SCIENCE: POLISH PERSPECTIVES

7-8 May 2021 | Zurich & online

#KEEPCALMANDCURIEON **@POLONIUM_ORG**

Welcome... and welcome back!

We are delighted to welcome you to the eleventh edition of ‘Science: Polish Perspectives’ (SPP)! It’s very reassuring to see that despite all the global trials and tribulations we have gathered together again, celebrating the Polish scientific diaspora. We have adapted and grew with the current times, and so you are now part of the first fully online SPP conference!

We are proud to say that SPP has become a hallmark event of our community, Polish scientists in Poland and abroad. We listen to your voices and follow innovative trends. We realized that so many of the talented young researchers share an entrepreneurial spirit. Therefore, this year we put a special focus on the interlink between science and industry. We hope you will enjoy two days of high quality research, workshops, an engaging panel discussion and most of all, build connections.

With a growing support of our partners, Polonium Foundation continues to fulfil our mission internationally. By organising joint events, speaking out in the media or doing research on the Polish research diaspora, we continuously prove that the voice of our community remains important, relevant, and heard.

We are extremely grateful to everyone who has been supporting Polonium - the sponsors, the partners, the committed and enthusiastic volunteers. But most of all, we would like to express our gratitude towards everyone who has ever attended and spread the good word about the Polonium Foundation and our events - thank you! It’s you who make it all worth it. We wish you an unforgettable conference.

WITH LOVE,

Karolina Werynska, SPP 2021 Project Leader,

Kasia Makowska, President of the Polonium Foundation, and the Team

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Udział NAWA w konferencji jest finansowany w ramach projektu Narodowej Agencji Wymiany Akademickiej i współfinansowana ze środków Europejskiego Funduszu Społecznego - Program Operacyjny Wiedza Edukacja Rozwój 2014-2020.

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DIALOG

Ministerstwo Nauki i Szkolnictwa Wyższego

Day 1, Friday 7 May

Day 1: Academia		
9:00 - 10:00	"Make your own" coffee & Gather Town Help Desk (on Gather Town)	
10:00 - 10:30	**Conference opening: Ambassador Iwona Kozłowska, Embassy of the Republic of Poland in Bern**	
10:30 - 10:45	**About Polonium Foundation and Polonium Network**	
10:45 - 12:45	**Workshop Session** (3 interactive workshops running in parallel)	
10:45 - 12:00	**1. From R&D to Spin-off company** **2. Development of early-stage companies - financing your ventures and choosing the right strategy** *PLUGin Foundation*	**Mental health and wellbeing in academia** (10:45 - 12:00) *Diego Hangartner in partnership with MeWell*
12:00 - 12:45		**Boost your career with NAWA** (12:00 - 12:45) *Polish National Agency for Academic Exchange*
12:45 - 13:45	"Make your own" lunch & Gather Town networking session (on Gather Town)	
13:45 - 15:15	**Speakers session II: Life Sciences**	
13:45 - 14:15	**Invited talk: Magdalena Filipowicz- Sinnreich, University Hospital Basel** *Deciphering immunological processes within the gut-liver axis*	
14:15 - 14:45	**Invited talk: Kaśka Koltowska, Uppsala University** *Orchestrating lymphatic endothelial cell migration*	
14:45 - 15:00	**Joanna Kacprzyk, University College Dublin** *How does the plant cell die? Investigation of programmed cell death regulation in plants.*	
15:00 - 15:15	**Magdalena Szczygieł, DKFZ German Cancer Research Center** *How to listen in on what cancer cells are whispering? Investigating intercellular communication in lung cancer progression.*	
15:15 - 16:45	**Poster session I (on Gather Town)** & "make your own" coffee	
16:45- 17:30	**Keynote talk: Magdalena Skipper, Editor in Chief, Nature** *The future of research and its impact lies in collaboration*	
17:30 - 17:45	Technical break	
17:45 - 19:15	**Panel Discussion: Cooperation between industry and academia** Panelists: Bogusława Cimoszko-Skoworoński, MIT EF, FounderPartners Paweł Zawadzki, MNM Diagnostics Mikołaj Gurdała, EIT Health Marcin Dymczyk, Sevensense	

Day 2, Saturday 8 May

Day 2: Academia, Startups & industry - running in parallel sessions		
10:00 - 11:30	**Speakers Session III: Physics & Applied Sciences**	**Speakers Session III: Humanities & Social Science**
10:00 - 10:30	**Invited speaker: Jakub Tomczak, Vrije Universiteit Amsterdam** *There is no AI without Deep Generative Modeling*	**Invited speaker: Adam Izdebski, Max Planck Institute for the Science of Human History, Jena, Institute of History, Jagiellonian University** *What triggers a climate crisis? Lessons from natural and historical archives*
10:30 - 10:45	**Marcin Kotlarz, Newcastle University** *3D bioprinting of cell-filled hydrogels for tissue engineering*	**Sławomir Dzido, University of Strathclyde** *People do not want the burden of carbon taxes… How else can macroeconomic policy makers finance the transition to net-zero economy?*
10:45 - 11:00	**Anna Rosławska, Institut de Physique et Chimie des Matériaux de Strasbourg** *Simulating the physics of photosynthesis with single molecules*	**Anna Sanecka, University of Lower Silesia** *Contemporary Polish theatre for children – a theatre performance as a pedagogical tool*
11:00 - 11:30	**Invited speaker: Ewelina Zatorska, Imperial College London** *Interacting network from the mathematical perspective.*	**Invited speaker: Sylwia Hyniewska, UCL** *Nonverbal behaviour and the healthy crypto-bias*
11:30 - 11:45	**Partner's presentation: Foundation for Polish Science**	
11:45 - 13:00	"Make your own" lunch & Gather Town networking session (on Gather Town)	
13:00 - 14:30	**Speakers session IV: Startups & Industry**	**Speakers session V: Applied & Life Sciences** (15 min per talk)
13:00 - 13:30	**Invited talk: Rafał Kamiński, OncoArendi** *Ensuring success in drug discovery and development – how to minimize attrition*	**Kamil Adamczewski, ETH Zurich** *Understand the AI - interpreting and compressing black-box neural networks* **Piotr Ciochoń, SOLARIS synchrotron in Kraków** *Reversible graphitization of silicon carbide – a new hope for Polish graphene?*
13:30 - 13:50	**Invited talk: Zuzanna Brzosko, Eli Lilly & Company** *Gene therapy delivery systems – recent advancements and remaining challenge*	**Paweł Sikora, Technische Universität Berlin** *Ultra-LightCon-3D - Lightweight 3D printable concrete wall system*
13:50 - 14:10	**Invited talk: Marcin Pietrzyk, Unit8** *Applied Artificial Intelligence - The story of Unit8*	**Paweł Matusz, University of Lausanne** *Old dog, new tricks... and a new home: What can multivariate analyses of human EEG tell us about how we pay attention in everyday environments*
14:10 - 14:30	**Invited talk: Michał Januszewski, Google Research** *Connectomics: automating brain mapping with machine learning*	**Iwona Hawryluk, Imperial College London** *Predicting the present – correcting the reporting delays in COVID-19 surveillance* **Agata Misiaszek, European Molecular Biology Laboratory** Genetic engineering and cryo-electron microscopy to study a molecular machine used by cancer – the story of human RNA polymerase I
14:30 - 16:00	**Poster session II (on Gather Town)** & "make your own" coffee	
16:00 - 16:45	**Keynote talk: Maciej Lewenstein, The Institute of Photonic Sciences, Castelldefels** *Brownian Motion Revisited*	
16:45 - 17:00	Technical break	
17:00 - 17:15	**Presenter Awards** **Conference Closing: Ambassador Jürg Burri, Embassy of Switzerland in Poland**	
17:15 - 18:15	**Steve Cross & friends present:** Science Comedy Deathmatch: Poland vs The World	

From R&D Project to Spin-off company

Katarzyna Kapłon

PLUGin Foundation

In this workshop we will look at the path you can take to turn your science project into a starting point for a successful business. How to build a research and development project? When to go for funding? Why market analysis is a scientist's best friend? And above all: how the university can help scientists in the commercialization of ideas and earn money at the same time and why spin-off companies are the easiest, although not simple way to earn money on projects based on knowledge.

Development of early-stage companies - financing your ventures and choosing the right strategy

Adrian Kondrat

PLUGin Foundation

In this workshop, we will explore different forms of financing new ventures as well as discuss the pros and cons of each of them. We will also analyse which of them are better in the early stage and which are more beneficial at a later stage of the development of your startups. Subsequently, we will examine different development strategies and tradeoffs associated with them. As there is not just one correct way, we will look through a few examples of companies successfully utilising different strategies and discuss what factors should be considered while choosing a strategy.

The PLUGin Foundation workshops will run as one session

Mental Health in Academia

Diego Hangartner

Institute of Mental Balance and Universal Ethics, in partnership with MeWell

How come that we have all our biological needs met - but we still feel unhappy, frustrated, stressed and anxious?
In this talk, Diego will provide insights into our basic mental structure, pointing toward ways and methods to update our current mental operating system. What happens when our mind is highjacked by the self sabotaging reactions of distraction, stress, and anxiety?
Cutting-edge neuroscientific and clinical research is increasingly showing how a few simple insights, together with specific training methods, can build up positive neurological systems to counterbalance these out-of-control reactions.

