

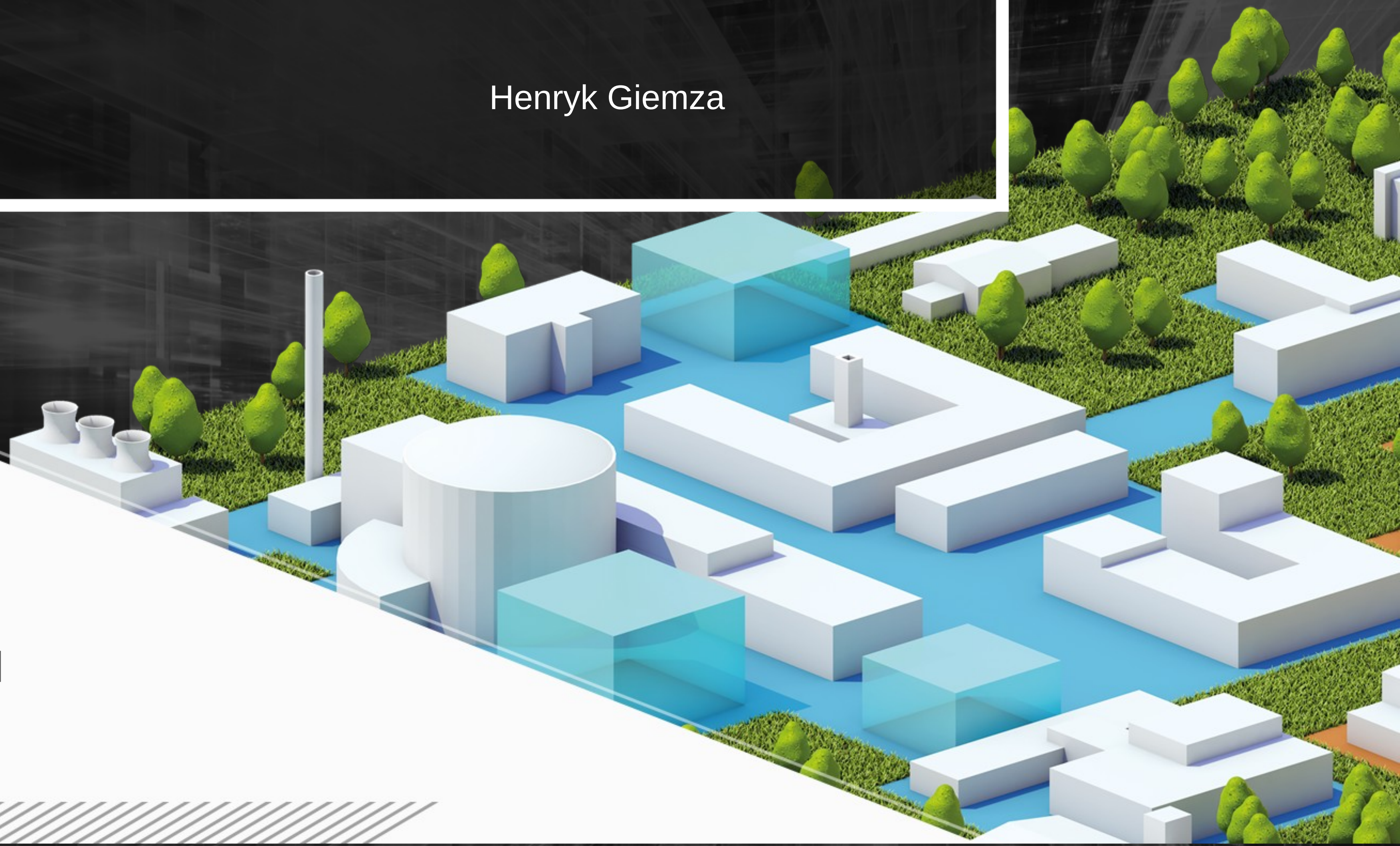


# Proto-WLCG Tier 1 NCBJ – CIŚ

Henryk Giemza



**NARODOWE  
CENTRUM  
BADAŃ  
JĄDROWYCH  
ŚWIERK**





# National Centre for Nuclear Research

Narodowe Centrum Badań Jądrowych (NCBJ)

