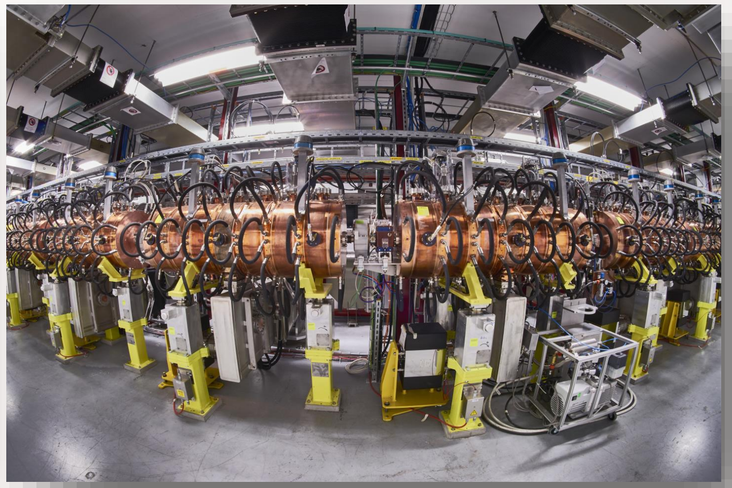


Division of Nuclear Equipment

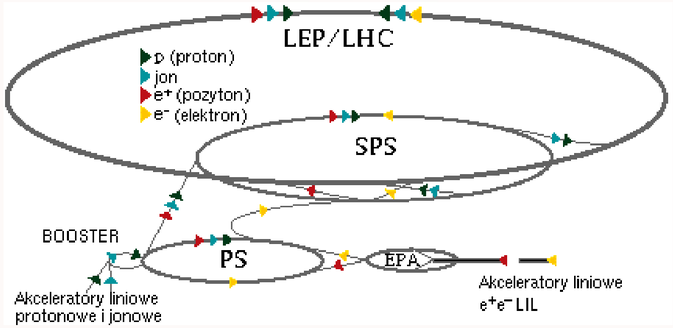




Positron source
for G-Bar experiment
in CERN



Linac4 for accelerator complex in CERN:
PIMS - PI mode structures:
12 accelerating structures C - N



Mobile accelerators for medicine and civil protection

Mobile medical electron accelerator for intraoperative Radiation Therapy

AQURE

150 projects among them Infrastructure projects: ~200 M€

NOMATEN
Centre of Excellence in Multifunctional Materials for Industrial and Medical Applications