NAWA
POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

Boost your career with NAWA

Katarzyna Pietruszyńska

Magdalena Kowalczyk

Narodowa Agencja Wymiany Akademickiej

Access to funding is essential for scholars to excel in their research careers. NAWA is happy to offer grants for academics at all stages of their careers that help to create an environment where researchers and students can achieve their best work.When applying for a grant, candidates dedicate a significant investmentof time and engagement to this process. What are the key elements that make for a successful grant application? How can you make your application stand out from the crowd? This workshop aims to increase the chances of your proposal being successful

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WORKSHOPS

The future of research and its impact lies in collaboration

Magdalena Skipper
Editor in Chief, Nature

Dr Magdalena Skipper is Editor in Chief of Nature and Chief Editorial Advisor for the Nature portfolio. A geneticist by training, she holds a PhD from University of Cambridge, UK. She has considerable editorial and publishing experience, having worked as Chief Editor of Nature Reviews Genetics, Senior Editor for genetics and genomics at Nature and Editor in Chief of Nature Communications. She is passionate about mentorship, research integrity, as well as collaboration and inclusion in research. As part of her desire to promote underrepresented groups in research, in 2018 she co-launched the Nature Research Inspiring Science Award for women early-career researchers.

Brownian Motion Revisited

Maciej Lewenstein
The Institute of Photonic Sciences, Castelldefels

Maciej Lewenstein graduated as MSc at Warsaw University in 1978 and PhD at Universität Essen in 1983. He was research fellow in Essen, at Harvard, Commisariat a l'Énergie Atomique in Saclay and at Joint Institute for Laboratory Astrophysics at Boulder. He was on faculty of Centre for Theoretical Physic in Warsaw (1986-1994), CEA in Saclay (1995-1998), of the Leibniz University Hannover (1998-2005). In 2005 he moved to Catalonia as ICREA Research Professor at the Institut de Ciències Fotòniques in Castelldefels. His interests include quantum optics, quantum physics, quantum information, atto-second science, and statistical physics. His other passion is avant-garde music - he is an acclaimed jazz writer and critic, author of "Polish Jazz Recordings and Beyond". At ICFO Maciej Lewenstein leads the Quantum Optics Theory group with 25 members working on the mentioned subjects.

KEYNOTE SPEAKERS

Gene therapy delivery systems – recent advancements and remaining challenges

Zuzanna Brzosko
Eli Lily and Company

Dr Zuzanna Brzosko is the Director of Corporate Strategy & External Innovation at Eli Lilly & Co. Previously, she co-founded and was the CEO of Sixfold Bioscience, a Y Combinator and venture-backed biotechnology company. Zuzanna has deep interest in the wider healthcare industry and has recently joined the West London NHS Trust as a Non-Executive Director under the Next Director scheme.

She completed her PhD and postdoctoral training in Neuroscience at Cambridge University and her undergraduate degree at Oxford University. Following her academic work, she worked in EU Pharma & Biotech equity research at Goldman Sachs.

Zuzanna has been recognized by the Forbes 30U30 in Science/Healthcare, the Maserati's Top 100 British Entrepreneurs and Aviva's Women of the Future in Science, amongst others.

Deciphering immunological processes within the gut-liver axis

Magdalena Filipowicz-Sinnreich
University Hospital Basel

After graduating from Medical School in Basel, I entered the MD/PhD-Program of the Swiss National Science Foundation and obtained a PhD degree in Biochemistry at the University of Basel. I then pursued my clinical training in Internal Medicine and Gastroenterology/Hepatology. I performed a postdoctoral fellowship at the University Hospital in Freiburg, Germany, funded by the European Association for the Study of the Liver. In 2016, I started working as a senior physician (Oberärztin) at the Gastroenterology Department of the University Medical Clinic in Liestal. In the framework of the SNF Ambizione-SCORE grant, I have in parallel built a research group working in the area of liver immunology at the Department of Biomedicine of the University Hospital in Basel.

INVITED SPEAKERS

Nonverbal behaviour and the healthy crypto-bias

Sylwia Hyniewska
University College London

Sylwia Hyniewska is an affective scientist and associate lecturer at UCL who moved to Zurich during the pandemic. She was a JSPS Fellow at Kyoto University and is currently a member of the Kokoro Centre, Japan. The methodology that Sylwia developed is now being applied to clinical populations, particularly to study emotion perception in the Autism Spectrum Disorder (ASD), Schizophrenia and Epilepsy.

During the pandemic she has put to use her background in Affective and Clinical Psychology, studying the neuropsychological consequences of the SARS-CoV-2 infection and associated emotion disorders, acute confusion and related treatments. In the international task force "NEuroCovid" founded by Emilia Łojek from the University of Warsaw, she is responsible for managing a deployment team in the UK.

Her interests also encompass everything related to new technologies, cognitive behavioural therapy and mental health.

Sylwia's favourite quote: "Perception is strong and sight weak. In strategy it is important to see distant things as if they were close and to take a distanced view of close things." (Miyamoto Musashi, 164)

What triggers a climate crisis? Lessons from natural and historical archives

Adam Izdebski
Max Planck Institute for the Science of Human History, Jagiellonian University

Adam Izdebski is an interdisciplinary environmental historian working on Late Holocene, leading projects on different time periods and regions of Western Eurasia, himself specialising in the ancient and medieval Eastern Mediterranean. His research aims to integrate scientific, archaeological, and textual evidence. He is Independent Research Group Leader at the Max Planck Institute for the Science of Human History, Jena, and Associate Professor at the Institute of History, Jagiellonian University in Krakow. His recent publications include a review article in Nature on past impacts of climate on historical societies (https://www.nature.com/articles/s41586-021-03190-2), a study tracing the emergence of market integration in Archaic Greece in paleoecological data (https://academic.oup.com/ej/article-abstract/130/632/2596/5766224), and a multi-disciplinary project on how climatic change played out in miracle stories in Italy at the end of Antiquity (https://link.springer.com/article/10.1007/s10584-021-03043-x).

INVITED SPEAKERS

Connectomics: automating brain mapping with machine learning

Michał Januszewski
Google Research

Michał Januszewski is a Staff Research Scientist at Google in Zürich, where he is currently a member of the Connectomics group and works on automated methods for high-throughput brain mapping at synaptic resolution. Together with his group he has developed Flood-Filling Networks -- a method for precise neuron tracing which improved error-free path lengths by an order of magnitude. In 2020, this approach was used to reconstruct the Drosophila hemibrain in collaboration with the FlyEM team at the HHMI Janelia Research Campus, forming the largest synapse-resolution map of brain connectivity that has ever been produced, in any species. Michał's research interests lie at the intersection of machine learning, neurobiology and high-performance computing, and in his work he collaborates closely with scientists at Harvard University, HHMI Janelia, and the Max Planck Institute of Neurobiology in Munich. Prior to Google, Michał did research in the fields of computational fluid dynamics and stochastic dynamical systems, in which he developed state-of-the-art GPU-accelerated numerical software. He holds a BSc degree in Computer Science, and a PhD in Physics, both from University of Silesia in Katowice.

Ensuring success in drug discovery and development – how to minimize attrition

Rafał Kamiński
OrcoArendi Therapeutics

Dr Rafal Kaminski has broad international experience in discovery and development of innovative small molecule drugs. After obtaining medical degree and doctorate in pharmacology at the Medical University of Lublin (Poland), he completed his post-doctoral training in the Netherlands (Radboud University) and USA (National Institutes of Health), as well as obtained the Diploma in Pharmaceutical Medicine (ULB, Belgium). He joined pharmaceutical industry more than 13 years ago and worked for UCB Pharma (Belgium) and Roche (Switzerland).

In both companies he has led R&D teams, where he was responsible for strategy, portfolio of preclinical projects and selection of clinical candidates. Two of his projects successfully completed Phase I/II studies and one drug candidate is currently in Phase III clinical development. He also has experience in coordination and oversight of drug discovery projects performed in collaboration with external partners (CRO, biotech). He was a member of scientific advisory boards and expert committees (FP7 UE; Wellcome Trust). Dr Kaminski authored more than 80 scientific papers (including Nature group journals) and his publications were cited more than 2900 times (Google Scholar). He is also an inventor or co-inventor in 6 patent applications.

INVITED SPEAKERS

Orchestrating lymphatic endothelial cell migration

Kaśka Koltowska
Uppsala University

Kaśka Koltowska graduated with a Bachelor of Science in Molecular Genetics from King's College London, England, in 2007. She continued her scientific journey by conducting PhD in Developmental Biology at National Institute for Medical Research and University College London, England. She focused on liver development in zebrafish in laboratory of Elke Ober, and graduated in 2011.

The same year she began her post-doctoral work in Ben Hogan's laboratory at the Institute of Molecular Bioscience, Australia. Her work was supported by an international post-doctoral fellowship from the Lymphatic Education & Research Network. She has investigated how lymphatic progenitor are defined and what regulates their migration and made two major contributions to the lymphatic development biology field. Firstly, she has uncovered an important cell division during the lymphatic specification. Secondly, she has discovered that mafba, a transcription factor, plays an instrumental role in regulating lymphatic endothelial cell migration during zebrafish embryonic development. In 2018 she has moved to Uppsala University, Sweden to open her research group. The lab main focus is to better understand how the molecular and cellular regulators work together to ensure proper lymphatic vessel formation. As this is very dynamic process she is using zebrafish as a model system in order to visualise it as it happens in real time in vivo. Together with state-of-the-art genetic models and newest single cell transcriptomics she aims to identify new players regulating lymphatic vessel development. Her work is funded by Swedish Research Council and she is a fellow of Wallenberg foundation and Ragnar Söderberg foundation.

Applied Artificial Intelligence - The story of Unit8 - solving business problems for big industries like chemical, finance, manufacturing and pharma using Artificial Intelligence, big data and advanced analytics

Marcin Pietrzyk
Unit8

Dr Marcin Pietrzyk is the founder and CEO of Unit8, a Swiss company bringing world-class experts with a proven track record in AI and Software Engineering to solve problems for industries that will experience the most significant breakthroughs in the next 50 years. Before Unit8 he was Head of Big Data & BI at Swisscom leading all the data & AI activities of the company. He completed his PhD in Orange Labs, Sophia Antipolis, France in the domain of data mining and machine learning. He was visiting lecturer at the University of St Gallen for EMBA. Marcin is originally from Krakow/Poland where he obtained a Master of Science at AGH Krakow University.