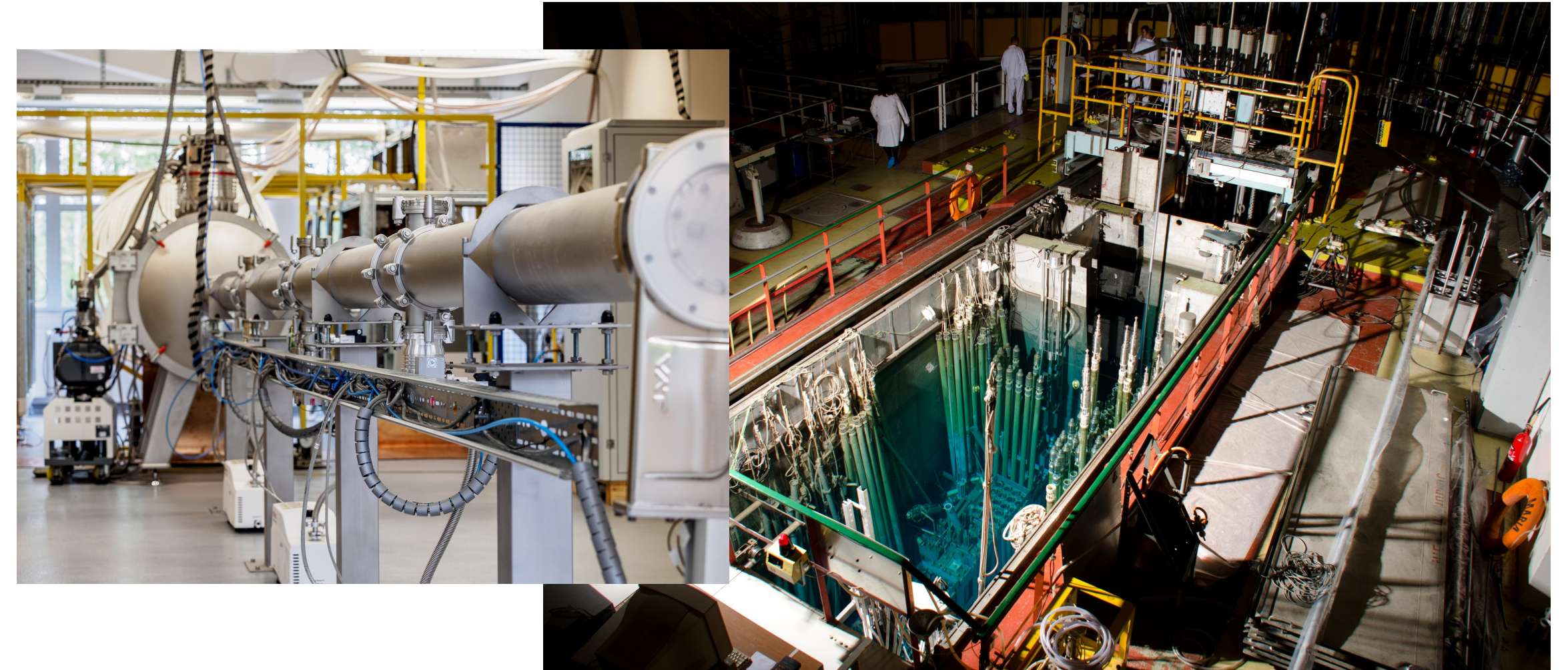
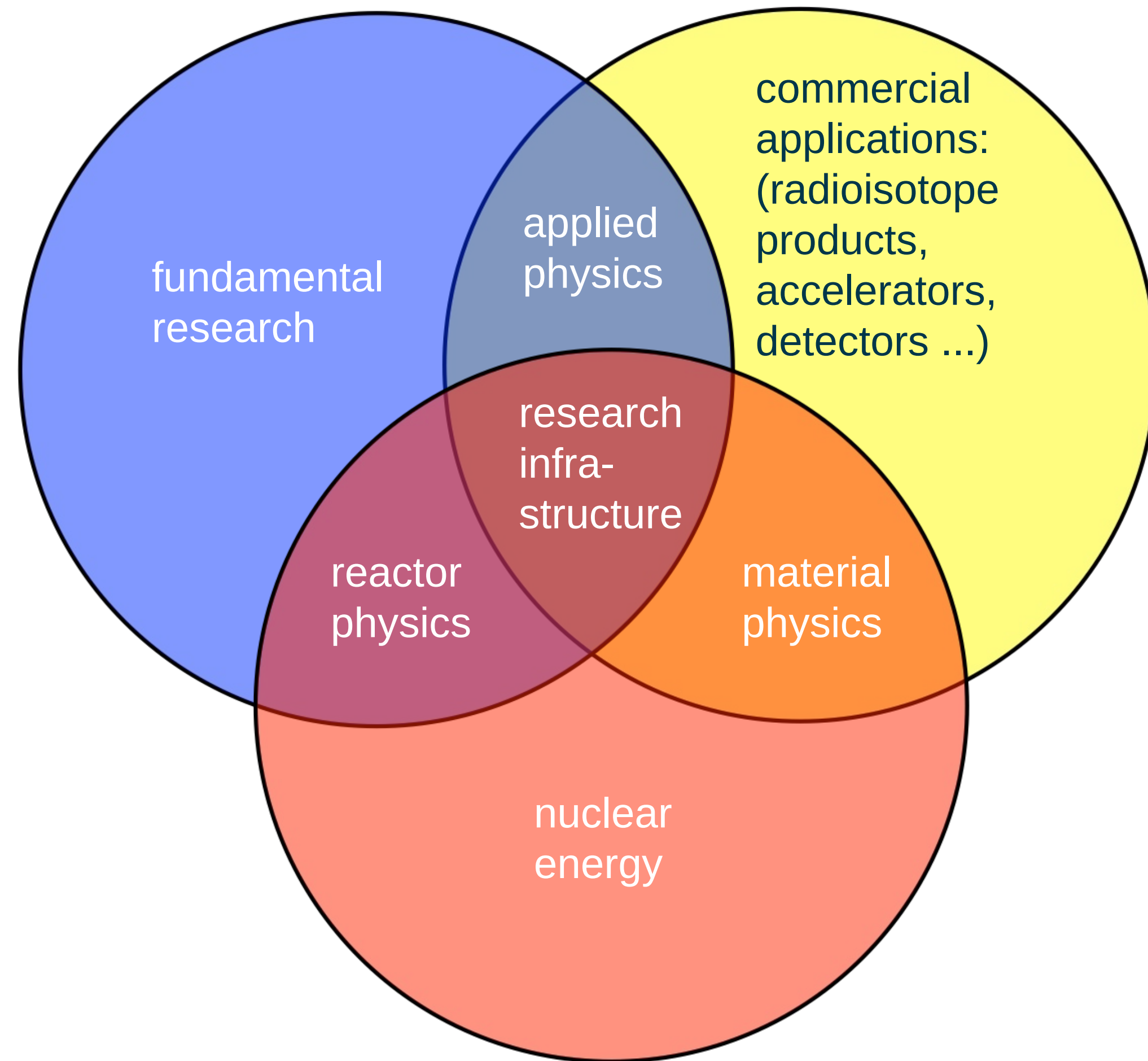
- Research institute established in **1955**
- Located ~30 km from Warsaw
- **>1100 employees:** 65 professors, 250 PhD, 40 PhD students and 100 graduate and undergraduate professionals
- Supervised by the Minister of Climate and Environment and subsidized by the Ministry of Education and Science