- Partnership NCBJ - VTT (FIN) - CEA (FRA)
- ISC

Center of Excellence - EC grant Teaming + IRA grant from FNP
cost: ~ 25 M€

CENTRIX

double radiographic accelerator + LAB
cost: ~ 5 M€

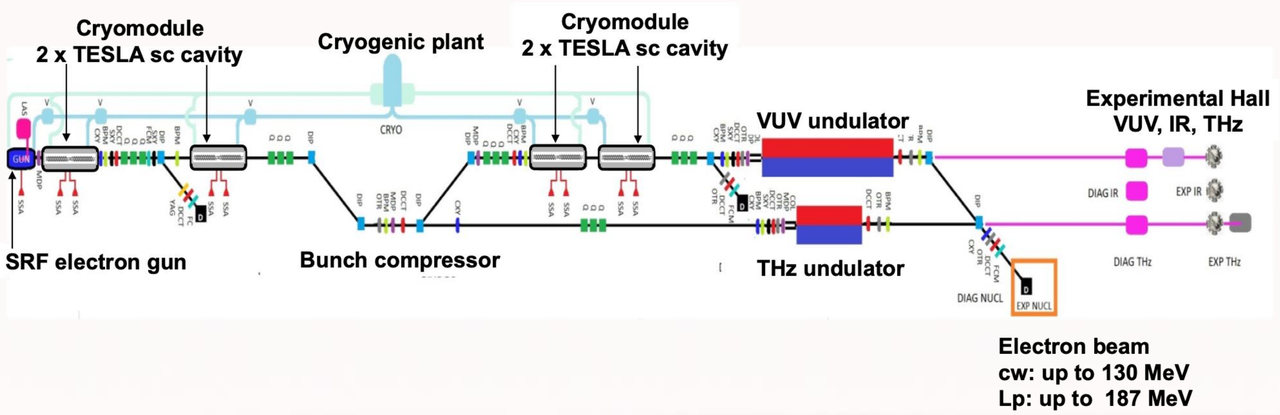
CERAD

cost ~50 M€

Center of Design and Synthesis of Radiopharmaceuticals for Molecular Targeting

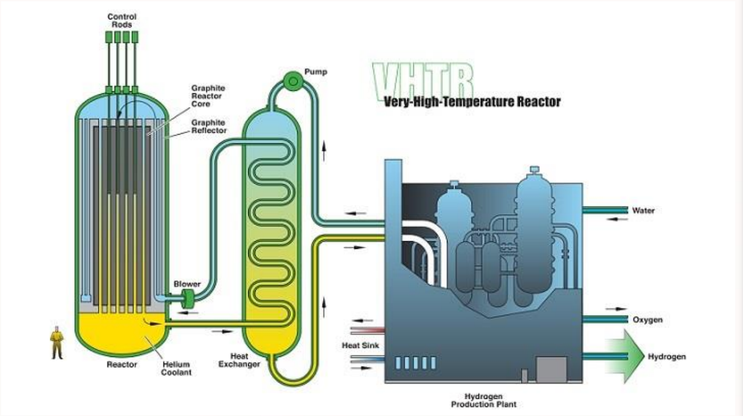
polfel

~100 M€



Electron beam
cw: up to 130 MeV
Lp: up to 187 MeV

HTGR - MNiSW - ~15 M€



New projects - CERAD

POLATOM

CONTROL PROCESS

Unia Europejska
Europejski Fundusz Rozwoju Regionalnego

Fundusze Europejskie Inteligentny Rozwój

CERAD

Center of Design and Synthesis of Radiopharmaceuticals for Molecular Targeting

Objective: to improve and expand the research infrastructure located at the NCBJ for research programs oriented at the design and pre-clinical evaluation of new drugs carrying the radioactive probe (**radiopharmaceuticals**) and other multimodality probes, suitable for diagnostic and therapeutic application using biologically active molecules traced at the cellular and molecular level

Widdening the range of available radionuclides:

^{11}C, ^{13}N, ^{15}O, ^{18}F, ^{22}Na, ^{44}Sc, ^{47}Sc, ^{74}As, ^{64}Cu, ^{67}Cu, ^{67}Ga, ^{68}Ge, ^{81}Rb, ^{82}Sr, ^{86}Y, ^{89}Zr, ^{94m}Tc, ^{99m}Tc, ^{109}Cd, ^{111}In, ^{123}I, ^{124}I, ^{201}Tl,^{211}At, ^{225}Ac,

Novel imaging techniques:
Multimodality scanners,
Chemical synthesis and
Biochemical laboratories,

