AGH
UNIVERSITY OF KRAKOW

Krakow – a city of history, science and culture

- Krakow is the historical and cultural capital of Poland – it has about 1 million citizens

- Theatres, galleries, museums – Krakow's charm and magic are captivating

- Krakow academic centre – 8 public and 12 private universities, JU established in 1364

- Krakow is the second largest business and industrial cantre in Poland

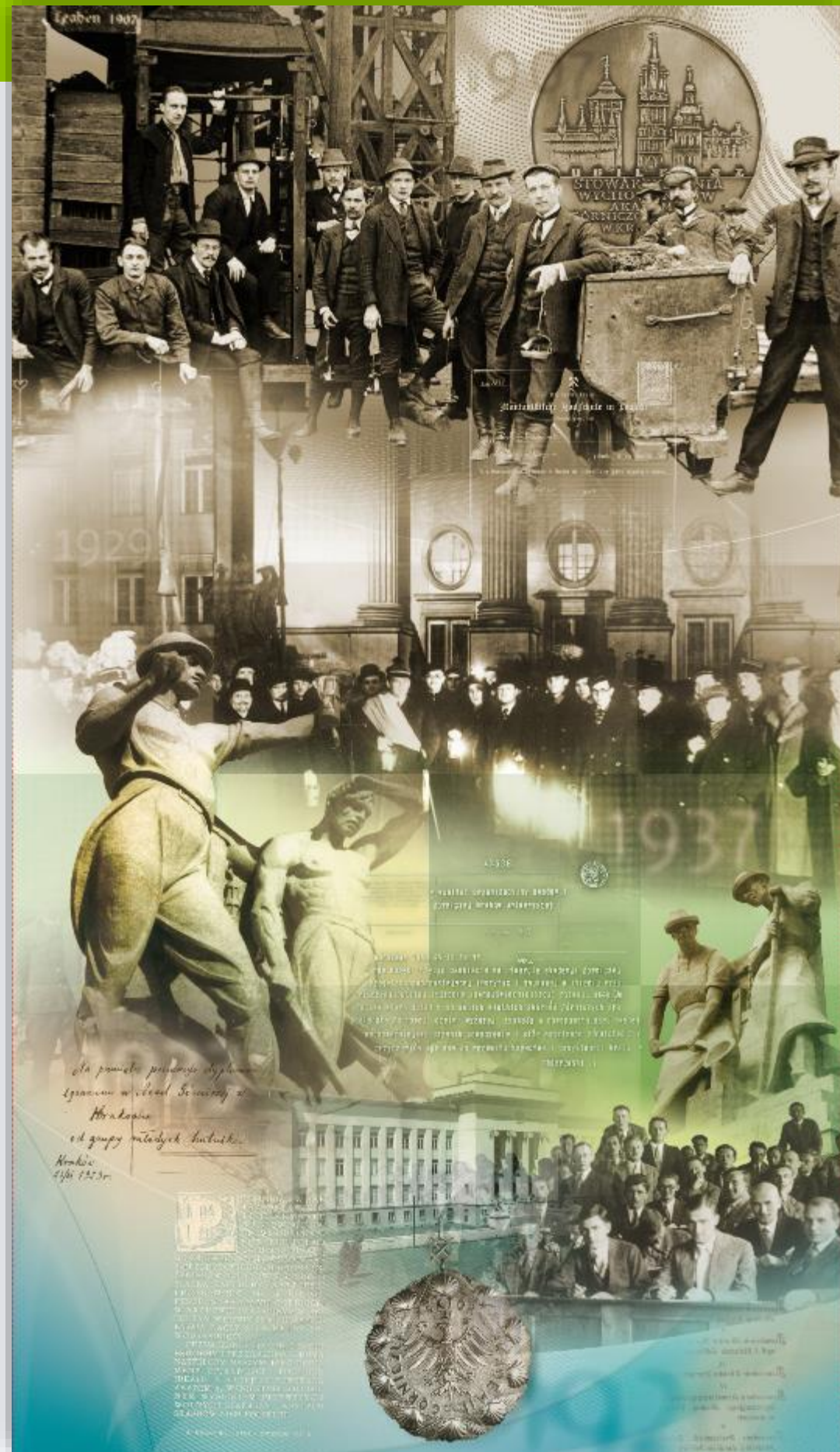- Unique atmosphere for more than 200,000 students

POLAND Krakow region

KRAKOW
almost 6,000 historical monuments and 15.5 million visitors in 2019

AGH
University
Of Krakow

100 Years of the AGH University

The university that serves the economy and the society

Establishment of the university – 31 May 1913
Emperor Francis Joseph I approved the establishment of a higher school of mining in Krakow

Opening of the university – 20 October 1919
Józef Piłsudski, the Chief of State, opened the Mining Academy

In **2015**, a resolution was made to rename the academy as "AGH University of Science and Technology".