# National Centre for Nuclear Research

## Main activities





# Department of Complex Systems (DUZ)

## Mission

Development of IT infrastructure and services for power engineering and scientific applications including high energy physics

## Projects and co-operations



## Activities

- HPC (T2K, LSST, EuXFEL, J-PET, HTGR, NOMATEN, PoFEL)
- Calculations of power distribution (IDEA)
- Grid computing (CMS, LHCb)
- CFD (Symkom)
- Cyber security of industrial networks
- Render farm (commercial)



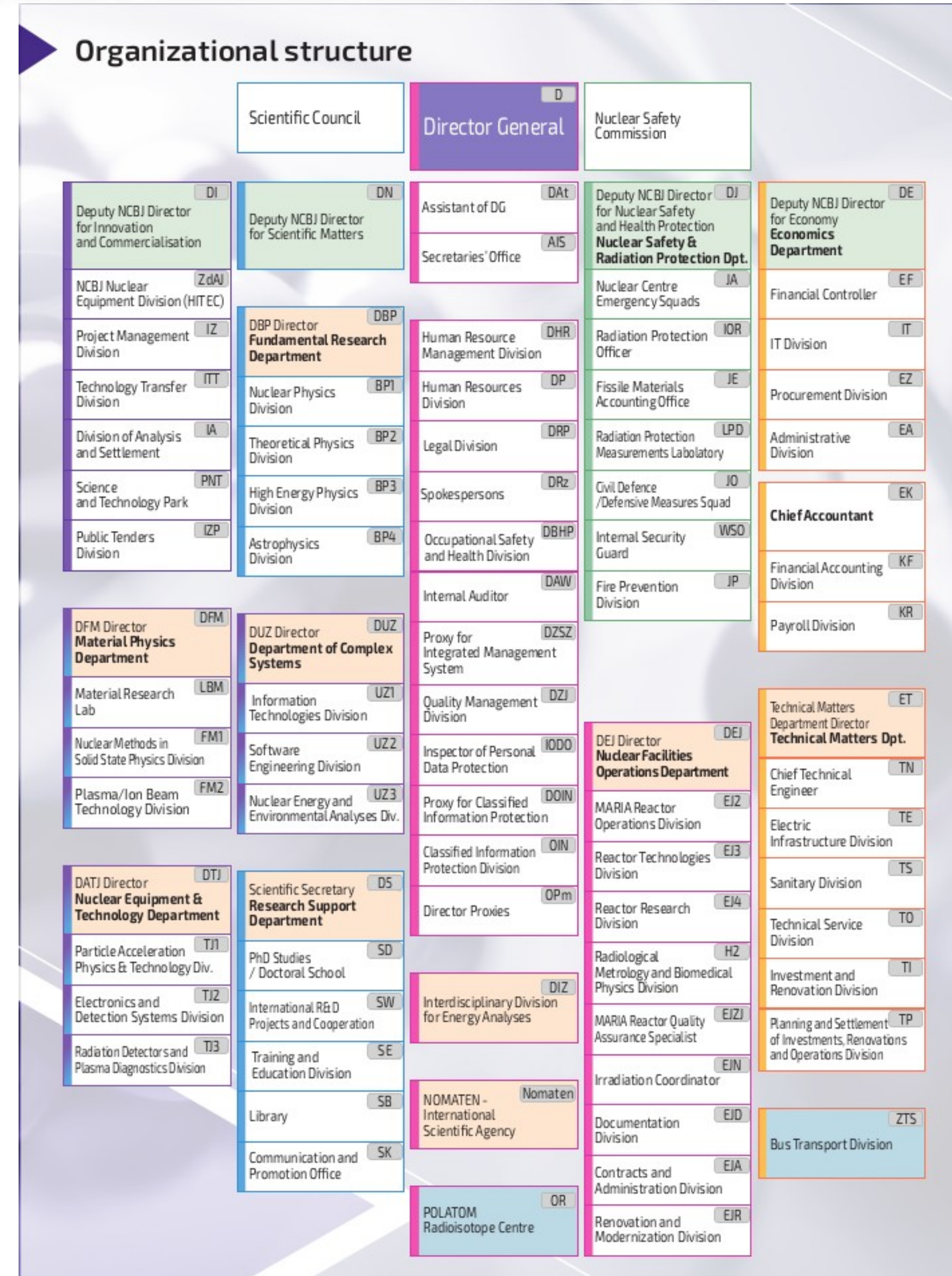
# Department of Complex Systems Representatives