INVITED SPEAKERS

There is no AI without Deep Generative Modeling

Jakub Tomczak
Vrije Universiteit Amsterdam

I am an assistant professor of Artificial Intelligence in the Computational Intelligence group (led by Prof. A.E. Eiben) at Vrije Universiteit Amsterdam. I am also the admission co-ordinator of the M.Sc. AI program at Vrije Universiteit Amsterdam. Before joining Vrije Universiteit Amsterdam, I was a deep learning researcher (Engineer, Staff) in Qualcomm AI Research in Amsterdam (10/2018 - 12/2019). Previously, I was a Marie Sklodowska-Curie fellow in Prof. Max Welling's group at University of Amsterdam, and an assistant professor and postdoc at Wroclaw University of Technology. My main research interests include deep learning, Bayesian inference and deep generative modeling. Recently, I am also interested in developing novel derivative-free optimization algorithms. I am very keen on applying machine learning to biology and medicine.

Interacting network from the mathematical perspective

Ewelina Zatorska
Imperial College London

In this talk I will present biological motivation and derivation of the mathematical model of agents interacting through dynamically remodelled network. This is also going to be a story of how pure mathematician got involved into very applied subject and actually enjoyed the research a lot!

Ewelina Zatorska obtained her PhD in 2013 from the University of Warsaw. She then held two postdoctoral positions: at Ecole Polytechnique Paris, and as the Chapman Fellowship of Imperial College London, along with Assistant Professorship at the University of Warsaw, and three visiting positions: Invited Professor at the Universite Paris Dauphine, Visiting Professor of the Waseda University in Tokyo, and the Fellow of the Institut Mittag-Leffler in Stockholm. In 2017 Ewelina became a Lecturer of the University College London, and in 2020 she moved to Imperial College London, where she works until today as a Senior Lecturer in the Applied and Numerical Analysis. She recently received the EPSRC Early Career Fellowship and is at the the stage of building her team to work on hydrodynamic models of interacting agents.

INVITED SPEAKERS

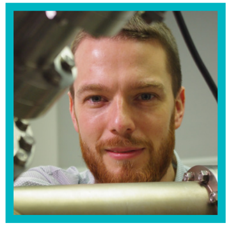
Understand the AI - interpreting and compressing black-box neural networks

Kamil Adamczewski
ETH Zurich

The aim of the research is twofold. Machine learning models require much data, and we attempt to find what data the models find useful, and if these choices are human-interpretable. Secondly, in particular, neural networks are powerful yet large and incomprehensible black-box models. We aim to find out if we need all the model parameters, remove unimportant units, and eventually produce networks that are smaller, faster, and more efficient.

We introduce Q-FIT, a new framework that provides quantifiable explanations on statistical models. We further apply it to the prevalent convolutional neural networks, and introduce two novel methods, Dirichlet Pruning and Shapley Oracle Pruning which transform a large neural network model into a lighter compressed version. The first method assigns a probabilistic distribution over the model parameters while the latter frames the problem as a cooperative game and computes which neurons are the most important for the network. The methods achieve state-of-the-art compression performance and obtain human-perceivable visual features.

NNs are the heart of today's AI products ranging from voice command engines to robots. Slimming the networks is necessary to make them more widespread to smaller devices such as phones, drones, or even cars, and to avoid using expensive high-end hardware or fast internet connection. Secondly, NNs also become hard to analyze and interpret and the public and the regulatory bodies should be able to receive explanations for algorithmic decisions.



Reversible graphitization of silicon carbide – a new hope for Polish graphene?

Piotr Ciochoń
SOLARIS synchrotron

The main goal of my research is to optimize and commercialize a new method of graphene growth via the reversible graphitization of silicon carbide. The process, protected by several pending patents, allows for the synthesis of high-quality, almost defectless graphene directly on an insulating substrate. It is fast, energy-efficient and environmentally-friendly and after scaling the production to 2" wafers, it will be ready to get out of the lab.

My research focuses on a new graphene growth method, based on the prolonged annealing of SiC wafers in ultra-high vacuum, in the flux of silicon from an external sublimation source. The method is optimized in the scale of 1cm×1cm samples and is currently being scaled to the 2" (5cm) wafers. Graphene is characterized with different microscopic, spectroscopic and diffraction methods, which confirm the high quality of the material. Because the growth happens directly on an insulator, there is no need to transfer the material for various applications in the ICT sector, which solves the main challenge related to the adoption of CVD graphene by the industry.

Because the graphene grown using the new growth method is characterized by high quality, has isotropic properties, is easy to integrate with industrial processes, has repeatable properties and, due to the energy-efficiency of the process, is very affordable, it can shake things up in the rapidly growing graphene market. Together with my colleagues, we have started a spin-off company which can boost Poland's chances in the global graphene race.

People do not want the burden of carbon taxes... How else can macroeconomic policymakers finance the transition to net-zero economy?

Sławomir Dzidzo
University of Strathclyde

The agreed deadline for reaching the global net-zero emissions economy is fast approaching. Yet, most policymakers are still unclear about the most efficient solutions to achieve this, particularly given the social aversion towards carbon taxes. Hence, my policy-relevant research aims to examine an alternative, potentially politically feasible approach which would engage pension funds in mitigation investments in return for tax-relief advantages.

By employing a macroeconomic modelling approach, I blend mathematics and its analytical perspective with economic concepts and eventually execute the crucial operations with the use of programming to effectively tackle a real-world economic problem.
In essence, I calculate tax rates which enable my proposition of subsidising green projects pursued by pension funds to mimic the social optimum both economically and environmentally. These preliminary results which I intend to present appear to confirm that the solution I propose indeed carries the same social welfare effects as traditional non-distortionary carbon taxes, at the same time exerting less socio-political pressure.

The results I intend to present lend an exciting hope that the climate transition may indeed be effectively financed, overcoming the understandable citizens' concerns and associated political constraints. At the same time, my research further highlights the prospective importance of cooperation between the policymakers, financial sector and industry overall in pursuit of the environmental goals.

Predicting the present – correcting the reporting delays in COVID-19 surveillance

Iwona Hawryluk
Imperial College London

Delays in reporting often lead to underestimating the severity of ongoing epidemics. These delays are caused by the need to record and process the data before they're made publicly available. We developed a new 'nowcasting' method, able to estimate the real number of deaths from COVID-19 now, by applying statistical methods to discover the patterns in the reporting delays. We show the applicability on the real dataset from Brazil.

To perform nowcasting, we use a Bayesian statistics method called "Gaussian processes". Gaussian processes are a powerful tool used widely in Machine Learning, for tasks such as classification and regression. Because they belong to the family of Bayesian statistics methods, they allow us to include uncertainty in our estimates. Gaussian processes also provide a very flexible framework -- we show that the method works for the whole country as well as individual states and can accurately nowcast the numbers of deaths even when changes in the reporting delays occur.

The framework developed allows to correct for time-varying delays in reporting of deaths and cases of COVID-19, which allows the policy makers to have an immediate and more accurate view of the situation. For example, with nowcasted numbers of deaths we can make a reliable real-time estimate of the reproduction number R – an epidemiological quantity which tells us whether the epidemic is growing (R>1) or is under control (R<1)..

How does the plant cell die? Investigation of programmed cell death regulation in plants.

Joanna Kacprzyk
University College Dublin

Programmed cell death (PCD) is a genetically controlled pathway for organized destruction of redundant or damaged cells. It is a key element of plant development and responses to pathogens and abiotic stresses. Although plant life cannot exist without cell death, the regulation of plant PCD is not well characterized. My research aims to advance our understanding of how this essential process is controlled at a molecular and genetic level.

Studying plant PCD can be difficult as dying cells are often buried within the bulk of the tissue and hence hard to access and sample. To address this challenge, we are using Arabidopsis thaliana cell suspension culture, facilitating cell death induction by diverse stimuli, easy pharmacological modulation, and precise monitoring of the resulting PCD rates. Here, we used this approach to generate unique RNA-seq datasets to identify the putative transcriptional regulators of plant PCD. Additionally, subcellular fractionation, followed by mass spectrometry-based analysis, provided insights into proteome changes associated with the early stages of PCD induction.

We identified an array of putative regulators of plant PCD, a fundamental process in plants and part of their defense arsenal against environmental stresses. The increasingly volatile climate poses new challenges to plant survival and crop productivity. Increased understanding of how plant PCD is regulated may therefore inform strategies for development of future-proofed crops.

3D bioprinting of cell-filled hydrogels for tissue engineering

Marcin Kotlarz
Newcastle Unversity

I use 3D bioprinting to produce cell-filled hydrogels and I integrate them with other types of biomaterials. I investigate if the created biological environment surrounding the biomaterial site could improve tissue-implant integration. The idea is to use the 3D bioprinting techniques to produce 3D in vitro models that can be used to better recapitulate the human body and ultimately work towards the development of novel tissue-engineered implants targeting specific clinical problems.

I work with a bioprinting technique called Reactive Jet Impingement (ReJI). Cells suspended in liquid biomaterials are jetted from the printhead. When biomaterial droplets meet, they react due to the chemical reaction and form a hydrogel. Later, with various quantitative and qualitative techniques, the cell-laden hydrogel structures are evaluated to understand the behaviour of bioprinted cells. For instance, cell morphology, organisation and interactions with biomaterials are studied using confocal and scanning electron microscopy techniques. We show that cell behaviour changes depending on the biomaterial surface.