AGH UNIVERSITY IN NUMBERS

- **17 Faculties + the Academic Centre for Materials and Nanotechnology**

- **81 programmes of study**

- **More than 200 diploma specialisations**

- **Total number of students** (2023)**: over 18,000**
  full-time students: 15,962
  part-time students: 2,112
  doctoral students: 813
  postgraduate students: 1930
  foreign students: 1,000

- Over **250,000** alumni sent to the economic sector

- **2,500 academic staff,** 6,000 employees
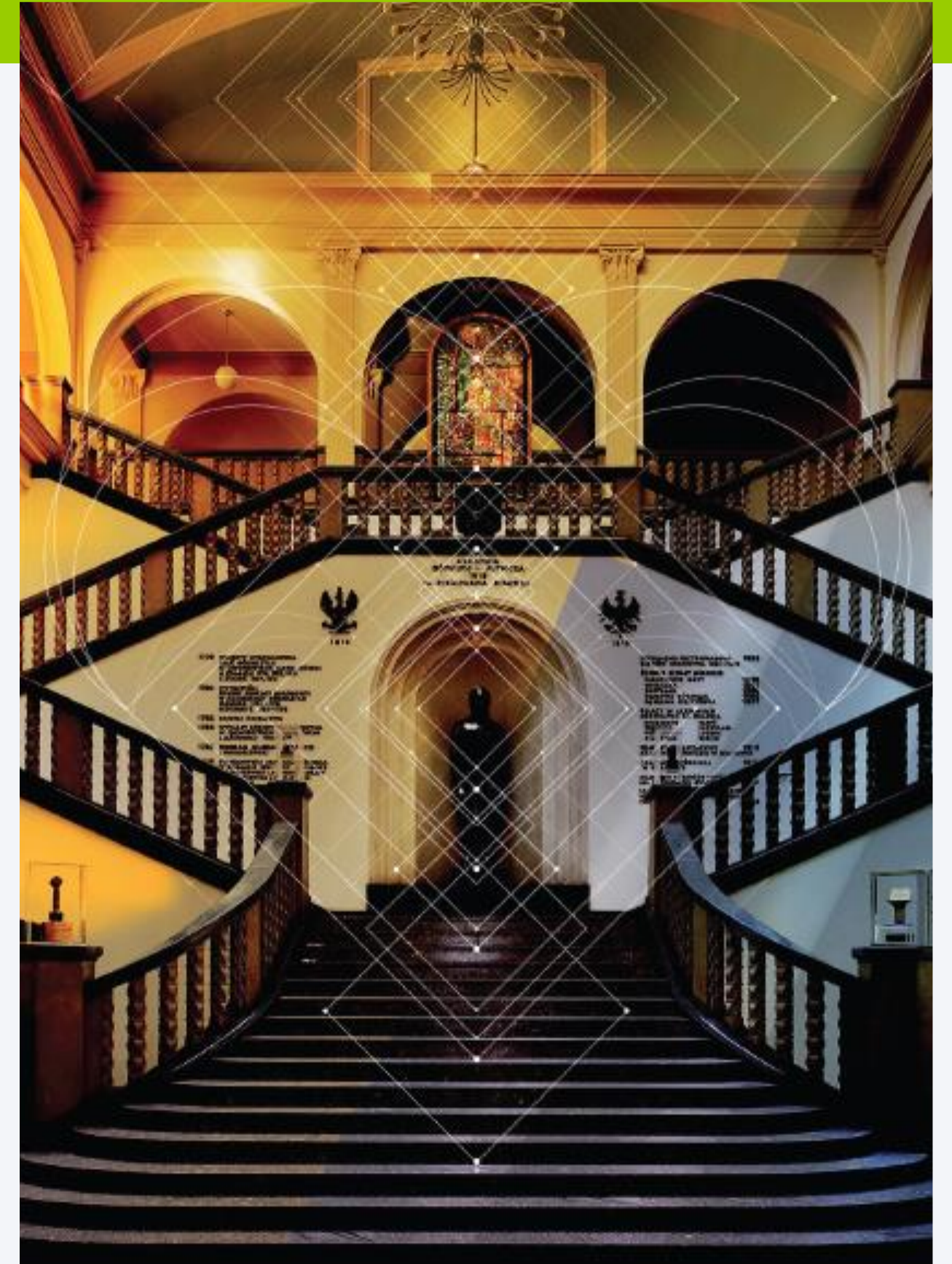
STRUCTURE

FACULTIES

- Faculty of Civil Engineering and Resource Management
- Faculty of Metals Engineering and Industrial Computer Science
- Faculty of Electrical Engineering, Automatics, Computer Science, and Biomedical Engineering
- Faculty of Computer Science, Electronics, and Telecommunications
- Faculty of Mechanical Engineering and Robotics
- Faculty of Geology, Geophysics, and Environmental Protection
- Faculty of Geo-Data Science, Geodesy, and Environmental Engineering
- Faculty of Materials Science and Ceramics
- Faculty of Foundry Engineering
- Faculty of Non-Ferrous Metals
- Faculty of Drilling, Oil, and Gas
- Faculty of Management
- Faculty of Energy and Fuels
- Faculty of Physics and Applied Computer Science
- Faculty of Applied Mathematics
- Faculty of Humanities
- Faculty of Computer Science

AGH University Doctoral School

Department of Foreign Languages

Department of Sport and Physical Education

NEW RESEARCH CENTRES:

- New Materials and Technologies
- Space Technology
- Cybersecurity
- Artificial Intelligence
- ......