**Wojciech Wiślicki**, Professor  
Director of the Department

**Adam Padée**, PhD Eng.  
Deputy Director of the Department,  
Chief of the Computing Centre

**Michał Wójcik**, MSc Eng.  
Leader of the Network and Security  
Teams

**Henryk Giemza**, MSc Eng.  
Leader of the Grid Computing Team



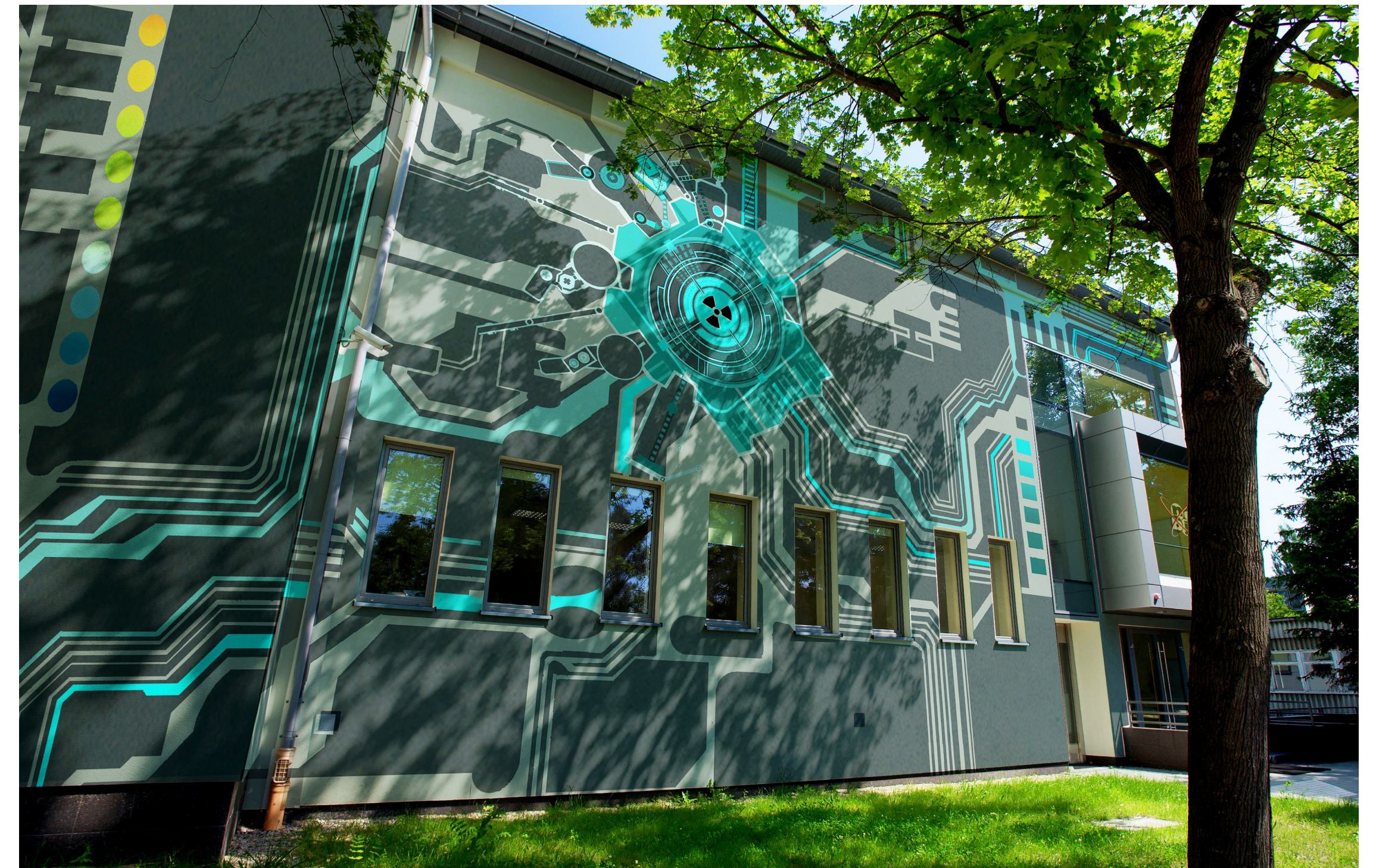


# Świerk Computing Centre

## Centrum Informatyczne Świerk (CIŚ)



- The computing centre is a part of the Department of Complex Systems (DUZ)
- “CIŚ” is our brand name, which has its source in an EU funded project of the same name (2008-2015, 30 M€)
- It is the youngest supercomputing facility in Poland, however our specialists are involved in grid computing since its beginning