The way 3D bioprinting is often portrayed in the media shows that the idea of 3D printed organs is often hyped. 3D bioprinting is a promising strategy that can help to develop new and improve current medical therapies but still requires a lot of research before implantation of 3D bioprinted organs becomes a reality. I want to share the PhD research I did to understand the potential of the 3D bioprinter I use for tissue engineering and how this research could contribute to the 3D bioprinting field.

Old dog, new tricks... and a new home: What can multivariate analyses of human EEG tell us about how we pay attention in everyday environments

Paweł Matusz
University of Lausanne

Electroencephalography (EEG) is perfectly suited to study the brain function. It records its direct activity, with sub-millisecond sensitivity, while being quite cheap, portable, easy to use in people of all ages. Those advantages of EEG helped study cognition decades ago, by correlating EEG responses with specific cognitive processes. Such a marker of attentional skills ("N2pc") has clarified how adults pay attention to visual objects, but it is absent in kids <10 years and insensitive to audiovisual objects. Using multivariate analyses of EEG, I showed adult-like and age-specific brain patterns in kids 5 and older and show these patterns can serve as markers of early learning success.

Our understanding of how we pay attention and how this supports learning comes from studies using mainly visual objects. But we know the brain treats multisensory objects, inherent to everyday (classroom etc.) environments, differently. And our treatments of learning disorders continue to fail. We can address those lacks by studying audiovisual attention skills, gauged via serious games and VR, their neural bases identified by modelling EEG.

Our understanding of how we pay attention and how this supports learning comes from studies using mainly visual objects. But we know the brain treats multisensory objects, inherent to everyday (classroom etc.) environments, differently. And our treatments of learning disorders continue to fail. We can address those lacks by studying audiovisual attention skills, gauged via serious games and VR, their neural bases identified by modelling EEG.

Genetic engineering and cryo-electron microscopy to study a molecular machine used by cancer – the story of human RNA polymerase I

Agata Misiaszek
EMBL Heidelberg

One of the most energetically expensive processes in a cell is making ribosomes, which then produce cellular building blocks - proteins. This task is performed by a molecular machine called RNA polymerase I (Pol I). Any misregulation of this process can lead to diseases such as cancer. We have obtained a high-resolution structure of the human Pol I allowing us to understand how Pol I looks and functions on an atomic level.

The close look at the human Pol I was only possible thanks to recent technological advancements. Inside human cells, we attached a tag to the natural Pol I using the CRISPR-Cas9 genetic engineering technology. This allowed us to separate it from the other cellular contents. We then froze Pol I in a thin layer of liquid-like ice and imaged it using an electron microscope (cryo-EM). From the collected images we reconstructed a 3D structure of the Pol I to a high resolution (2.7 Å). Using our structure, we could confirm how many subunits Pol I has, which was not definite until now. We could also capture higher-order structures of the RNA emerging from the Pol I, which may allow it to proceed faster.

So far, Pol I has only been studied in yeasts, which significantly differ from humans. Thus, it is important to study directly the human molecular machines if we want to understand what happens during diseases. The structure of Pol I might help in the design of the anti-cancer drugs targeting it. Further studies will unravel the details of how human Pol I produces ribosomal RNA giving us a better understanding of the regulation of this process.

Simulating the physics of photosynthesis with single molecules

Anna Rosławska
Strasbourg Institute of Material Physics and Chemistry

Photosynthesis is fundamental for life on our planet. It allows plants to convert solar into chemical energy using complex assemblies of organic molecules (pigments), such as chlorophyll or carotene. Their role is to collect and further transport the energy in many individual steps optimized by nature for maximal efficiency. Our goal is to reproduce and understand the physical phenomena behind this process at the level of an individual molecule.

To achieve that goal, we use a scanning tunneling microscope that allows us to study and manipulate matter with atomic precision. Using its atomically sharp tip we precisely move individual pigment molecules and form well-defined assemblies similar to those found in plants. A tunneling current flowing from the tip to the pigment assembly excites light emission with sub-nanometric precision allowing us to study optical properties of matter well below the diffraction limit. We find that the excitation of a single molecule in the assembly leads to the luminescence of other pigments due to successive energy transfer steps depending on the intermediate pigments mediating the process.

Our toy model demonstrates that we can study the role of photosynthetic pigments mediating the energy transfer process with precision unachievable by other methods. Directly addressing the respective positioning and orientation of different pigments will allow us to decipher how we can reproduce the efficiency of photosynthesis in artificial light-harvesting devices of the future.

Contemporary Polish theatre for children – a theatre performance as a pedagogical tool

Anna Sanecka
University of Lower Silesia

My research focuses on contemporary Polish theatre for children. I treat the performances as a pedagogical tool and a possible starting point for introducing children into issues considered "inappropriate" or too difficult for them, such as death, democracy, equality, dialogue, otherness. Since many adults (parents, teachers) have problems discussing such subjects with children, the joint reception of a performance can facilitate conversation.

In my research I analyse and interpret selected plays for children (age 4 to 9) from the repertoires of two Polish theatres - the Puppet Theatre in Wrocław and the Animation Theatre in Poznań. Being convinced that children are interested in the same issues and topics as adults, I interpret particular performances to find some universal and important subjects that can be discussed with young audience. I understand performances as phenomenological potential objects which are realised in specific concretisations – interpretations. Therefore for the explanation I use hermeneutics paradigm and interpret the performance in the context of thoughts of well-known contemporary philosophers.

Performances for children are rarely the subject of interest of pedagogues. Scientific works on this subject are created rather within the art sciences. Despite the recognition of the axiological character of cultural pedagogy, it deals with aesthetic upbringing rather than upbringing for values so the theatre for children is hardly treated as a tool in their axiological nurture. My research attempts to show this aspect of performances for children.

SPEAKERS

Ultra-LightCon-3D - Lightweight 3D printable concrete wall system

Paweł Sikora
Berlin Institute of Technology

The construction industry still relies on centuries-old processes to manage complex projects. 3D printing with concrete could revolutionise construction. The EU-funded Ultra-LightCon-3D project intends to bridge this gap by introducing the first insulating ultra-lightweight concrete (ULWC) material for 3D printing of building envelopes.

Printable lightweight aggregate concrete (load-bearing material) as well as ultra-lightweight foam concrete (in-fill material) were designed and evaluated. To improve the thermal performance and satisfy the mechanical performance of the load-bearing element waste recycled glass sand as well as lightweight filler were introduced to the mixture. Comprehensive material characterizations (i.e., fresh and hardened properties) of developed concrete mixtures were carried out to determine their suitability for 3D printing application. Subsequently, various wall configurations were designed and their thermal performance was developed to meet the thermal transmittance values regulated by EU towards applying them as building envelopes.

As an outcome of this research a new approach towards designing 3D printable wall system was presented. Moreover, eco-friendly, lightweight, printable concrete mixture composition containing recycled glass was developed.

How to listen in on what cancer cells are whispering? Investigating intercellular communication in lung cancer progression.

Magdalena Szczygieł
DKFZ German Cancer Research Center

Lung cancer is the leading cause of cancer-related deaths. While the importance of the immune system in cancer has been understood and exploited with immunotherapies, the influence of resident lung cells on cancer progression is not clear. In my project, I decipher the communication between cancer cells and the cells producing the 'scaffold' of the lung. They are suspected to help cancers to resist therapy, but the mechanisms remain unknown.

To listen in to what cancer cells are saying I use mass spectrometry – an analytical technique registering the mass-to-charge ratio of molecules that are previously separated and ionized. In a field called proteomics, we use mass spectrometry to capture the snapshot of protein composition in or outside of the cells. Using statistical models we try to infer dynamic behaviors of protein networks. In my project, I labeled cancer cells and normal lung cells with different 'colors' readable by a mass spectrometer to see which cell produces what protein in a given condition. I could see that the cancer environment secretes proteins 'eating out' pieces of the lung to be able to spread in the body.

Cancer cells outsource a lot of work to innocent bystanders – other lung cells – that help them fight immune cells, feed them, and get them activated. It's tough to cure cancer by aiming to kill cancer cells – their genomes are often unstable, so they can quickly 'evolve' to become resistant to drugs. Therapy targeting the surrounding cells rather than the tumor itself could overcome these hardships, if only we learn what molecules to block.

SPEAKERS

What skills on the labour market really matter? Analysis using k-means method

Karolina Bolesta
Warsaw School of Economics

There are 5 types of jobs on the labor market. The distinction includes routine and non-routine ones. These groups are widely characterized in the literature. Whereas each group has some common features, the specification of specific skills is often missed. What is innovative here, I research unrealized labor demand - online job offers collected by the RPA tool. The purpose is to check what patterns are common across the groups.

The database includes roughly over 2,3 billion observations collected in the period 2015-2020 from the most popular job websites in Poland. Each observation is one vacancy job and has its predefined code assigned which allows classifying to one of the 5 job groups. This analysis undertakes all features of a job, not only this code. Using the k-means method, the algorithm groups the vacancies into also 5 groups and then empirically checks the validity of the theory. It turns out that most discrepancies happen in non-routine groups of jobs, because of their wide diversity. The needed skills are changing year by year. The highest demand is for cognitive skills.

The labour market has been evolving for ages, so do employers' expectations. The more we know about what we need when looking for a job, the higher the probability to get the dream one. It is crucial to identify the needed skills as narrow specialization is highly appreciated. The current classification of jobs in the literature is a good basis, nevertheless the needed skills in a group are changing. The unrealized labor demand is a fresh look in this matter.

The presence of azole fungicides in the environment – a perspective of environmental microbes.