SPACE UNIVERSITY

- UNIVERSEH – European Space University for Earth and Humanity: Universities of Toulouse, Luxemburg, Lulea, Dusseldorf, and AGH University
- AGH University Space Technology Centre
- Space engineering related education programmes
- Space inspires research & transfer of technology
- Achievements of "AGH Space Systems" student research club
- Network of 17 **Polish Space Universities**
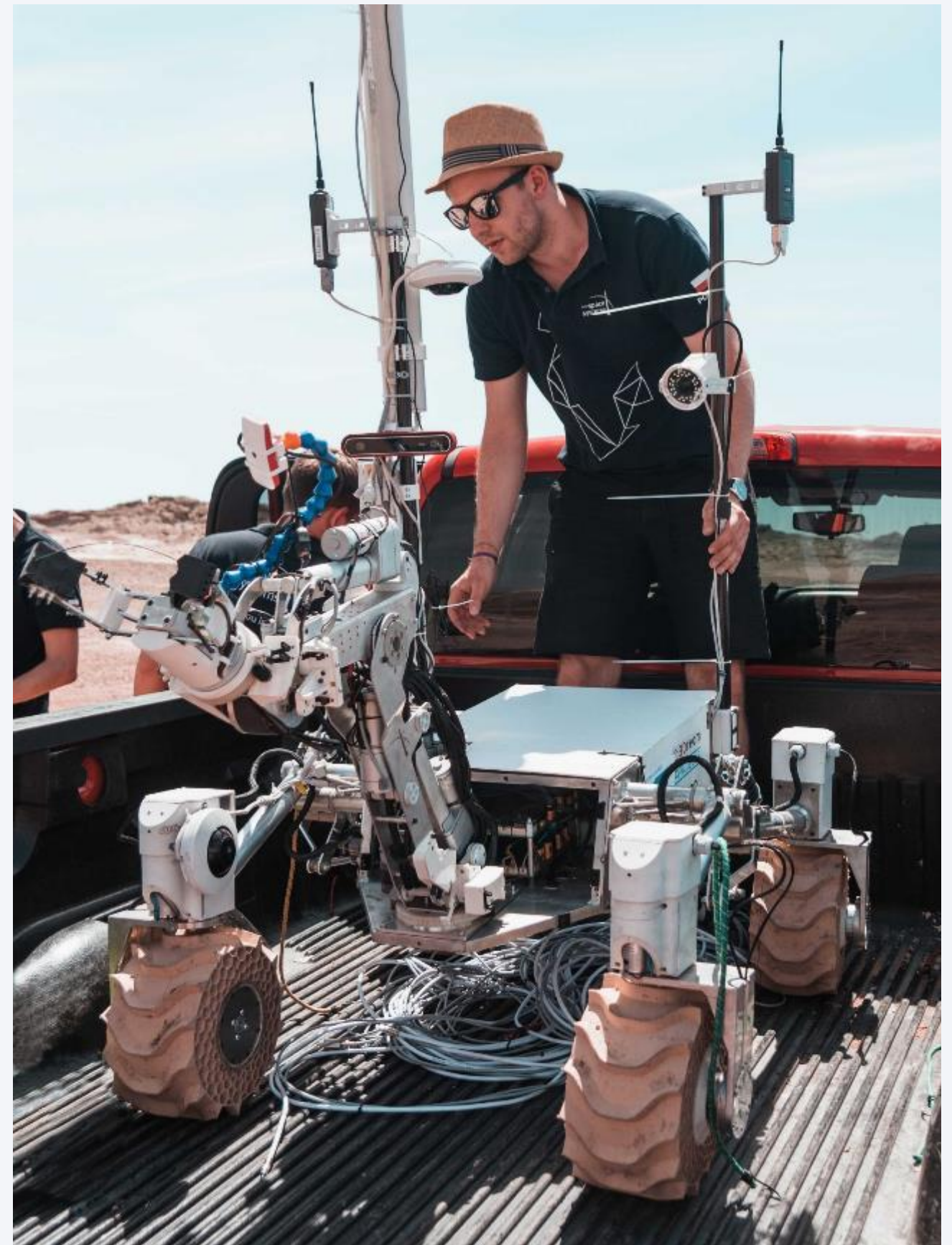
Unique and modern world-class equipment
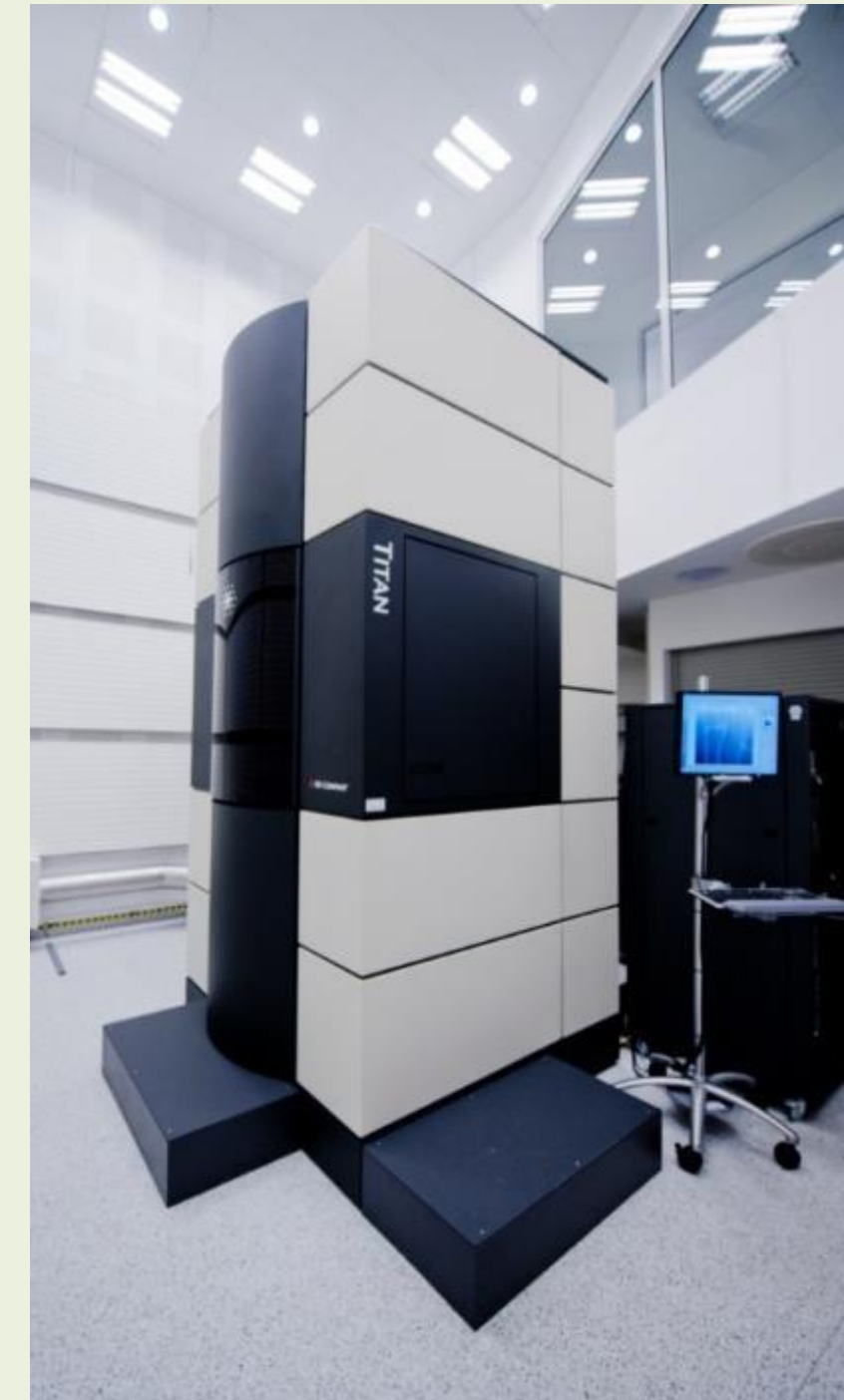
AGH UNIVERSITY CAMPUS