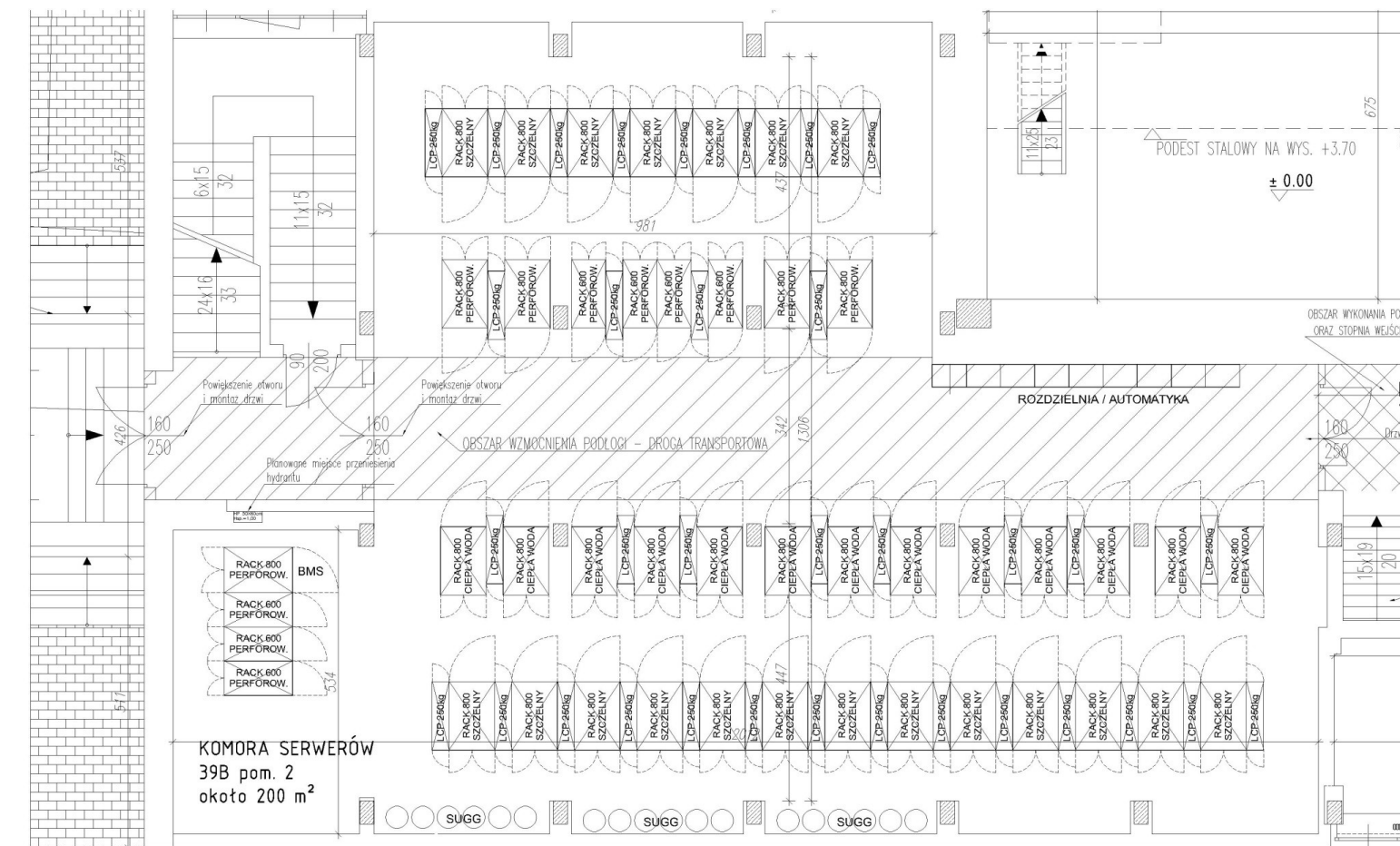




# Świerk Computing Centre

## Resources

- Computing
  - 1.4 PFLOPS
  - 36000 cores, 200 TB RAM
- Disk storage
  - 26 PB (Lustre, Isilon, Netapp, dCache)
- Tape storage
  - TSM4500, 16 PB (uncompressed)
- Network
  - Internet: 2 x 8 Gbps
  - Academic internet: 100 Gbps
  - Internal Infiniband network
- Ongoing upgrades
  - New server room (end of 2022)
  - New computing resources (1.6 PFLOPS in 2023, PraceLab2)
  - New storage resources (25 PB in 2023, KMD)





