Department of Fundamental Research (DBP) in 2020

Structure

Nuclear Physics Division (BP1)
head - prof. dr. hab. Zygmunt Patyk

nuclear structure and nuclear reactions at low and intermediate energies

Theoretical Physics Division (BP2)
head - dr. hab. Michał Kowal

nuclear physics from low to high energies, physics of elementary particles, field theory, astrophysics, cosmic rays, cosmology, classical and quantum gravity

High Energy Physics Division (BP3)
head - dr. hab. Justyna Łagoda

experimental elementary particle physics and experimental high energy nuclear physics

Astrophysics Division (BP4)
head - dr. hab. Agnieszka Pollo

oobservational cosmology and astrophysics, experimental cosmic ray physics

Employee of DBP

	DBP 2019		DBP 2020	
	people	jobs	people	jobs
prof. & dr. hab.	28 (12)	16.9	41(13)	29.4
dr	51	49.3	50	48.3
mgr	3	3	3	2.25
administration & technical stuff	9 (5)	8	8	8
all	91 (17)	77.2	102(13)	87.9

2020	BP1		BP2		BP3		BP4	
	people	jobs	people	jobs	people	jobs	people	jobs
prof. & dr. hab.	4(1)	3.1	18(3)	15	11(6)	6	7(3)	4,6
dr	2	2	17	17	20	18.3	11	11
mgr	0	0	0	0	1	0.25	2	2
administration & technical stuff	2	2	0	0	0	0	3	3
all	8(1)	7.1	35(3)	32	32(6)	24.55	23(3)	20.6

27 Ph.D. students

* in brackets number of employee receiving pension

Colleagues who passed away

Jacek Rożynek (1951 - 2020)

Bohdan Mariański (1947 - 2020)

Promotions

Doctorates:

- Raul Nair, supervisor – prof. dr. hab. Teodor Siemiarczuk
- Oleksandr Kovalenko, supervisor – prof. dr. hab. Teodor Siemiarczuk
- Wojciech Brodziński, supervisor – dr. hab. Janusz Skalski

Habilitations:

- Tolga Altinoluk (BP2)
- Michał Bluj (BP3)
- Katarzyna Małek (BP4)
- Jakub Wagner (BP2)
- Paweł Zin (BP2)

27 (18+9) Ph.D. students, **1** habilitation procedures in progress

Research grants

2019

all grants: **56**

grants of NCN: **26**

MNiSW : **15**

UE, FNP, NCBiR, NAWA: **15**

2020

all grants: **49**

grants of NCN: **27**

MNiSW : **7**

UE, FNP, NCBiR, NAWA: **15**

6 new accepted applications for NCN grants

Publications

2020

Peer-reviewed publications: **350**

BP1: **20** (9 together with BP2, BP3 or BP3)
BP2: **101** (48 together with BP1 or BP3)
BP3: **219** (53 together with BP1, BP2 or BP4)
BP4: **72** (5 together with BP1 or BP3)

2019

Peer-reviewed publications: **359**

BP1: **19** (8 together with BP2 or BP3)
BP2: **134** (75 together with BP3)
BP3: **247** (80 together with BP1, BP2 or BP4)
BP4: **43** (1 together with BP3)

Main fields of research

Experimental physics

- High-energy particle physics – experiments CMS & LHCb, 14*
- Neutrino physics – experiments T2K, SK, km3net, Hyper-K, DUNE, 10
- High-energy nuclear physics – experiments ALICE @ LHC, NA61/SHINE, MPD @ NICA, 5
- High-energy lepton-hadron interactions – experiment COMPASS, 4
- Hadron physics – experiments WASA & KLOE-2, 5
- Observational cosmology – projects VIPERS, VVDS, AKARI, Planck, 6
- Observational astrophysics – LIGO-Virgo, 5
- Cosmic ray physics – experiments JEM-EUSO, 7
- Nuclear structure – experiments @ GSI and @ U200, 4
- Nuclear reactions at low and intermediate energies, 5

* approximate number of physicists involved

Main fields of research cont.

Theoretical physics

- Structure and dynamics of atomic nuclei (superheavy and exotic), 4*
- Interactions and structure of hadrons, QCD, 8
- Cosmological models, classical and quantum gravity, 6
- Physics beyond Standard Model and dark matter, 9
- String theory, 3
- Ultra-cold atomic gases, 2

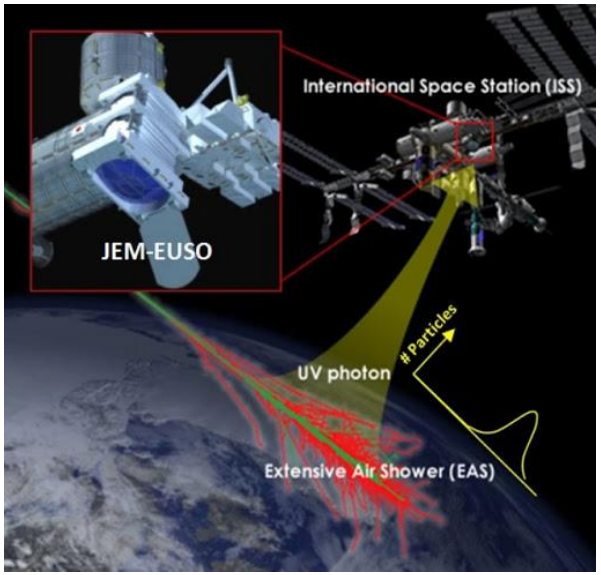
* approximate number of physicists involved

Presentations of main research achievements of 2020

presentation	speaker
Isomeric states of nuclei far from stability	V. Charviakova
Flavor anomalies from asymptotic safety	K. Kowalska
Parton distributions at high energy	T. Altinoluk
Curvature of the Universe	J. Ostrowski
The non-minimal coupling constant and the primordial de Sitter state	O. Hrycyna
Towards resolving the gravitational singularities problem	W. Piechocki
Properties of heaviest nuclei	J. Skalski
Indirect searches for signals of new physics at the CMS experiment	M. Szleper
Search for CP violation in $\Xi_c^+ \to p K^- \pi^+$ decays using model-independent techniques	A. Ukleja
Hadrons correlation study in NA61/SHINE experiment at CERN	B. Maksiak
Constraint on the CP symmetry-violating phase in neutrino oscillations in T2K experiment	G. Żarnecki
Galactic WIMP search with the Super-Kamiokande detector	P. Mijakowski
New applications of strong lensing systems	M. Biesiada
Overview of the Planck results	P. Bielewicz
Through the atmosphere into the core of the neutron star	A. Majczyna
Filling mass gaps in stellar graveyard by LIGO-Virgo data	A. Zadrożny

JEM-EUSO program (Joint Experiment Missions for Extreme Universe Space Observatory)

Studies of the origin and nature of
Ultra-High Energy Cosmic Rays with E > 10^{19} eV



Mini-EUSO – mission to study Earth UV emissions

Small UV telescope for the night atmosphere observation with a very fast camera (400 000 frames/sec).

High voltage sub-system was made in NCBJ
BP4-Łódź Cosmic Ray Laboratory

S. Bachole et al., arXiv:2010.01937