AGH UNIVERSITY FACILITIES

Department of Telecommunications, II

Academic Centre for Materials and Nanotechnology

Centre of Energy

Academic Computer Centre CYFRONET

Department of Telecommunications, I

Centre of Computer Science

Centre of Ceramics

Main Library

In the last 15 years, more than 20 large construction projects have been carried out.

INFRASTRUCTURE

Park and palace complex in Młoszowa

Sienkiewiczówka – guest house

Klub STUDIO

Music Production Studio „Kotłownia"

Centre of New Energies in Miękinia

Student Campus

Fitness Centre

Swimming pool

CERN-AGH collaboration in general

- Collaboration for many years in major experiments
  - Faculty of Physics and Applied Computer Science (ALICE, ATLAS, CMS, LHCb)
  - Faculty of Computer Science (ALICE, TOTEM/CMS)
  - Faculty of Computer Science, Electronics and Telecommunications (ALICE)
  - Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering (ALICE)
- Collaboration in EU-funded projects (selected, with ACK Cyfronet AGH)
  - InterTwin, Indigo DataCloud, XDC,…
  - EGI projects (ACE, Engage, InSpire…)
  - EOSC projects (Hub, Beyond, Future…)
  - HNSciCloud, CrossGrid/DataGrid …
- Participation in WLCG
  - ACK Cyfronet AGH delivers power and storage for WLCG for 20+ years,
    as part of Polish WLCG (for ATLAS T2, 33 kHS23, 3.4 PB, previously for ALICE T2)
  - AGH representatives work for WLCG CB and C-RRB

Closer view of ALICE-AGH collaboration

- **Started informally 2016 due to INP PAS initiative**
  (Prof. Marek Kowalski, Prof. Jacek Otwinowski)

- **Associated Member (decision of Collaboration Board 28.8.2017)**
  (Spokesperson: Federico Antinori)

- **Full Member (decision of CB 27.3.2020), voting (76/0/0)**
  (Spokesperson: Luciano Musa)

- **Member of ALICE-PL Consortium (27.7.2021)**
  (Coordinator: Prof. Marek Kowalski, AGH TL: Jacek Kitowski, DTL: Adrian Horzyk)

- **Members (Glance)**
  - All: 40, MNO: 8, PhD students: 4

- **Topics of collaboration**
  - Front End Electronics - FIT project
  - Development of CCDB, RCT, predicting job exec time
  - AI and ML for fast simulation, detect abnormalities
  - Shifts, service work

- **Collaboration co-financed by the Ministry of Science and High Education**

FIT detector enhancement at AGH

- ## New readout electronics for FV0

  - Improvement of linearity, range and accuracy of time and charge measurements
  - Signal noise and time jitter reduction
  - Wider bandwidth
  - Precise timetable for development