# Świerk Computing Centre

## Current support of WLCG Experiments

**7 years** of support as opportunistic resources, **1 year** as a part of Polish WLCG federation

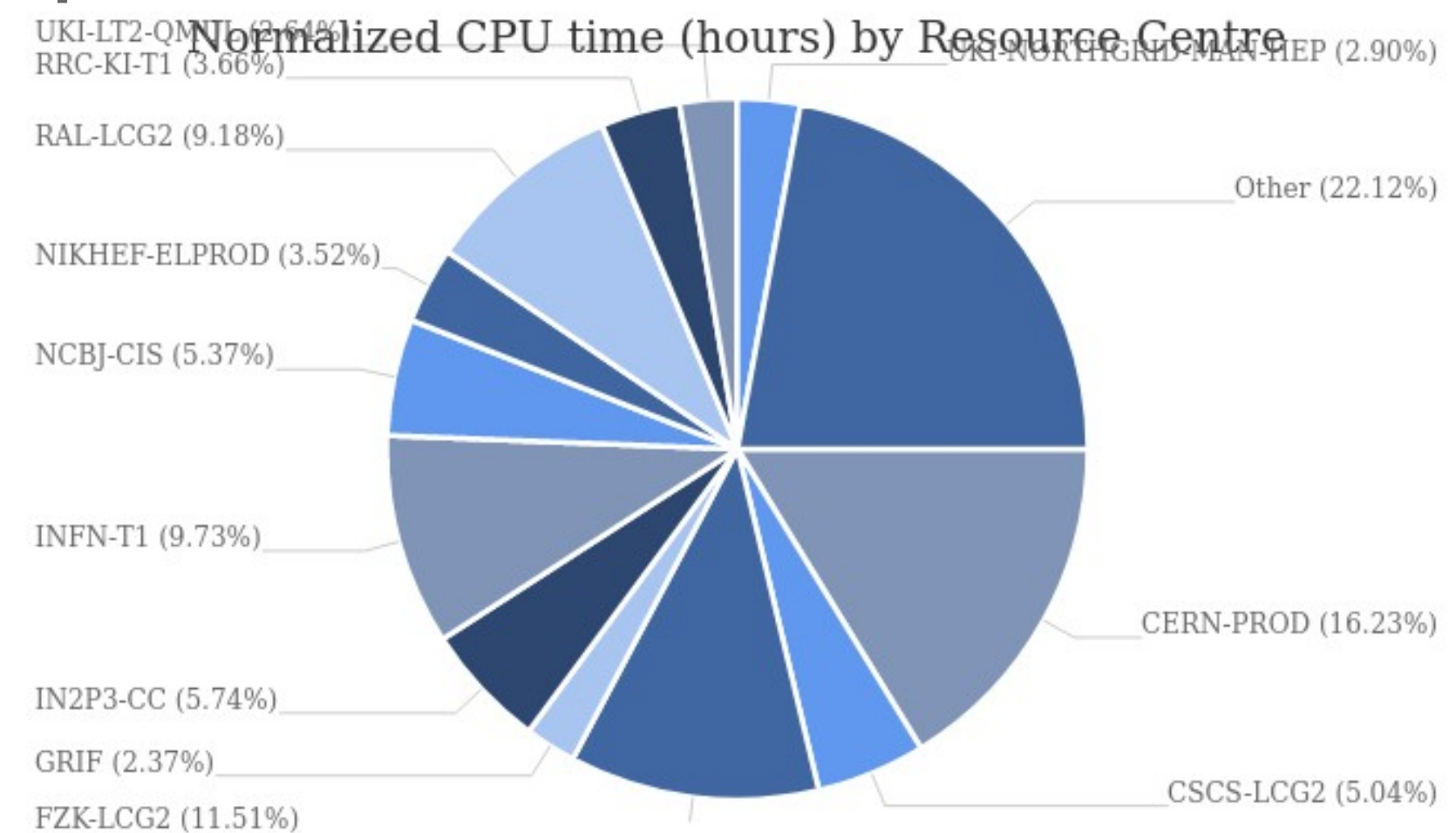
- CMS, Tier-2

- T2\_PL\_Swierk
- 34<sup>th</sup> position in 2021
- 28<sup>th</sup> position in 2022

- LHCb, Tier-2D (proto Tier-1)

- LCG.NCBI.pl. LCG.NCBI-CIS.pl
- 6<sup>th</sup> position in 2021
- 9<sup>th</sup> position in 2022

UKI-LT2-RHUL	21,829,604	<b>21,829,604</b>	<b>0.17%</b>
BEIJING-LCG2	25,805,583	<b>25,805,583</b>	<b>0.2%</b>
INFN-ROMA1-CMS	26,870,383	<b>26,870,383</b>	<b>0.21%</b>
NCBJ-CIS	26,773,001	<b>26,773,001</b>	<b>0.21%</b>
FI_HIP_T2	37,278,902	<b>37,278,902</b>	<b>0.29%</b>
NCG-INGRID-PT	47,207,275	<b>47,207,275</b>	<b>0.37%</b>
UKI-SOUTHGRID-BRIS-HEP	51,612,799	<b>51,612,799</b>	<b>0.4%</b>