30 MeV cyclotron
accelerating protons and alpha particles to 30 MeV and deuterons 15 MeV

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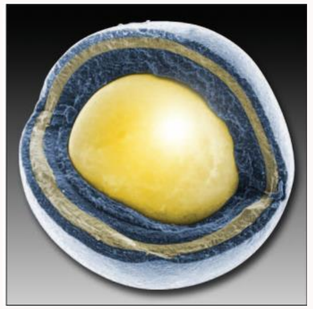
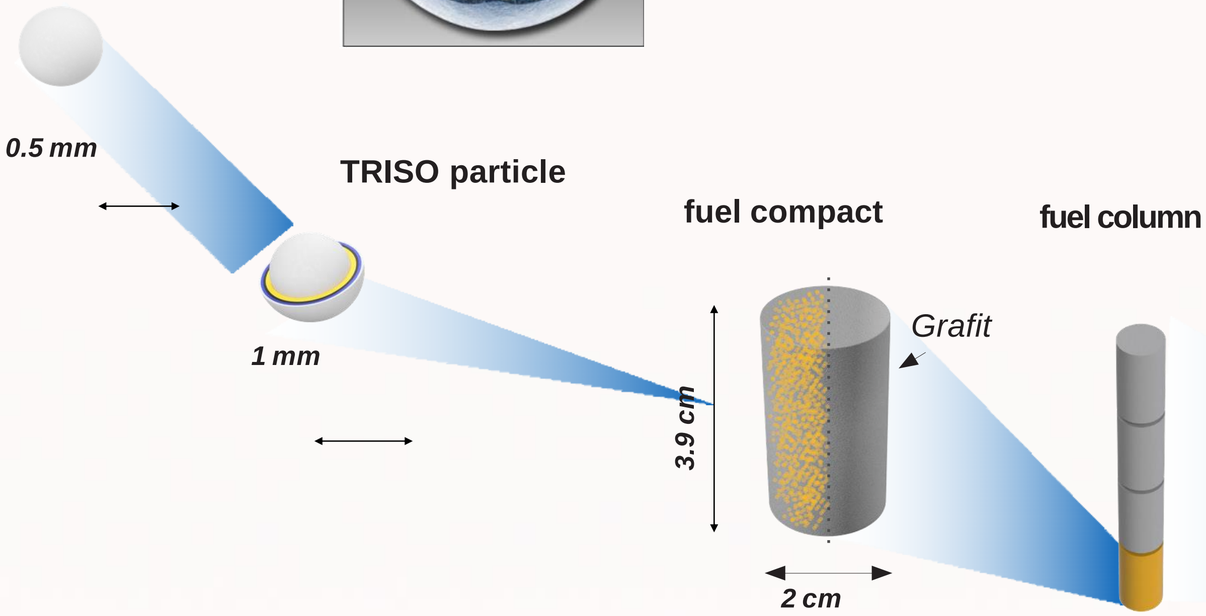
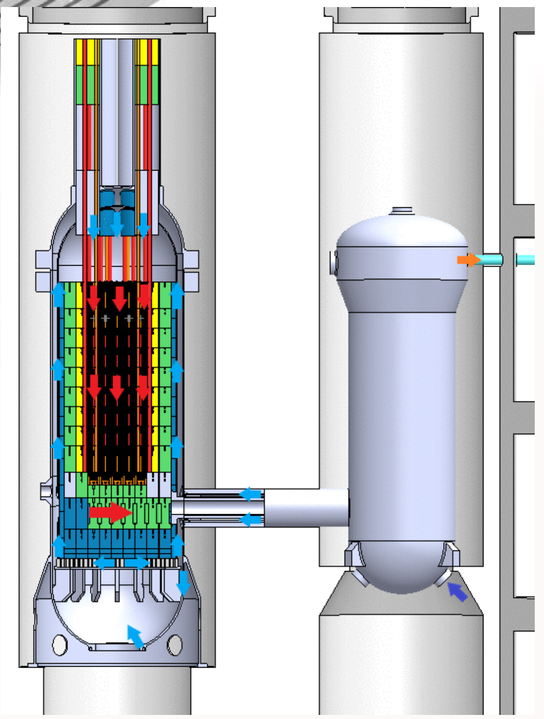
HTGR-POLA - termal power 30 MW

Contract Nr 1/HTGR/2021/14 NCBJ - Ministry of Science
“Technical design of High Temperaturę Gas Cooled Nuclear Reactor”
15 M€



UO_2





Department
of Fundamental Research

Nuclear Physics

Theoretical Physics

High Energy Physics

Astrophysics

Theory of Superheavy Nuclei in Poland

A New Description of Superheavy Nuclei Synthesis

03-07-2024

The heaviest known elements can only be produced under laboratory conditions. For years, nuclear physicists have been pushing the boundaries of the periodic table, trying to find the optimal reactions for synthesizing new elements. Scientists from the National Centre for Nuclear Research (NCBJ) and the Faculty of Physics at the University of Warsaw have succeeded in creating a new theoretical model that describes the key stage in the production of the heaviest atomic nuclei.