See Thu. Plenary 9:50
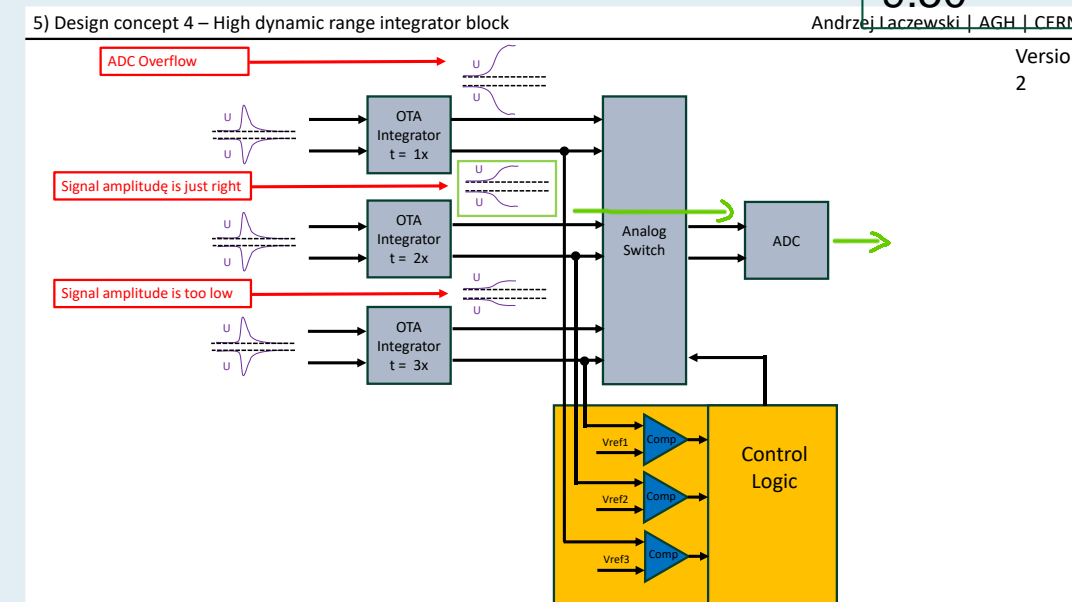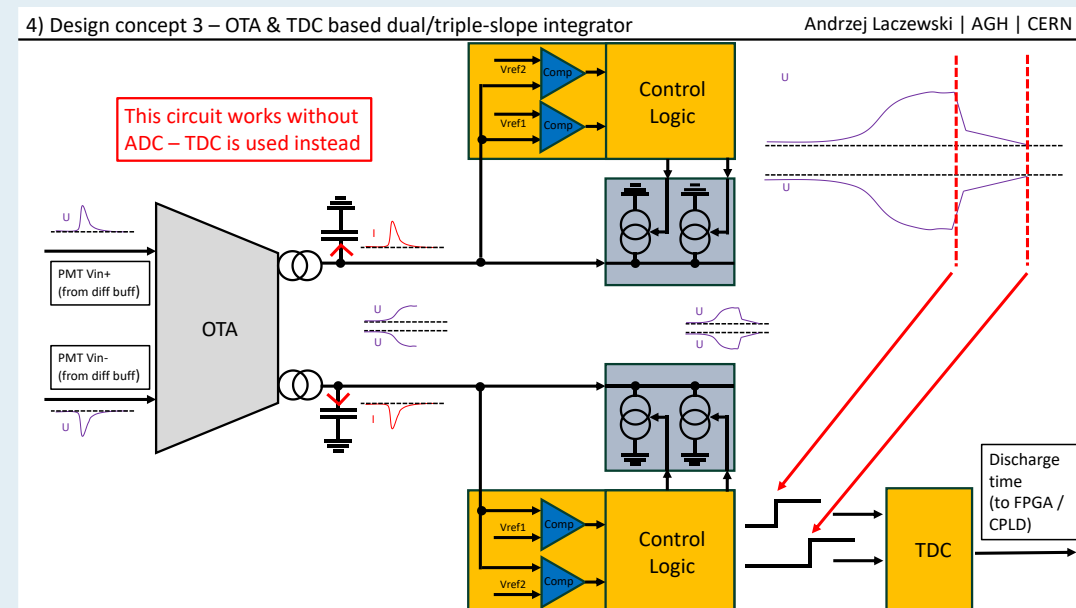
- ## FIT control server software migration to WinCC

  - IPBus-based solution replaced with GBT link
  - Future compatibility with ALFRED framework
  - Easier DCS operation and maintenance

See Wedn. FD Session 16:00

Paweł Russek, Cezary Worek, Sebastian Koryciak, *Faculty of Computer Science, Electronics and Telecomm.*
Piotr Wiącek, *Faculty of Physics and Applied Computer Science*
Mirosław Jabłoński, *Faculty of Electrical Engineering, Automatics, Comp. Sci. and Biomed. Engr.*
Krystian Rosłoń (CERN), Jacek Otwinowski (INP), Grzegorz Kasprowicz (WUT), Władek Trzaska & FIT Project (CERN),

Construction of FIT Laboratory at AGH

- Lab allows AGH's engineers and scientists to be involved in the development and maintenance of the FIT detector

- Purchase of the equipment (100,000 €)

- Setup and configuration of all necessary systems:
  FEE, FLP, DCS, QC, O2

- Critical for ALICE operation development of skills and knowledge of AGH employees and students

Paweł Russek, Cezary Worek, Sebastian Koryciak, *Faculty of Computer Science, Electronics and Telecomm.*
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Jacek Otwinowski (INP), Władek Trzaska & FIT Project (CERN),

RCT - Run Condition Table improved

- Data analysis and quality control (QC) of detectors' physical data
  - with arbitrary time resolution for higher accuracy
- Aggregation QC information from multiple systems (QCDB, …)
- Visualizing quality of data globally and in detail
- Implemented in production