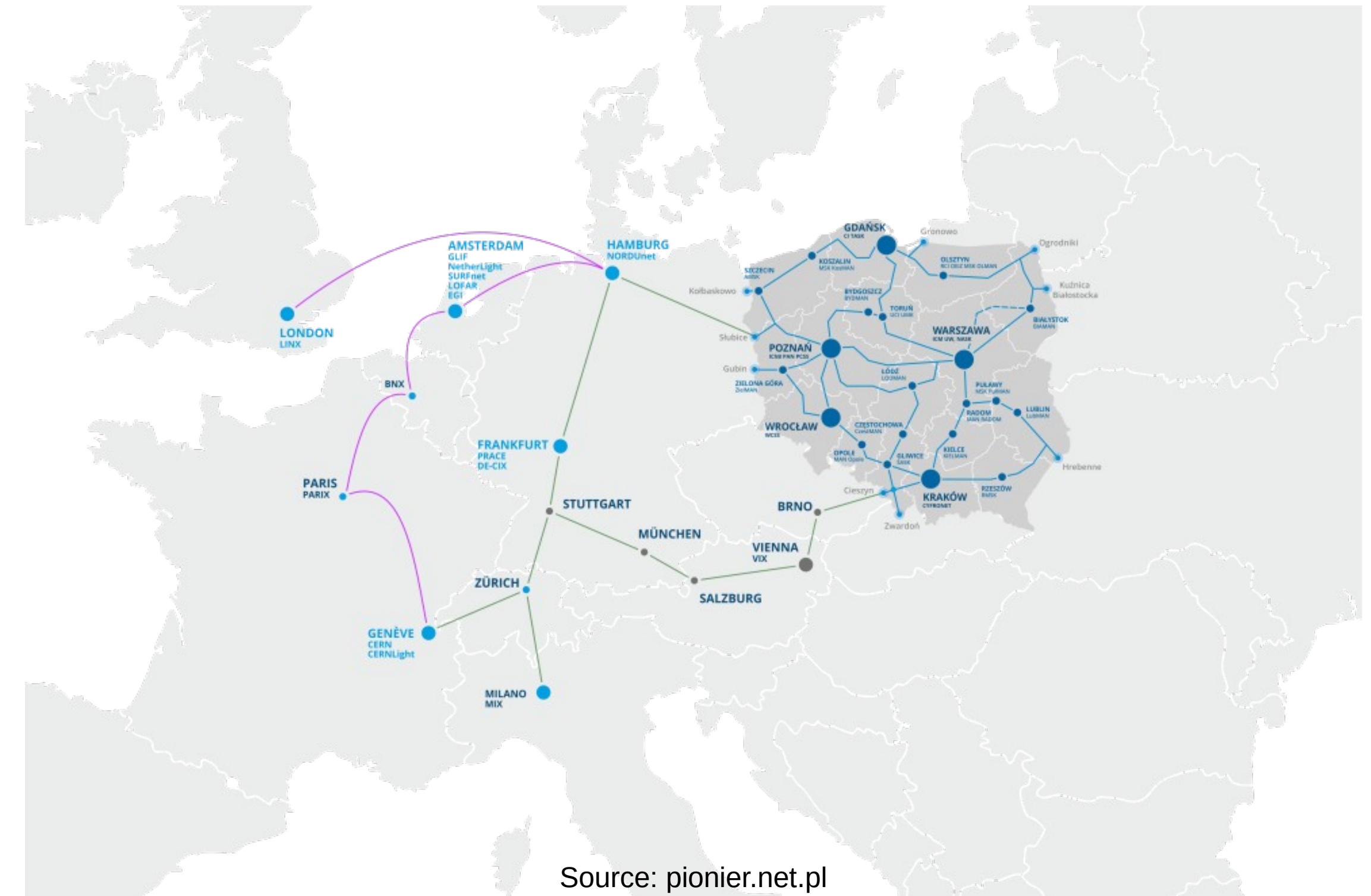




# NCBJ-CIS WLCG Proto-Tier 1

## Network resources

- 100 Gbps link to PIONIER (academic internet, Geant)
  - 20 Gbps dedicated VLAN to **LHCONE**
    - Full speed achieved during 2022 Data Challenge
  - Additional 20 Gbps dedicated VLAN to **LHCOPN**
    - Works ongoing
    - Connection will be tested during 2023 Data Challenge (June)
- Two independent 8 Gbps links to internet (Exatel)
  - Provides around 5.6 Gbps to CERN (2022 Data Challenge)
  - **Backup** links for WLCG activities



## Milestones

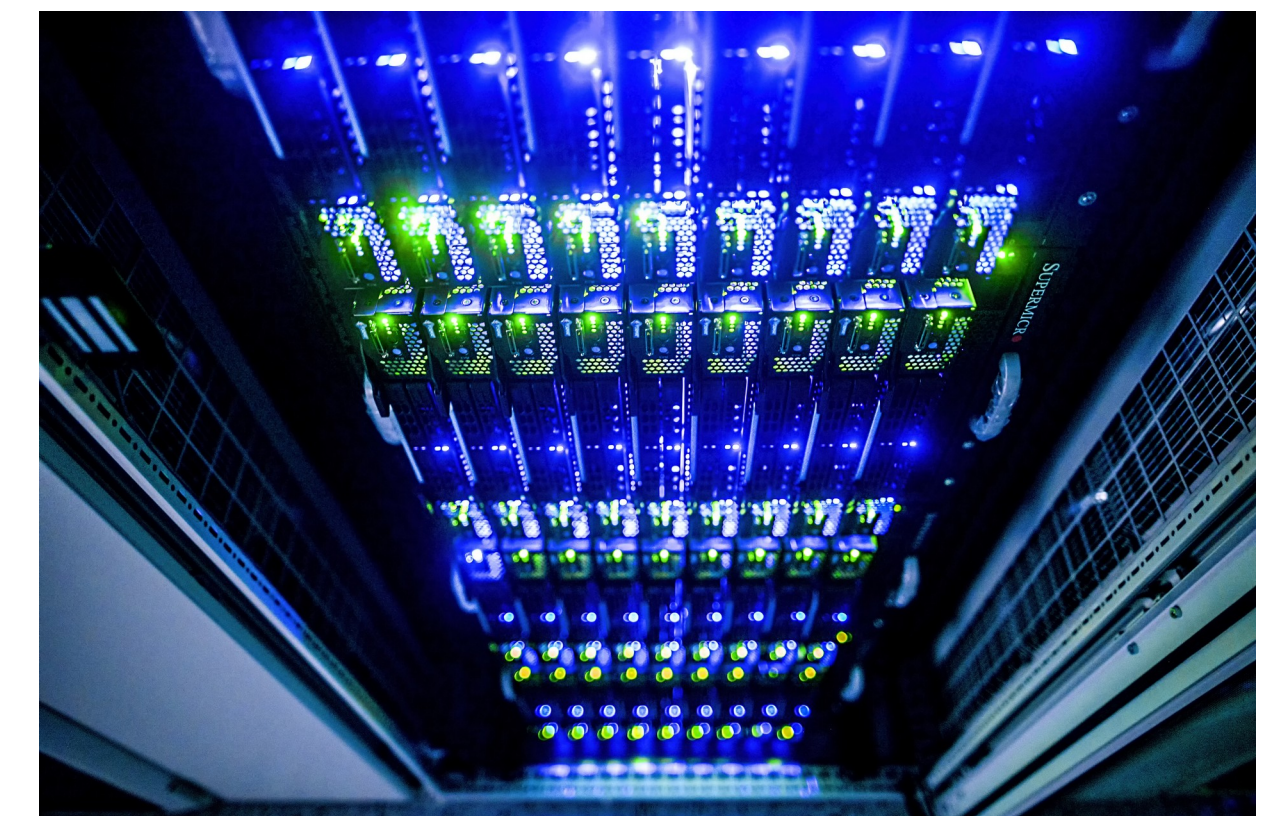
- 1) Dedicated **LHCOPN VLAN** (end of April 2023)
- 2) Support of **IPv6** on the academic internet links (end of April 2023)