Natalia Burlaga
Poznan University of Technology

Azole fungicides are used as active ingredients in pharmaceuticals, pesticides and personal care products. Hence, there are many ways by which they can reach the natural ecosystems. This can have a negative effect on living organisms and pose ecotoxicological risk to microorganisms. The aim of our study was to understand the impact of selected azoles on the environmental bacteria and to analyze various methods of these compounds' degradation.

The experiments performed include analysis of the cell membrane permeability, total glutathione level and activity of selected enzymes. These studies allowed evaluation of the bacterial stress response to the presence of azole antifungals. In addition, the ability of the selected environmental strains to biodegrade azole derivatives was analyzed. Besides, the physicochemical method assisted by ultraviolet radiation was optimized to remove these compounds more efficiently. The research results showed that azoles caused dynamic changes in the properties of the cells. Analysis of azole removal processes showed that physicochemical methods are more effective than biological ones.

The results presented have provided a significant insight into the strategies used by environmental bacterial cells to survive exposures to toxic and potentially fatal azole antifungal agents. They clearly indicate that azole antifungal residues may be harmful for environmental bacterial strains. Azole compounds are hardly biodegradable, and therefore it is necessary to conduct further research towards their removal from the natural environment.

Expression of versican mRNA transcript to predict cardiac remodelling after myocardial infarction

Aleksandra Chabior
Medical University of Warsaw

Adverse left-ventricular remodelling (LVR) is defined as an increase in end-diastolic left-ventricular volume by 20% 6 months after acute myocardial infarction (AMI). LVR is associated with cardiac dysfunction, therefore deteriorating the prognosis.
We aimed to compare the concentrations of messenger RNA transcripts in the peripheral blood of patients with and without LVR at 6 months.

The study included 75 patients with first ST-elevation myocardial infarction (STEMI) treated with percutaneous coronary intervention. Whole blood concentrations of 6 transcripts were determined 24 hours after AMI using droplet digital polymerase chain reaction. The correlations between mRNA transcript expression and left ventricular ejection fraction (LVEF) and N-terminal-pro B type natriuretic peptide (NT-proBNP) concentration were evaluated.
Among 75 patients, 4 were lost to follow-up and 71 were included in the analysis. Seventeen (24%) patients developed LVR at 6 months. Versican (VCAN) mRNA expression was lower in patients who developed LVR, compared to those who did not (P = 0.02), and discriminated between these patients.

Dysregulation of VCAN expression in the acute phase of AMI may contribute to LVR at 6 months. Whether decreased expression of VCAN might be a useful tool to predict LVR in clinical practice remains to be established.

Jan Brzechwa as an IP lawyer of the interwar period

Ewa Fabian
University of Warsaw

The research focuses on the early development of copyright law in Poland and abroad through the biography of a famous poet, Jan Brzechwa (Jan Lesman before the II World War). Some of Brzechwa's achievements as a lawyer involved representing prominent figures in court cases during the interwar period. The research uncovered and described sources about these cases yet uknown to the academic community. One of these cases relates to the poetry of C.K.Norwid and the pokutne remedy (penance).

Using various kinds of digital pre-war archives and collections, with approximately 10 of such archives in Poland and around 5 in other countries (mainly France, Switzerland and Italy). Assessing the best UI techniques used by such archives and the best techniques used for accessing and using such archives.

The research is state funded (NCN grant) and is an example of a historical research related to the history of copyright law in Poland. The results showed how biographies of important historical figures could be influenced by pre-war Polish courts. The research is conducted, among others, by a lawyer with a direct court experience, giving the study a practical prespective.

POSTER PRESENTERS

Lockdown scheduling during a pandemic

Katarzyna Gdowska
AGH-UST in Krakow

During the COVID-19 pandemic a key issue is to schedule such actions as lockdowns, which reduce the virus transmission but also have their negative economic and social effects. Hence, careful scheduling is important to convince the society to accept them and obey. Models for lockdown scheduling may serve as a part of a decision support system to provide an objective justification for timing and duration of interventions-to-be-introduced.

A Mixed-Integer Programming model for lockdown scheduling was developed, which minimizes the associated social and economic costs represented here with reversed probability of survival. Optimal timing and duration of interventions-to-be-introduced may be considered as foundations for a strategy for dealing with the pandemic. Models which can be included in a Decision Support System are relatively scarce. Therefore, an original methodology based on Weibull distribution may be useful for Decision-Making.

The use of phospholipid monolayer as a model biomembrane

Adam Grzywaczyk
Poznan University of Technology

Effective transport through cell biomembrane is considered as a crucial factor for efficient drug action. Model structures can be used to determine the changes that the bilayer membrane undergoes. One possible model configuration is a liposome, a vesicle spontaneously created from phospholipids. In this case, liposomes were used to identify the surface properties of phospholipid layer structure before exposure to pharmaceuticals.

Liposomes were produced by a reverse-phase evaporation method. 3 mg of 1,2-dipalmitoyl-sn-glycero-3-phosphocholine was dissolved in chloroform. Then distilled water with 0.5 mg of Tween 80 was added and sonicated for 10 minutes. Then, the organic phase was removed using a rotary evaporator. The phospholipid in the water created gel, followed by the creation of liposomes. The second step was the evaluation of zeta potential and particle size of liposomes, Candida albicans and Candida krusei yeasts after exposure to nitrofurans. Pharmaceuticals caused the changes in zeta potential and particle size of samples.

Stress conditions caused changes in particle size. C. albicans size increased, which can be connected with the creation of agglomerates as a response to the hazardous environment. Moreover, the zeta potential of C. albicans also increased which also can be related to the creation of agglomerates. It is worth noticing, that liposomes also showed changes after exposure, which proves that they are suitable model structures of a biological membrane.

POSTER PRESENTERS

Art & Science

Marlena Hewitt
Freelance Painter & Illustrator

Marlena Hewitt is a Polish-American visual artist who creates abstract paintings based on novel scientific research. She successfully uses visual arts as a powerful tool for promoting science. She shows her work at museums of science, gives talks about pattern languages in art and science, and creates STEAM workshops for kids in the USA as well as Europe.

Marlena is fascinated with patterns. She trains her eye and mind to look for them, to understand them, and to break them. Intrigued by abstract art, in her project, she analyzes the data, looks for patterns, and turns them into specific abstract paintings.
This "intersection" allows her to create a meaningful abstract work.

Marlena works on projects with scientists from Harvard University and Massachusetts Institute of Technology in the USA. Her work is published at Physics Report, Sky and Telescope, and other places.

Marlena has a degree in visual arts and architecture from Boston, USA and a teaching degree from Poland. Currently, she lives in Poland where she teaches art, works on international STEAM projects and studies art therapy. In 2020 she wrote a thesis about the use of visual arts as a tool to promote STEAM education. In 2021 she worked on a thesis about how to successfully use abstract art and pattern language as a tool of communication in (art) therapy.

In her future she sees herself as an artist-in-residence working alongside scientists and sharing the knowledge with the public.

Radio Environment Maps for Green 5G and Beyond Networks

Marcin Hoffmann
Poznań University of Technology

In 5G and beyond networks, base stations (BSs) are expected to be densely deployed to increase throughput. This implies increased energy consumption, contributing to global carbon emissions. However, research shows that a lot of BSs are underutilized for certain periods. They can be switched off to provide energy savings. This research aims to develop a Radio Environment Map, providing a mapping between user positions and active BSs.

The formal optimization problem identified in this research is the maximization of network energy efficiency, defined as a ratio between median user bitrate and average system power consumption, under Quality of Service Constraints. The behavior of complex, modern, wireless communications systems using large antenna arrays is hard to be fully modeled mathematically. Thus, the optimization problems are resolved using reinforcement learning. The process of obtaining solutions, i.e. filling REM with data, and its evaluation is performed using computer simulations. Accurate results are obtained due to the utilization of the realistic wireless radio channel model, e.g., ray-tracing model.

Computer simulations have shown that with the use of Radio Environment Map driven by reinforcement learning underutilized BSs can be identified and matched with patterns of network users' positions. After the learning phase, the proposed reinforcement learning-based BSs switching algorithm is proven to provide 70% gains in EE over a state-of-the-art algorithm using an analytical heuristic. This makes a step toward green 5G and beyond networks.

POSTER PRESENTERS

The hunt for groundwater-cleaning microbes

Natalia Jakus
Universität Tübingen

Bacterially-mediated autotrophic nitrate removal coupled to Fe(II) oxidation is thought to drive natural nitrate attenuation in organic-poor aquifers. However, autotrophic nitrate-reducing Fe(II) oxidizing (NRFeOx) bacteria have not been isolated subsurface and as such there are no model cultures to study this environmentally relevant process.

Using a combination of cultivation and sequencing methods supported by NanoSIMS analysis, SEM imagining, and kinetic modeling, we obtained an autotrophic NRFeOx culture and performed experiments to determine the identity of the NRFeOx bacteria, their physiology, genetic potential and the extent of nitrate removal.
The culture was shown to mediate oxidation of Fe(II) coupled to nitrate reduction. The stoichiometry of this reaction suggested that nitrate was transformed to harmless nitrogen. However, the most dominant species did not possess a full set of genes to mediate the process alone, suggesting that the complete reduction could be only achieved via interspecies interactions.

We present a novel enrichment culture that can be used as model organisms for further study on nitrate removal in aquifers. We demonstrate that in organic-poor environments, microbes can use inorganic substrates such as Fe(II) to reduce nitrate. The results are important for predicting the fate of nitrate in contaminated groundwater and expand our knowledge on the mechanism and ecology of nitrate-reducing Fe(II)-oxidizing communities.

Naturial Orifice Surgery - the world's first virtual reality simulator

Przemysław Korzeniowski
Imperial College London

Currently, the most common method for clinicians to acquire surgical skills is to assist more experienced colleagues during procedures. Due to patient safety and high costs, this form of training is increasingly being questioned. There is a growing emphasis on training outside the operating room. Virtual reality (VR) simulators are an effective supplement to traditional surgical training.