The paper has been published in the prestigious journal Physical Review C in the Letters section and is available at the following web address https://doi.org/10.1103/PhysRevC.109.L061603

SCIENCE IN POLAND

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Calculations show unexpected way to produce super-heavy elements

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
Świerk

Home About

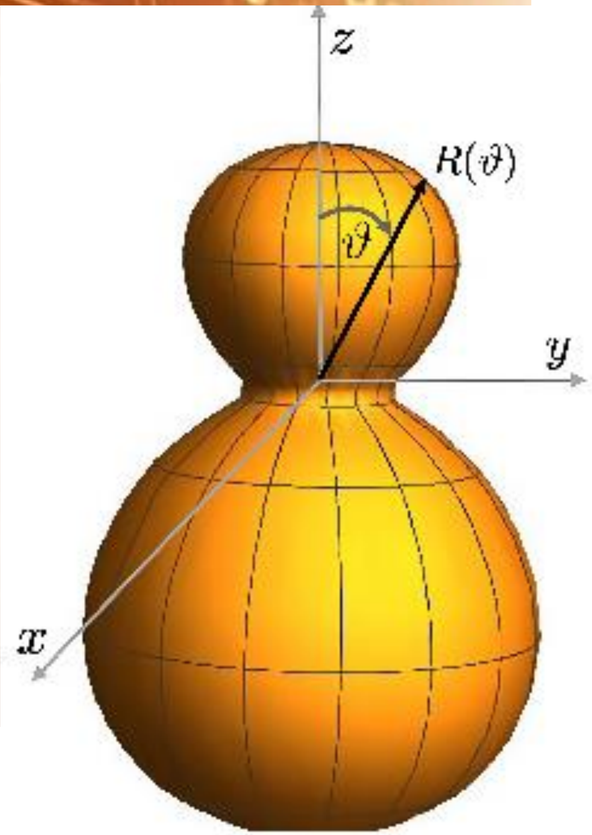
Michał Kowal as head of the GANIL Scientific Council

10-02-2025

Dr hab. Michał Kowal, head of the Theoretical Physics Division at the NCBJ's Department of Fundamental Research, has been elected chairman of the Scientific Council of GANIL (Grand Accélérateur National d'Ions Lourds – Grand National Accelerator of Heavy Ions). GANIL is the largest nuclear physics centre in France and one of the leading research centres in this field in the world.

The GANIL centre, located in Cean, Normandy, has a whole complex of accelerators, including five cyclotrons and the superconducting SPIRAL2 LINAC linear accelerator. With their help, a wide range of experimental research on nuclear physics and related fields can be conducted. NCBJ scientists are also involved in the research. The Scientific Council, headed by Michał Kowal, assesses the condtion of the accelerator complex, plans for its modernisation and expansion, and selects the experimental programmes carried out at GANIL.

Congratulations!