# NCBJ-CIS Proto-WLCG Tier 1 Computing

NCBJ-CIS [HS06]	2014 – 2020	2021	2022	2023 (planned)	2024 (planned)
<b>Provisioned resources</b>	3000 – 70000	76000	68000	72000 – 105000	105000
<b>WLCG Pledges</b>					
CMS (50%)	0	0	5150	5100 (400 cores)	35000 (Tier 1)
LHCb	0	0	8625	63000 (5500 cores)	70000
<b>Utilization</b>					
CMS	400 – 7600	3050	5500	n/a	n/a
LHCb	2400 – 41000	58000	34500	n/a	n/a
<b>% of pledge</b>					
CMS	n/a	n/a	106 %	n/a	n/a
LHCb	n/a	n/a	400 %	n/a	n/a

Platform	Specification	Number of nodes
Intel S2600TP	1 x Intel Xeon E5-2680 v3 128 GiB RAM 2 x 400 GB SSD 2 x 1G Ethernet	84
Intel HNS7200AP	1 x Intel Xeon Phi CPU 7210 192 GiB RAM 1 TB SSD 2 x 1G Ethernet	48



## Milestones

1) We are committed to provide **5% of CPU** resources required by **LHCb**. This number was already achieved in **2020** and **2021**, however in 2022 utilization is going to be lower due to smaller needs of the experiment (relative to the available resources) and lower efficiency of jobs (~80%, where typically was 97% in the past years). **We plan to work closer with LHCb in 2023 to come back to the previous levels.**



# NCBJ-CIS Proto-WLCG Tier 1

## Disk storage

NCBJ-CIS [TB]	2014 – 2020	2021	2022	2023 (planned)	2024 (planned)
<b>Provisioned resources</b>					
CMS	300 – 550	650	650	650	650 – 1500
LHCb	300 – 600	600	600	600 – 1500	600 – 1500
<b>WLCG Pledge</b>					
CMS (50%)	0	0	425	440	1500
LHCb	0	0	600	600	1500
<b>% of pledge</b>					
CMS	n/a	n/a	153 %	147 %	100 %
LHCb	n/a	n/a	100 %	100 % or more	100 %
<b>Utilization</b>					
CMS	0 – 500	600	600	n/a	n/a
LHCb	0 – 470	480	530	n/a	n/a

Platform	Specification	Number of nodes
Tyan B7118F100V100HR	2 x Intel Xeon Gold 6226R 192 GiB RAM 1,05 PB HDD (1,4 PB RAW), RAID60, up to 9GB/s of throughput 2 x 100G Ethernet	3

### Milestones

- 1) Space for LHCb Tier-2D datasets and Tier-1 buffers is already **fully pledged**. In **2023** NCBJ is able to provide **additional 1.4 PB** of storage what will place it in the middle of all LHCb Tier-1 sites (the actual value will be discussed with the experiment).
- 2) In 2024 we plan to add extra space for CMS





# NCBJ-CIS Proto-WLCG Tier 1

## Tape storage

NCBJ-CIS [TB]	2021	2022	2023 (planned)	2024 (planned)
<b>Provisioned resources</b>				
CMS	0	0	0	5000
LHCb	5000	5000	5000	5000
<b>WLCG Pledge</b>				
CMS	0	0	0	5000
LHCb	0	0	5000	5000
<b>% of pledge</b>				
CMS	n/a	n/a	n/a	100 %
LHCb	n/a	n/a	100 %	100 %

Platform	Specification	Number
<b>Supermicro SYS-6029U-TR4</b>	2 x Intel Xeon Gold 5222 128GiB RAM 2 TB SSD NVMe + 60TB HDD SATA 2 x FC 8 Gbps 2 x 10G Ethernet	2
<b>IBM TS4500</b>	TS1080 Ultrium 8 drives (throughput up to 360 MBps)	5
	LTO7M8 tapes (9TB)	1780



### Milestones

1) During 2022 Data Challenge our tape system was able to support a sustained **throughput of 1.1 GB/s** during writing. For a Tier-1 of our size LHCb requires **1.3 GB/s**, so we plan to **buy 3 additional tape drives** (May-Jun 2023).



# NCBJ-CIS Proto-WLCG Tier 1

## Manpower

Teams	Personnel	FTE
HPC	5 people	3
Grid	2 people	1
Network	4 people	4
Storage	2 people	1
Infrastructure	3 people	3
Software	9 people	7
<b>SUM</b>	<b>25 people</b>	<b>19</b>

- We are going to dedicate **3 FTE** to Tier-1 activities.
- Our commitment will increase in the future when we extend Tier-1 support to **CMS**.



# NCBJ-CIS Proto-WLCG Tier 1

## Services

- Level of support
  - As required in MoU, with on-call duty outside of the prime hours
- In the past 12 months availability and reliability (ARGO) were both at the level of 99% what fulfills requirements presented in the MoU.
- NCBJ supports all LHCb Tier-2 and Tier-2D sites as well as many other Tier-1 sites as its personnel hold the role of the Tier-2D Coordinator and take shifts as GEOC and DQCS.



Thank you for your attention



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