Almost all detectors collected 100% of usable data

RUN	Fill No.	Start	Stop	TRG Start	TRG Stop	L3 (A)	Dipole (A)	μ(INEL)	$INEL_{avg}$ (Hz)	GAQ	CPV	EMC	FDD	FT0	FV0	HMP	ITS	MCH	MFT	MID	PHS
552205	9691	31/05/2024 02:30:24	31/05/2024 04:36:13	31/05/2024 02:30:24	31/05/2024 04:36:13	-29,999.8	-5,999.96	0.03	681,034	100	+ QC	100	100	100	100	100	100	100	100	100	100
552204	9691	31/05/2024 00:13:34	31/05/2024 02:16:20	31/05/2024 00:13:34	31/05/2024 02:16:20	-29,999.8	-5,999.96	0.03	678,628	100	+ QC	100	100	100	100	100	100	100	100	100	100
552203	9691	30/05/2024 22:07:09	31/05/2024 00:03:52	30/05/2024 22:07:09	31/05/2024 00:03:52	-29,999.8	-5,999.96	0.03	680,220	100	+ QC	100	100	100	100	100	100	100	100	100	100
552201	9691	30/05/2024 19:59:14	30/05/2024 21:47:30	30/05/2024 19:59:14	30/05/2024 21:47:30	-29,999.8	-5,999.96	0.03	685,407	100	+ QC	100	100	100	100	100	100	100	100	0MCR	100
552200	9691	30/05/2024 10:15:21	30/05/2024 19:42:55	30/05/2024 10:15:21	30/05/2024 19:42:55	-29,999.8	-5,999.96	0.03	678,598	100	+ QC	100	100	100	100	100	100	100	100	42	100
552198	9691	30/05/2024 09:07:45	30/05/2024 10:07:30	30/05/2024 09:07:45	30/05/2024 10:07:30	-29,999.8	-5,999.96	0.03	685,124	100	+ QC		100	100	100	100	100	100	100	100	100
552197	9691	30/05/2024 07:45:06	30/05/2024 08:53:10	30/05/2024 07:45:06	30/05/2024 08:53:10	-29,999.8	-5,999.96	0.03	676,707	100	+ QC	0	100	100	100	100	100	100	100	100	100

Łukasz Dubiel, Agata Kruczkiewicz, Robert Marcjan, Roman Dębski, *Faculty of Computer Science*
Piotr Konopka (CERN), Jian Liu (CERN), Martin Boulais (CERN)

My personal contribution to ALICE…

Some physics / detector operation topics coordinated recently by the ATLAS members from AGH

➢ Electro-weak and quarkonia working group (Iwona Grabowska-Bołd)

➢ LHC Heavy Ion Working Group (Iwona Grabowska-Bołd)

➢ Ultra Peripheral Collisions (Mateusz Dyndał)

➢ Trigger Min Bias / Fwd Signature working Group (Tomasz Bołd)

➢ Trigger Heavy Ion Menu Forum (Krzysztof Cieśla)

➢ Trigger Monitoring and Data Quality (Klaudia Maj)

Participation of AGH in the experiment/collaboration organisation

Iwona Grabowska Bołd – member of the Collaboration Board

Iwona Grabowska Bołd – member the ATLAS Executive Board Additional Members

Iwona Grabowska Bołd – member ATLAS Publication Committee

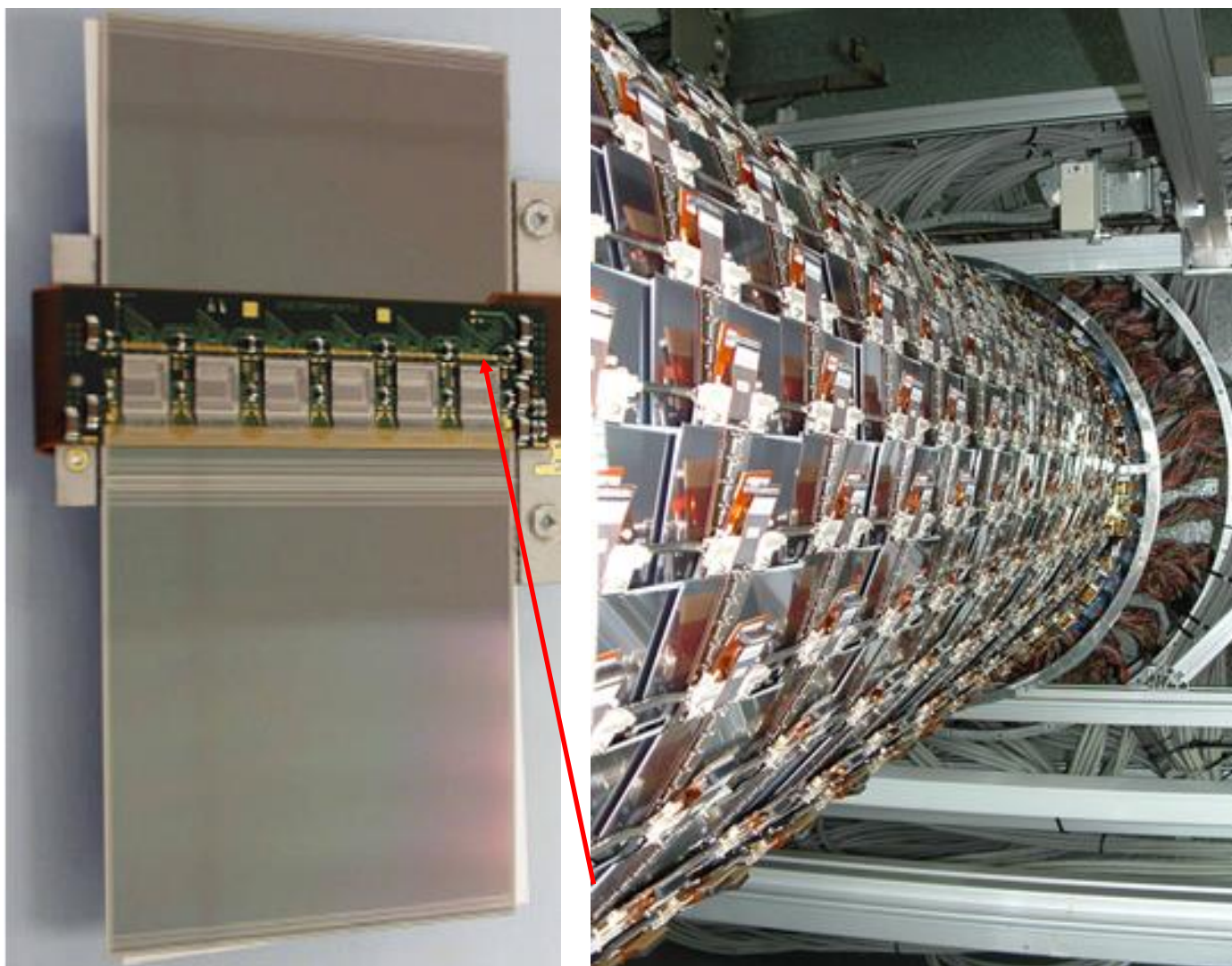Tomasz Bołd – member of the CB Chair Advisory Group