We develop a VR simulator for training experimental, minimally invasive surgical procedures conducted through the natural orifices of the body (NOTES), which leave no external scars on the patient's body. The realism and effectiveness of the simulator were verified by a series of studies involving surgeons with varying degrees of experience. Experienced surgeons performed the virtual procedure faster, more efficiently and more accurately than novices, which indicates that NOViSE can contribute not only to improving the training of NOTES techniques but also to popularizing innovative NOTES techniques among surgeons.

VR simulation of surgical procedures can contribute to surgical training without putting patients at risk, raising ethical issues or requiring expensive animal or cadaver facilities. Moreover, in the context of an innovative and experimental technique such as NOTES, NOViSE could potentially facilitate its development and contribute to its popularization by keeping practitioners up to date with this new minimally invasive technique.

POSTER PRESENTERS

LRP2 orchestrates dynamic remodeling of stem cells during neural tube formation.

Izabela Kowalczyk
Max Delbrück Center, Berlin

Coordination of signaling pathways and cellular rearrangements is essential for proper patterning and morphogenesis to establish the highly complex structures of our brain. The project aims at understanding the genetic modulation of crucial signaling pathways and thus genetic predispositions to neural tube disorders. Additionally, my work seeks to elucidate biomechanical cell-autonomous mechanisms essential in neural tube closure processes.

The endocytic receptor LRP2, a SHH co-receptor, is essential for specification of the forebrain stem cells. Loss of LRP2 leads to severe defects in forebrain hemisphere separation, known as holoprosencephaly (HPE). Penetrance of HPE in Lrp2-/- mice depends on genetic modulators, reflecting the situation in humans, carrying pathogenic LRP2 variants. Applying complex genetics combined with transcriptomics and functional analyses, I identified novel modulators of the SHH pathway. High and super resolution microscopy analyses of LRP2-deficient neural folds placed LRP2 in context of apical membrane remodeling, neural stem cell shape control and neural crest cell integrity during head formation.

We uncovered that native differences in the stem cells composition modulate the signaling capacity, which can further be extrapolated to human disease penetrance. Moreover, a proper balance between stem cell pools may be critical for the coordination of tissue patterning. LRP2 is a multifunctional player in the neural stem cell niche, which controls signaling and cell morphology, culminating in the large-scale morphogenesis of the neural tube.

Chromatographic method development for simultaneous determination of albumin and low-molecular-weight thiols in human plasma

Katarzyna Kurpet
University of Łódź

Thiols play a central role in metabolism and cellular homeostasis. Because of the possible use of their plasma levels alteration as biomarkers of health status, the aim of our research was to develop a new method for the simultaneous determination of thiols that are crucial for the proper functioning of the organism. The developed procedure can be applied to plasma samples to monitor the biochemical processes in various pathophysiological states.

The developed method for simultaneous determination of human serum albumin, cysteine, homocysteine, N-acetyl-L-cysteine, glutathione, cysteinylglycine and α-lipoic acid is based on pre-column derivatization of analytes with thiol-specific fluorescence labeling reagent, monobromobimane, followed by separation and quantification by reversed-phase high performance liquid chromatography with fluorescence detection. Oxidized and protein-bound thiols were converted to their reduced counterparts by reductive cleavage with sodium borohydride prior to derivatization step. The developed method is highly sensitive, repeatable, and linear within the physiological and pathological ranges of total thiols.

Our method makes it possible to determine seven important thiols in human plasma. We believe that this protocol fulfills experimental and clinical requirements for routine assessments of plasma thiols content in pathophysiological conditions. It would act as a powerful analytical tool in the high throughput screening of a large number of samples because equipment for HPLC-FLD analysis is often part of the instrumentation of hospital laboratories.

POSTER PRESENTERS

Controlling lipid synthesis on a molecular level brings us closer to stop the global obesity and diabetes epidemic

Joanna Kwiatek
Rutgers University

Why are cells fat or skinny? How is lipid metabolism controlled? One of the most important enzymes regulating lipid metabolism is phosphatidic acid (PA) phosphatase. The importance of this enzyme is exemplified by cellular defects and lipid-based diseases including obesity and diabetes. This work aimed to develop a model system to assess enzyme activity, which is crucial for controlling lipid synthesis.

Method: PA was incorporated into phospholipid vesicles (liposomes) composed of phospholipids. The system was optimized to support enzyme-liposome interaction and to afford activity greater than with the detergent system used routinely in the past. Results: PA phosphatase activity was regulated by the phospholipid composition of the liposomes, whereas enzyme interaction was insensitive to the composition. PA phosphatase activity was dependent on the bulk (hopping mode) and surface (scooting mode) concentrations of PA implicating how the enzyme operates along the nuclear/ER membrane in vivo.

Understanding the molecular mechanism which controls lipid production is essential for stopping the global obesity and diabetic epidemic. Hence, my biochemical studies performed on the model system allowed me to study PA phosphatase activity and its mode of action on the molecular level. Controlling enzyme activity and its location allows regulating the lipid synthesis, hence bringing a potential solution for curing lipid-based diseases.

Why are some genetic neuromuscular diseases still unsolved? The MYO-SEQ Project

Magdalena Mroczek
Newcastle University

Limb girdle muscular dystrophies (LGMDs) are a group of rare neuromuscular disorders characterised by wasting and weakness of the hip and shoulder muscles. The standard diagnostic method is gene panel, a test that analyzes multiple genes. The aim of the MYO-SEQ project is to implement next generation sequencing (NGS), a method analysing all genes in the human organism, to identify the genetic causes of unexplained LGMD cases.

The MYO-SEQ project is a cooperation with clinicans, pharmaceutical companies and MIT. It applies exome sequencing to a cohort of 2.000 patients with undiagnosed LGMD. In the MYO-SEQ we reached a diagnostic yield of 52%. We compared solved and unsolved individuals from the same cohort. In the unsolved cohort late onset patients represented 36% and only 14% in the solved one. Pathogenic single variant frequency was counted for three recessive genes, CAPN3, ANO5 and GAA, and it was about four times higher in the unsolved subcohort. We analysed genetic data for patients sharing a common additional feature (e.g. cardiomyopathy, epilepsy) and identified genetic modifiers, such as RYR2 for heart arrhythmia.

Many patients with genetic diseases still lack a molecular diagnosis. We compared solved and unsolved individuals from the same large cohort. Prevalence of late onset LGMD in the unsolved cohort may suggest acquired disease or polygenic inheritance. Higher pathogenic carrier frequency in unsolved cohort may imply presence of a second deep intronic causative variants. Analysing data of individuals sharing an additional feature can identify novel genes or genetic modifiers.

Fast solar aircraft - hopeless dreams or future of aviation?

Natalia Narożańska
YASA, Oxford

Kerosene appears to be irreplaceable in aviation. Solar aircrafts fly as fast as an average car, electric aircrafts are short-distance, hydrogen aircrafts pose significant safety challenges. There exists no zero-emission aircraft with a range of over 1500 km and cruise speed above 140 km/h. The aim of my research was to design one, using the emerging perovskite solar cells. The material is very light and cheap. Could it compete with kerosene?

A theoretical model was developed to describe the power balance of a solar aircraft, giving results in a good agreement with a top speed of Solar Impulse 2. The trends observed were used to define and propose a first concept airframe. The analysis proves that it is necessary to add an extra component, which focuses only on solar power harvesting. A deployable solar collector using perovskite solar cells printed on a composite material is introduced for the application. The stability characteristics were then investigated theoretically and experimentally. A suitable airframe for the application is designed and matched with a collector. Design is then tested in the X-Plane flight simulator.

This feasibility study concludes there is potential in applying perovskite solar cells for commercial and cargo applications, showing that the solar-powered aircraft may be suitable for applications beyond high altitude pseudo satellite applications. Unlike electric and hydrogen aircraft, these do not require extra airport infrastructures and hence their implementation on the market could potentially be swift.

Impact assessment of nitrofuran antibiotics towards environmental bacteria

Amanda Pacholak
Poznan University of Technology

The pollution of the natural environment with antibiotics belongs to the most challenging problems of the 21st century. Nitrofuran derivatives have been widely employed as food additives, pharmaceuticals and conservatives since 1940s. However, their environmental impact still remains unclear. Our research aims to investigate their biodegradation and the effect on the cell envelopes of newly isolated Gram-negative bacteria.

We used traditional biochemical methods as well as novel powerful techniques (such as atomic force microscopy, transmission electron microscopy, metagenomics) which allowed detailed studies of the bacterial cells exposed to the presence of selected nitrofurans. The results indicate that nitrofurantoin mostly induces the strongest remodeling of the bacterial surfaces. Modifications of the cell structure are modulated by the nature of nitrofuran molecule and depend on the phylogenetic classification of the cells. As for biodegradation potential, the bacteria from the urban areas show greater biodiversity and stronger ability to degrade nitrofurans than the ones present in the rural premises.

We demonstrated that the exposure of bacterial cell to antibiotics promotes changes in the bacterial cell envelope. These alterations in the cell structure may lead, on the one hand, to multilevel adaptation process, but on the other hand to cells destruction. Our research helps improve the understanding of environmental impact of nitrofurans that attract little scientific attention but pose a threat to the environment and human health.

POSTER PRESENTERS

The author, the character and the reader in Miguel de Unamuno´s fiction: a Bermuda triangle?

Katarzyna Barbara Parys
Universidad Autónoma de Madrid

The relations between a character, an author and a reader are the key to fiction. Miguel de Unamuno plays in his experimental narrative with those elements in order to wake the reader up and make her an active element within the text. My goal is to make the world know this amazing writer and his not-so-well-known stories which at the same time leave us with existential threat and make us laugh hard.

