

18 VILLUM Young Investigators



Postdoc
Olena Riabinina
University of Southern Denmark, Department of Biology
Granted DKK 9.3m
Genetics, Genomics, Bioinformatics and Systems Biology

Cracking the mosquito olfactory code to beat malaria

Malaria is a disease that affects half of the world's population and causes more than 400,000 deaths per year. Malaria is transmitted by mosquitoes that use their sense of smell to find humans. This project will unravel how the mosquitoes detect and process smells, and how we can interfere with their sense of smell to reduce the number of mosquitoes that bite us. The grant will fund the recipient, one postdoc, one PhD student, one technician and equipment. ●



Postdoc
Pengyu Guan
Technical University of Denmark, Department of Photonics Engineering
Granted DKK 10m
Electrical engineering, Electronic engineering, Information engineering

Optical Time-Lens for Ultrahigh Capacity Passive Optical Network (Lens-PON)

This project aims to significantly advance the state of the art in time-lens based optical signal processing technologies for ultrahigh capacity optical access network and unleash their potential for energy-efficiency. This will be achieved through the investigation of new Fourier processing units and schemes, exploring photonic integrable linear/nonlinear components for broadband applications. The grant will fund two PhD students, one postdoc and equipment. ●



Assistant Professor
Eva Arnsjang Christensen
University of Southern Denmark, Department of Chemistry, Bioscience and Environmental Technology
Granted DKK 8.1m
Cellular and Developmental Biology

Novel Imaging Method

New land winnings in microscopy introducing super-resolution techniques makes it possible to visualise how proteins and lipids interact in the mammalian plasma membrane. Recent evidence for membrane lipids organising in nano-domains suggests they have a regulatory role. The project aims to develop new techniques and analysis methods to image position, interaction and transport over the membrane by lipids and proteins. The grant will fund one PhD student, two postdocs and equipment. ●



Assistant Professor
Giorgos Leloudas
University of Copenhagen, Niels Bohr Institute
Granted DKK 9.9m
Universe Sciences

STING: Studying Transients in the Nuclei of Galaxies

STING will study the most extreme objects in the Universe: gigantic black holes located in the centres of galaxies. While these objects are normally invisible, they can be observed when they briefly interact with their environment. By studying such transient phenomena, STING will address questions fundamental for both the physics of black holes and the evolution of galaxies. The project will run at the Niels Bohr Institute and the grant will fund one postdoc and one PhD student. ●



Assistant Professor
Helena Safavi-Hemami
University of Copenhagen, Department of Biology
Granted DKK 9.5m
Molecular and Structural Biology and Biochemistry

Evolution-Guided Discovery of Novel Receptor Ligands from Animal Venoms

Predatory marine cone snails use diverse toxins to capture prey. These conotoxins target receptors in the prey's nervous and sensory system with remarkable selectivity. This project will identify and characterise a large number of novel conotoxins and utilise this data to provide unique insight into the evolution of toxin ligands and their receptor targets. The grant will fund the training of one PhD student, one postdoc, equipment and exchange with international collaborators. ●



Assistant Professor
Ida Moltke
University of Copenhagen, Department of Biology
Granted DKK 5m
Genetics, Genomics, Bioinformatics and Systems Biology

Detecting and investigating natural selection driven by epidemics

The aim of the project is to develop methods to detect evidence of selection favouring disease-protecting genetic variants and to use these methods to investigate if such selection has acted during recent epidemics of diseases like plague and Ebola. The main purpose is to gain insight into the role of epidemics in evolution. However, the project may also offer insight into how the diseases can be prevented in the future. The grant will fund two postdocs and the generation of data. ●



Assistant Professor
Jiwoong Lee
University of Copenhagen, Department of Chemistry
Granted DKK 7m
Synthetic Chemistry and Materials

Water: Divide and Conquer (Split and Purify)

Water is the most important molecule on Earth. All forms of life consist of water, which also provides the essential environment for proliferation of life. However, recent global climate change is seemingly accelerating the unpredictability of secure water supply sources. This project will provide a new Catalytic Desalination Process by Diamine and Carbon Dioxide. The grant will fund two PhD students and one postdoc. ●



Assistant Professor
Kristoffer Szilas
University of Copenhagen, Department of Geosciences and Natural Resource Management
Granted DKK 7.4m
Earth System Science

A partial cumulate origin of the subcontinental lithospheric mantle

The project will investigate the origin of enigmatic olivine-rich rocks (peridotites), which occur as km-scale inclusions within 3600 to 3000 million-year-old continental crust in Greenland. A detailed geochemical study will provide new constraints on the formation of the first continents, as well as on the initiation of plate tectonic processes which is unique to planet Earth. The grant will fund one PhD student and one postdoc, equipment and fieldwork in Greenland. ●



Assistant professor
Lars E. Kristensen
University of Copenhagen
Niels Bohr Institute
Granted DKK 9.4m
Universe Sciences

Unravelling the complex and prebiotic chemistry of star-forming regions

Planetary systems, such as the Solar System, mainly form in large molecular clouds. These clouds show an incredibly rich organic chemistry which may imprint on the forming planets. Through observations with the most powerful radio telescopes on Earth, this project will quantify the role of the external environment on the chemical richness in forming planetary systems, both in our own Milky Way Galaxy and in the distant Universe. The grant will fund the recipient, two PhD students and a postdoc. ●