Władysław Dąbrowski – member of the ITk Institutional Board

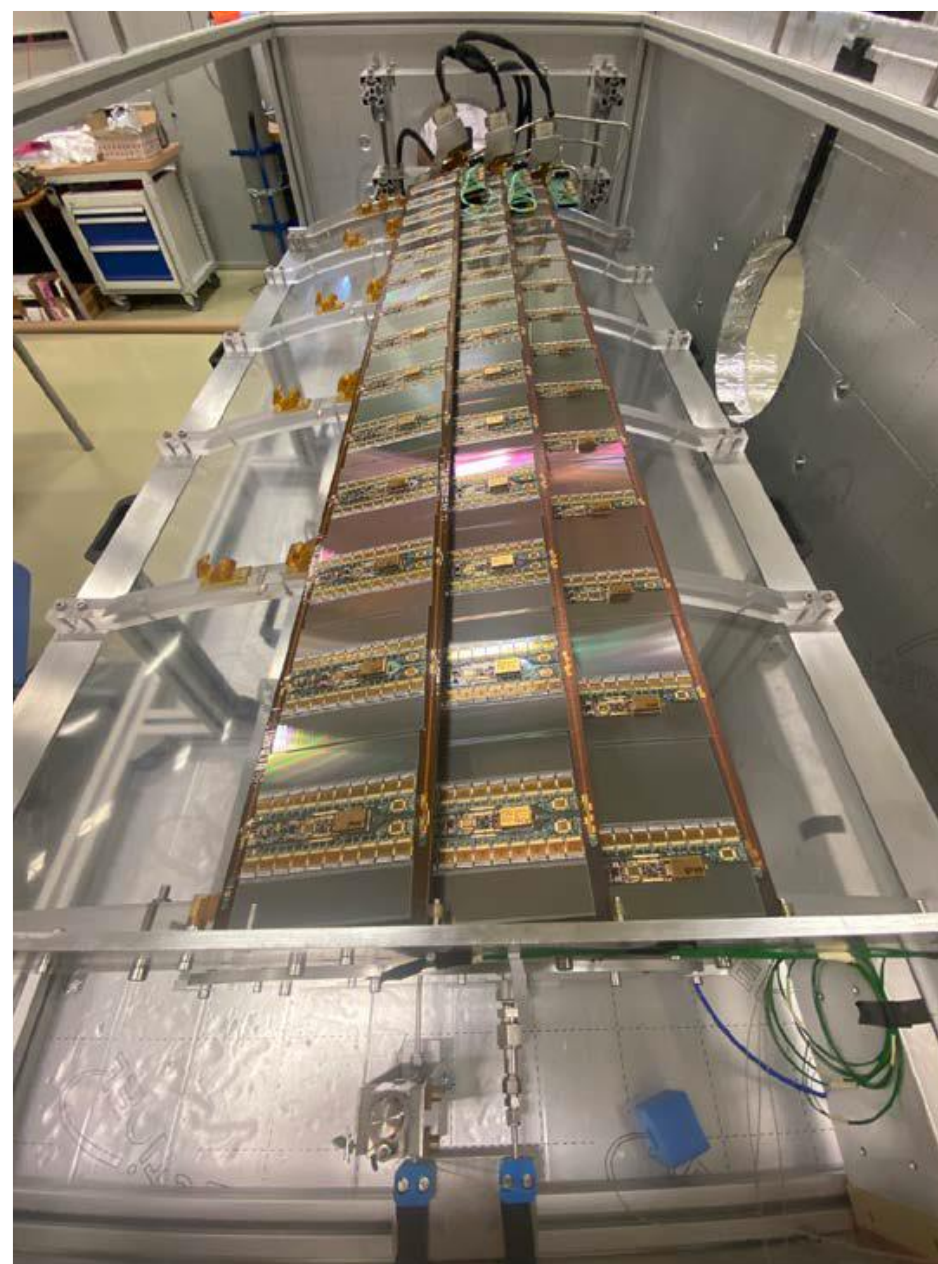Władysław Dąbrowski – member of the ATLAS Upgrade Advisory Board