My goal is to apply well-known theories from the field of formal philosophy into non-realistic literature. Philosophers usually base their theories on simple fictions, while the stories that break typical distribution of power between the reader, the author and the character enrich philosophical views with new cases that were not taken into account. I also analyze the key component of those relations in order to discover which elements are causing existential threat, which make us laugh and why sometimes both are the case. The method I am using is my own key of interpretation based on logic and formal philosophy. So, if you fancy literature with some logical topping, welcome to my world.

What happens when a character threatens the author of his story with death? What happens when the reader is also a character in the story? Spanish literature, and in particular Miguel de Unamuno´s writings are a rich source of philosophical problems, especially existential ones. Nevertheless, to approach Spanish existentialism with logical tools and get to know some amazing pieces of literature is something you cannot miss!

Understanding the relation between oncoprotein DEK and chromatin organisation in breast cancer

Agnieszka Pierzyńska-Mach
Italian Institute of Technology in Genoa

DEK protein is a ubiquitous nuclear factor that has been consistently associated with tumour progression. Its overexpression in cancer cells raises the possibility of using DEK as a tumour marker. It is also an architectural chromatin factor that influences gene activity. This work aims to investigate the spatial correlation between the organization of DEK oncoprotein and the local chromatin structure depending on the degree of cell malignancy.

Methods: The study is based on dual-colour confocal and STED (STimulated Emission Depletion) super-resolution microscopy images obtained by immunolabelling of DEK and active/inactive chromatin epigenetic markers and RNA-FISH technique in human model breast cancer cell lines. Dynamics of DEK protein was obtained thanks to 12h time-lapses of breast cancer living cell.
Results: We show the differences of the nanoscale distribution of DEK in relation to chromatin organisation pattern. Live-cell imaging enabled observation of formation of DEK protein bodies necessary for the DNA replication process in close proximity of inactive genes in normal-like breast cells.

This study provides novel insights into the tumour-promoting activity of DEK, its role in crucial cellular processes such as DNA replication and gene regulation, and thus makes progress in our understanding of basic mechanisms of carcinogenesis.

POSTER PRESENTERS

How do Supermassive Black Holes kill their own galaxies?

Joanna Piotrowska-Karpov
University of Cambridge

In my research I combine a thorough analysis of three state-of-the-art cosmological simulations with the observed Universe as seen in the visible light, to learn what physical processes are responsible for galactic `death'. The importance of black holes residing in galactic centres has been long entertained, however I focus on establishing the exact mode of operation of black holes which cause their host galaxies to cease star formation.

A genuinely exciting feature of my work is combining machine learning techniques with more traditional methods, like regression and correlation analysis, to explore the non-trivial physical processes responsible for shutting down star formation in massive galaxies. By consistently applying random forest analysis to all three cosmological simulations and the observations, we reveal *black hole mass as the most important parameter for determining the star-forming future of a given galaxy*. We also show how other physical quantities previously thought to carry importance for galactic `death' entirely lose their significance once we account for their strong connection with black hole mass.

It is excruciatingly hard to advocate for the importance of supermassive black holes in the context of our daily life on Earth. Astronomically, however, our results are ground-breaking, forcing the community to entirely rethink the mode of operation of supermassive black holes. We show how it is the persistent action of gentle black hole jets, rather than the violent outburst of quasar activity, which ultimately cause galaxies to die.

Patenting and implementation of inventions on the Polish and foreign markets on the example of inventions: "Mixing stationary bed in devices with vibratory rolling-screw drive"

Wojciech Poćwiardowski
University of Technology and Life Sciences in Bydgoszcz

I would like to present the patenting system for UTP in Bydgoszcz on the example of my own inventions, which is mixing stationary bed in devices with vibratory rolling-screw drive. These devices allow: elimination of the necessity of triggering the rotational movement of the agitator or tank, uniform mixing of the bed in the entire volume, causing motion in the volume of granular material by means of a rolling-screw drive system, use of stationary stirrers that are mixing segments.

The Design Thinking method was used in the development of innovative solutions. The solutions received a pre-implementation grant and work is currently underway to implement them in the industry in Poland.

Elimination of the necessity of triggering the rotational movement of the agitator or tank. Uniform mixing of the bed in the entire volume. Causing motion in the volume of granular material by means of a rolling-screw drive system. Use of stationary stirrers that are mixing segments. Mixing segment/stirrer consists of a wound spiral surface inside the tube and forces the material upward.

POSTER PRESENTERS

Nanostructured metal oxide-graphene composites for multifunctional applications

Elżbieta Regulska
Universidad de Castilla-La Mancha

Currently, I enjoy my journey with synthesis and physicochemical investigations of novel organophosphorus materials in the group of Prof. Romero-Nieto. Alongside, I aim at exploiting multifunctionality of the metal oxides and graphene-based nanostructured junctions. With this respect I set particular focus on photo- and electrocatalytic materials.

Herein, I present synthesis of graphene-quantum-dots-decorated spinel nickel aluminate and their application as photo- and electrocatalysts. The composite was fully characterized by TGA, DSC, ATR-FTIR, PXRD, SEM, EDX, XPS, TEM, and UV–Vis techniques. The photocatalytic activity of the $NiAl_2O_4$/GQDs under simulated solar light irradiation was demonstrated towards potential pollutants, including a series of dyes, toxic phenol and fungicide. Additionally, we utilized the same material for the enhancement of the electrocatalytic performance of the modified electrode. The constructed biosensor was utilized in glucose sensing in human body fluids of diabetic patients.

This work offers new insight into the application of the conjunction of the inorganic spinel and GQDs. Importantly, it also provides a simple and efficient route for water remediation from common pollutants. Moreover, the $NiAl_2O_4$/GQDs composite enhances the electrochemical response. Herein, we demonstrated the synergistic behavior of $NiAl_2O_4$/GQDs-modified electrode in glucose sensing of diabetic patients.

Fate of the Sulfur Radical Cation in C-terminal Methionines: Deprotonation vs Decarboxylation

Vidhi Sehrawat
University of Poznan

AUG codon is the starting point of the existence of proteins inside us, biomolecules so complex that a huge part of science has been devoted to their research. Just like chunking can help in understanding big words better, a protein is studied well by focusing on its amino acid residues. One such amino acid, methionine, is where the translation of the language of RNA begins. Our research focused on chemical changes in C-terminal methionine under oxidative stress.

We used N-Acetylmethionine as the model compound and 3-Carboxybenzophenone as the photosensitizer. Utilizing the techniques of nanosecond laser flash photolysis, HPLC, and LCMS/MS for an all-rounded analysis, we noted observations of interesting transient species and coupling products around pH 6 and 11. We proposed two possible pathways for the observed sulfur radical cation: deprotonation (α-thioalkyl radical) and decarboxylation (α-aminoalkyl radical).

The comparative studies gave a hint of the absence of significant effect of pH on the residue. This knowledge can be utilized in further studies at biological pH to deal with the damages to oxidizable functional groups in similar amino acids (e.g. >S in Met), hoping to contribute to finding a cure for resulting diseases like Alzheimer's.

POSTER PRESENTERS

Dendrimersomes as nanocarriers for rose bengal delivery in photodynamic therapy

Krzysztof Sztandera
University of Łódź

Photodynamic therapy (PDT) is a highly efficient treatment method of basal cell carcinoma. Due to its advantages (high selectivity and limited side effects) the interest in PDT is growing. However, the features of photosensitizers may limit the efficacy of therapy. To overcome these obstacles, use of nanosystems for drug delivery has been proposed. Here, we present the application of a dendrimersome (d-some) as a nanocarrier of rose bengal (RB).

Using spectroscopy and zeta potential measurements we have showed that encapsulation of RB in the dendrimersome is spontaneous and highly efficient. With the use of MTT cytotoxicity assay we have demonstrated that encapsulation of RB in the dendrimersome improves the drug's phototoxic properties. Further, with the application of two highly selective probes (ABDA and H2DCFDA), an increased generation of singlet oxygen and other reactive oxygen species (ROS) by RB-loaded dendrimersome has been demonstrated, indicating the main PDT-associated mechanism of cell death. Flow cytometry analyses has proved that encapsulation in the dendrimersome significantly enhances cellular uptake of RB.
outcome of chemotherapy.biological membrane.

We have demostrated that d-somes may serve as nanocarriers of RB, enhancing its photodynamic potential. Through comprehensive analysis of mechanism of action, we have linked this phenomenon with increased generation of 1O2 and ROS, and enhanced intracellular concentration of the drug. These observations bring hope for extended application of d-somes as carriers of different anticancer drugs, providing improved outcome of chemotherapy.

When the apple does fall far from a tree: How reduced inheritance of growth parameters helps Escherichia coli survive exposure to antibiotics

Joanna Urbaniec
University of Surrey
University of Wollongong

My research focuses on antibiotic persistence which is a mechanism through which genetically-susceptible bacteria can survive longterm exposure to antibiotics. I am currently working with 'highly-peristent' (Hip) Escherichia coli strains with the aim of dicovering metabolic pathways that are responsible for their Hip phenotype. I am hoping that my research will lead to the development of more effective treatment regimes that target these 'antibiotic persisters'.

Through single cell observations in microfluidic systems our group has determined that in E. coli HipQ strain antibiotic persistence is linked to 'reduced phenotypic inheritance' (RPI) i.e. a reduced correlation of growth parameters between cells of the same lineage. We have subsequently linked RPI to a mutation in the transcription factor ydcI whose function is not yet well understood. My current research focuses on further investigation of the structure and function of ydcI through a combination of expression studies, biochemical assays and CRISPR genome editing. I am aiming to narrow down the specific genes and pathways regulated by ydcI which are responsible for the phenomenon of RPI and subsequently increased antibiotic persistence.