Westinghouse

OSGE
ORLEN SYNTHOS GREEN ENERGY

SNETP
Sustainable Nuclear Energy Technology Platform

FISA EURADWASTE 2025
SNETP Forum

KINGS
한국전력국제원자력대학원대학교
KEPCO INTERNATIONAL NUCLEAR GRADUATE SCHOOL

nucc
nuclear collaboration center | UW-KINGS

framatome

arabelle solutions
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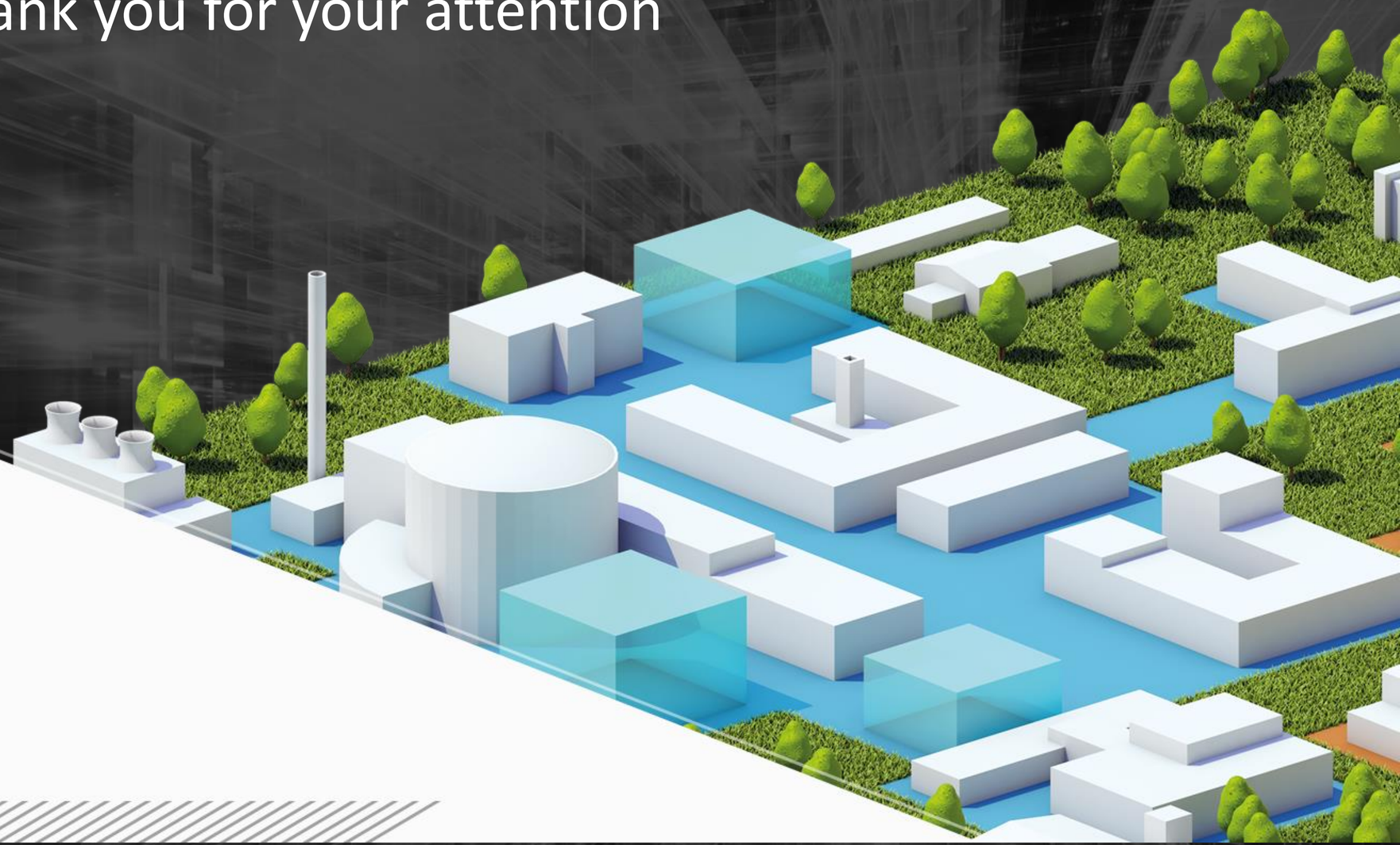
Thank you for your attention



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www.ncbj.gov.pl