Some components of the ATLAS detector developed by AGH
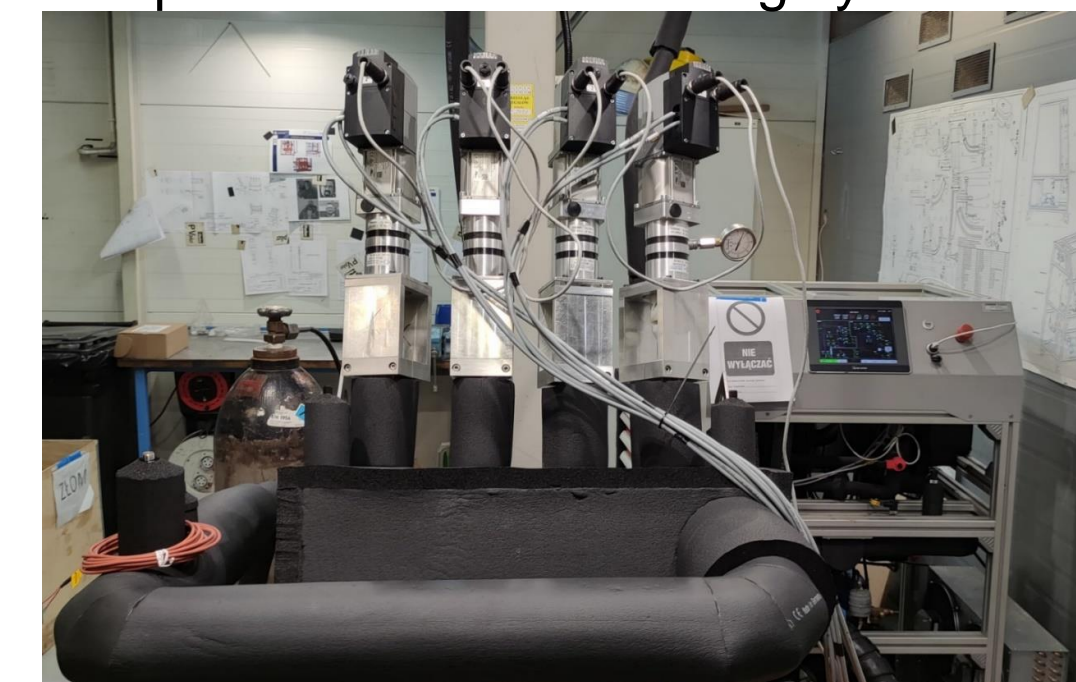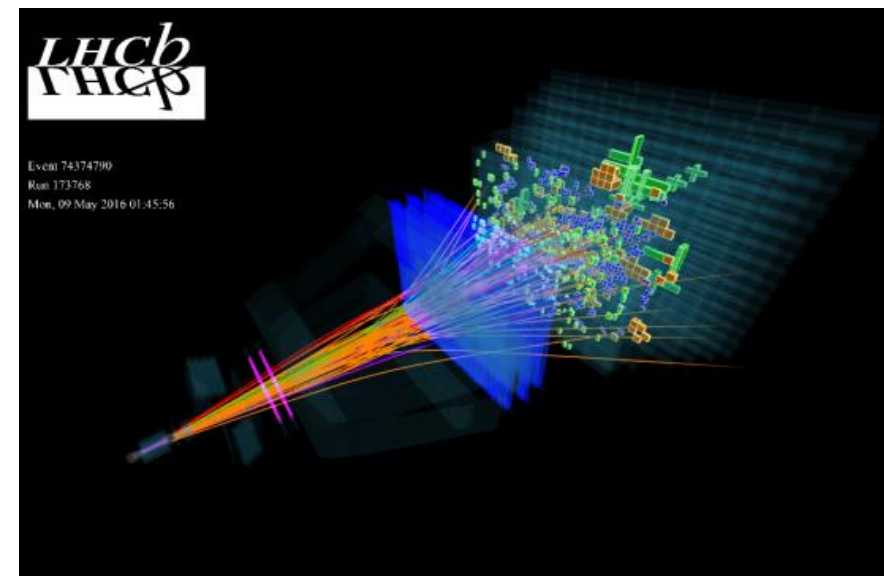
SemiConductor Tracker

ITk Strips modules
for Phase II upgrade

Radiation and magnetic field tolerant
DC-DC convertes for the ITk power
supply system

Component of the ITk cooling system

ASIC developed by AGH (W. Dąbrowski)
rad-hard technology, 6 mln readout channels

AGH@LHCb

AGH-LHCb team contribution to the experiment
(21 members, including Tomasz Szumlak (coordinator), Marek Idzik, Agnieszka Obłąkowska-Mucha et al.)

❑ **AGH scientists are present since the beginning of 1998:** contribution to initial feasibility studies for various decay channels.

❑ **Silicon detectors development:** AGH team almost from the beginning contributed to construction of silicon vertex detector (strip sensors), its firmware and high-level software.

❑ **LHCb upgrade I:** readout electronics for Upstream Tracker, studies of radiation hardness of new pixel sensors, development of high-level trigger and calibration software for both silicon tracking detectors

❑ **LHCb upgrade II:** readout electronics for Magnet Stations and fiber tracker, sensor studies for vertex detector and trigger software

❑ **Physics analyses**: rare hadronic B decays, exclusive processes (vector mesons), CP-violation in charm decays