Antibiotic persistence is a major growing concern for public health as it increases treatment duration and can even contribute to treatment failure, especially in immunocompromised individuals. Furthermore, there is also a growing array of evidence that it is a 'stepping-stone' for the development of genetic antimicrobial resistance (AMR).

POSTER PRESENTERS

Wealth is hidden in spent batteries. Recovery of metals from waste Li-ion batteries by acid leaching.

Weronika Urbańska
Wrocław University of Science and Technology

Lithium-ion batteries are currently used in much small-size electronic equipment but also electric vehicles. Concerning the requirement to introduce a circular economy model, but also due to the depletion of natural resources and the trend of replacing them with other recycled raw materials, an important task of global systems for the management of waste batteries and accumulators is to develop and implement appropriate technologies for the recovery of valuable materials contained in them.

One of the most effective and advantageous method of processing waste LIBs is the hydrometallurgical recovery of metals contained in the electrode powder. Concerning current research trends, laboratory tests were conducted on recovery of Co, Li and Ni from spent LIBs using acid leaching, where 1.5 M H_2SO_4 was used as leaching agent and reducing agent were H_2O_2 and/or glutaric acid. Besides, the influence of the type of dosed reducing agents on the obtained metal recovery rates was investigated. The best recovery results for the three tested metals were achieved in experiments in which the battery powder was leached with two reducing agents that were used simultaneously. This confirms the assumed research hypotheses.

The analysis of the situation in Poland shows that none of the domestic waste cells recycling companies deal with the comprehensive processing of spent Li-ion batteries, which will probably completely dominate the global cell market in a short time. Therefore, the proposed concept of Co, Li and Ni recovery may constitute the basis for the development of a comprehensive, implementable waste management system.

The smaller the better. Structural characteristics of macrocyclic peptide as a potent modulator of PD-1/PD-L1 immune checkpoint axis.

Edyta Żyła
Jagiellonian University

My last work was focused on anti-tumor macrocyclic peptide blocking PD-1/PD-L1 tumor maintenance axis. As long as monoclonal antibodies therapies are burdened with poor solid tumor penetration and mAb-related toxicity, it is important to find new therapeutics able to overcome those obstacles. Here, we described not well known 3rd class macrocyclic peptide and its mechanism of action which help to understand the nature of the ligand-peptide interaction and design macrocyclic super-drug.

Based on the crystal structure we determined the details of the macrocyclic peptide ligand-PD-L1 interactions revealing their hydrophobic and electrostatic nature. We also report sulfur binding mode between PD-L1 and the ligand involving interaction between sulfur atom of methionine from PD-L1 and phenyl aromatic ring of phenylalanine from the ligand, which to date has been only scarcely described in the case of one of the 1st class (non-peptidogenic) macrocycles binding modes. In vitro assay crearly reveals that the peptide can disturb interaction between PD-1 and PD-L1 and restore anti-tumor T cells activity.

Macrocyclic peptides(MP) act as PD-1 agonists and not only exhibit high affinity and specificity of binding but also, and even more importantly, lack immunogenicity. Unlike mAb, MP are not sensitive for mutations in tumor epitopes because their interaction is not founded on strict sequence but structure of protein surface and in concequence lack of drug resistance. MP are small enough to get between two interacting protein wich allows them to not only avoid PD-1/PD-L1 interaction but also stop it.

PANEL DISCUSSION

Cooperation Between Industry and Academia

Bogusława Cimoszko-Skowroński

MIT EF CEE, Co-founder and Board Member MIT FounderPartners, Partner

Serial entrepreneur, technology startups ecosystem builder, financier with deep capital transactions experience from UBS AG, EBRD London, FFC Fincoord Ltd, VC and angel investor

Mikołaj Gurdała

Innovation and EIT Health InnoStars Manager

Mikołaj Gurdała is an expert with extensive experience experienced in EU funds, technology transfer and R&D. He has considerable expertise of international affairs and cross-sectoral cooperation. With EIT Health, one of the biggest healthcare organisations in Europe, he is responsible for developing international joint ventures and innovative projects co-created with academia and industry partners. He was one of the founders of building in Europe so called InnoStars Region within the EIT Health organisation, with aims to develop digital health, medtech and biotech innovations in the emerging markets.

Marcin Dymczyk

Sevensense

Marcin Dymczyk is a co-founder and a Chief Product Officer at Sevensense Robotics, an ETH Zurich spin-off focusing on AI-based autonomy solutions for mobile robots. Before founding Sevensense, Marcin got a PhD degree in Robotics from Autonomous System Lab, where he was researching 3D mapping and localization algorithms for robots and AR/VR. During his doctoral studies, he spent a year at Google as a visiting researcher. Marcin also holds a BA in Finance, with experience at EY, BCG and in banking.

Paweł Zawadzki

CEO, MNM Diagnostics

After obtaining a triple PhD (chemistry, physics, biology) in 2009, Pawel spent 7 years at Oxford University studying DNA technology at Departments of Physics, Biochemistry and Oncology. In 2017 he established DNA repair focused research group at Adam Mickiewicz University. 2018, the MNM Diagnostics was born as a need to bring genomics directly to patient's bed by merging genomics with AI technologies.

Moderated by:

Bartosz Paszcza

Polonium Foundation

Science Comedy Deathmatch: Poland vs the World

Steve Cross

Steve Cross might be the UKs' nerdiest comedian. To be honest, he's much too lazy to check. He specialises in making clever people funny and runs Science Showoff, where anyone can try anything about science on stage.

He's been to SPP before, where he begged anyone to marry him so he could work in the EU.

No-one helped him out.

We are very excited to have Steve join us again, this time as the host of the Science Comedy Deathmatch: Poland vs The World. Make sure you tune in for this unmissable part of SPP online entertainment!

Foundation of Polish Science - Rethink your research

Marcelina Firkowska

Foundation for Polish Science

Marcelina Firkowska is Project Commercialization Coordinator in FNP. She supports a family of FNP funded researchers on such topics as intellectual property management, knowledge and technology transfer, communication and collaboration with business. Has a Ph.D. in neuroscience, ran her own projects and worked for a decade as a lab manager at the International Institute of Molecular and Cell Biology. She has a degree in intellectual property law and innovative management of R&D systems in science.

You came up with something interesting during your research but have no idea what to do next? Want to start an academic start-up but don't know where to start? She's your (wo)man!

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POLONIUM FOUNDATION TEAM

"Supporting the best, so that they can become even better"

The Foundation for Polish Science (FNP) was founded in 1991 as an independent, non-governmental, non-profit organization with a mission to support science. We are the largest NGO funding science in Poland. We award prizes, stipends, subsidies and grants to leading scientists and research teams, encourage the transfer of scientific achievements to business practice and support all kinds of initiatives that serve science in Poland. We help outstanding scientists – regardless of their nationality or career stage - to pursue world-class research, while hosted in Polish institutions.

Our offer includes the **START programme** which is the most prestigious stipend opportunity for young researchers under 30 years old. We also honour eminent researchers for their outstanding achievements or discoveries with the **FNP PRIZE** regarded as the most prestigious of its kind in Poland.

In 2015 we started to implement the **International Research Agendas programme** financed by the European fund within the Smart Growth Operational Programme 2014–2020. The Foundation received over PLN 532 million which allowed for providing support to approx. 14 units responsible for the implementation of International Research Agendas in Poland. These units pursue now research programmes created by world-renowned authorities in the field in which the unit specialises and apply in Poland best practice in HR policy, R&D management, and commercialisation of R&D results.

Prof. Leszek Kaczmarek and dr hab. Ewelina Knapska, International Research Agendas programme laureates

In 2016 the Foundation started to implement programmes financed by the European fund within the Smart Growth Operational Programme 2014–2020, Measure 4.4. The Foundation received over PLN 727 million for implementing the following programmes:

- **TEAM Programme**
- **TEAM-TECH Programme**
- **TEAM-TECH Core Facility and TEAM-TECH Core Facility PLUS**
- **FIRST TEAM Programme**
- **POWROTY/REINTEGRATION Programme**
- **HOMING Programme**
- **TEAM-NET Programme**

PIs awarded with FNP grants have now positions available within their research teams. These positions are open to undergraduate students, PhD candidates and postdocs. All competitions are advertised internationally, via FNP's homepage or via EURAXESS. Research programmes will vary from grant to grant, however research quality will always be high: these are some of the best people to work with and best places to do that work at.

You can find out more about each programme and job opportunities at www.fnp.org.pl/en.

Dr hab. Agnieszka Błachnio-Zabielska, TEAM programme laureate, with her team members

NAWA POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE – NAWA

ENHANCING THE POTENTIAL OF POLISH SCIENCE AND HIGHER EDUCATION THROUGH INTERNATIONAL EXCHANGE AND COOPERATION

The Polish National Agency for Academic Exchange (NAWA) was officially inaugurated on 1 October 2017. The Agency works towards the internationalisation of Polish science by supporting and stimulating international research collaboration and academic exchange. In this context NAWA completed the system formed by two other agencies in Poland: the National Science Centre and the National Centre for Research and Development.

NAWA aims to reinforce research excellence, internationalise Polish universities and research institutions, as well as promoting Poland and its language and culture to build Poland's brand with interesting educational and research opportunities. These objectives are to be achieved through a wide range of the Agency's programmes:

- Programmes for Scientists
- Programmes for Institutions
- Programmes for Students
- Polish Language Programmes

FOR MORE INFORMATION PLEASE VISIT NAWA'S WEBSITE AT **WWW.NAWA.GOV.P L/EN**

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Renate Rutiku, PhD

a visiting scientist at the Jagiellonian University in Kraków

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