Associate Professor
Efrén Fernández-Grande
Technical University of Denmark
Department of Electrical Engineering
DKK 7.2m
Electrical engineering,
Electronic engineering,
Information engineering

Large-scale acoustic holography

Sound is central to how we perceive the world and interact with it. Currently, it is not possible to sense sound over large volumes of space. This research is a first-hand attempt in investigating and developing sensing methods to capture the full three-dimensional acoustic field inside the volume of a room. The research has a wide impact on communications, virtual reality, heritage preservation, architecture and the arts. The grant will fund the training of two PhD students and two postdocs. ●



Assistant Professor
María Escudero-Escribano
University of Copenhagen
Department of Chemistry
Granted DKK 10m
Physical and Analytical Chemical Sciences

Atomic ensembles for clean energy and synthesis (AtomSyn)

Electro catalysis is essential for the development of a green economy based on clean energy and sustainable chemical synthesis. The main purpose of AtomSyn is to understand and tune the selectivity of new “dream” electrochemical reactions by atomic-scale control of the geometric structure of the catalyst surface. This approach will allow us to convert greenhouse gases into fuels as well as synthesise high-value chemicals. The grant will fund three PhD students, two postdocs and equipment. ●



Associate Professor
Jonas Peters
University of Copenhagen
Department of Mathematics
DKK 8.2m
Mathematics

Causal Learning in Real World Applications

In causality, we want to understand how a system reacts under interventions (e.g., in gene knock-out experiments). These questions go beyond statistical dependences and cannot be answered by standard methods from statistics. Causal models are stable with respect to changes in the environment, a property that will help us to learn causal structures from data. Together with two PhD students and one postdoc we will apply our research in earth system science, biogeography, and computational biology. ●



Assistant Professor
Markus Ahlers
University of Copenhagen
Niels Bohr Institute
Granted DKK 7.4m
Universe Sciences

Deciphering Cosmic Neutrinos with Multi-Messenger Astronomy

One of the most exciting recent results in astronomy is the detection of high-energy neutrinos by the IceCube Observatory in Antarctica. The origin of these neutrinos is yet unknown. Astrophysical neutrinos are produced along with high-energy photons (gamma rays) via collisions of cosmic rays with gas and radiation. This project aims to identify neutrino sources via innovative IceCube data analyses that are tailored to multi-messenger sources. The grant will fund one PhD student and two postdocs. ●



Associate Professor
Luca Camilli
Technical University of Denmark
Department of Micro- and Nanotechnology
DKK 9.6m
Nanotechnology

Two-dimensional silicon for electronics

In the quest for higher performance electronics, this project will focus on silicene, the only two-dimensional material inherently compatible with current technology. In particular, the project will unveil silicene's electronic properties and establish a robust platform for studying and developing silicene transistors. The grant will fund one postdoc, one PhD student and equipment. ●



Assistant Professor
Martin Nielsen
Technical University of Denmark
Department of Chemistry
Granted DKK 10m
Synthetic Chemistry and Materials

Acceptorless alcohol dehydrogenation in ionic liquid by homogeneous catalysis

The transformation from a polluting energy system using fossil fuels, to an environmentally benign alternative based on sustainable resources, is one of the most important tasks of our time. This project will contribute to reaching this goal by developing catalytic processes that effectively extrude hydrogen from renewable organic material, allowing a viable implementation of a hydrogen based energy system. The grant will fund two PhD students, two postdocs and a lab technician. ●



Associate Professor
Nanna Bjarnholt
University of Copenhagen,
Department of Plant and Environmental Sciences
DKK 10m
Molecular and Structural Biology and Biochemistry

Glutathione transferases in plant specialised metabolism

Plants produce a broad array of ‘specialised metabolites’ that are of great importance in everything from medicine to crop performance. Glutathione transferase enzymes constitute a large and mysterious family in plants, expected to have unresolved functions in specialised metabolism. With this grant a post doc and a PhD student will explore these enzyme functions to increase our understanding of specialised metabolism and provide tools for future optimisation of plant utilisation. ●



Associate Professor
Cristiano Spotti
Aarhus University
Department of Mathematics
DKK 7m
Mathematics

Complex shapes

The research project will investigate metric aspects of the relations between differential and algebraic geometry, two of the most classical branches of Mathematics, which also have significant connections with current Theoretical Physics. We aim to study how notions of best shapes interact with the geometry of complex spaces, giving emphasis to degenerations, models, and to the investigation of “the space of best shapes”. The grant will fund one postdoc and two PhD students. ●



Associate Professor
Vito Foderà
University of Copenhagen
Department of Pharmacy and Analytical Chemistry
DKK 8.6m
Condensed Matter Physics

Protein Superstructures as Smart Biomaterials (ProSmart)

Protein superstructures hold a great potential as new biomaterials in areas such as tissue engineering and drug delivery. This project aims at unravelling the role of intermolecular interactions in controlling the growth, structure and properties of protein superstructures. The project will provide a novel platform for the design and realisation of tailored protein-based materials. The grant will fund two postdocs, one PhD student and equipment. ●