# **18 VILLUM Young** Investigators



Assistant Professor **Giorgos Leloudas** 

University of Copenhagen, Niels Bohr Institute Granted DKK 9.9m

Universe Sciences

Assistant Professor

Helena

## **Evolution-Guided Discovery of Novel Receptor Ligands** from Animal Venoms

Safavi-Hemami University of Copenhagen, Department of Biology

Granted DKK 9.5m Molecular and Structural Biology and Biochemistry

#### Assistant Professor Ida Moltke

University of Copenhagen, Department of Biology

Granted DKK 5m Genetics, Genomics, **Bioinformatics and Systems** 



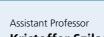
The project will investigate the origin of enigmatic olivine-rich rocks (peridotites), which occur as km-scale inclusions within 3600 to 3000 million-year-old continental crust in Greenland. A detailed geochemical study will provide new constraints on the formation of the first continents, as well as 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.

and Natural Resource Management

Granted DKK 7.4m Earth System Science



Biology



University of Copenhagen, Department of Geosciences



# **Kristoffer Szilas**



University of Copenhagen, Department of Chemistry Granted DKK 7m

## Assistant Professor Eva Arnspang

Department of Chemistry, Bioscience and Environmental Technology

## Granted DKK 8.1m

Cellular and Developmental Biology

New land winnings in microscopy introducing super-resolution techniques makes it possible to visualise how proteins and lipids interact in the mammalian University of Southern Denmark, 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.

Christensen

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

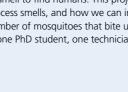
Malaria is a disease that affects half of the world's population and causes more than 400,000 deaths per year. Malaria is transmitted by mosquitoes that use their sense of smell to find humans. This project will unravel how the mosquitoes detect and process smells, and how we can interfere with their 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.

## **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.



**Novel Imaging Method** 







# Pengyu Guan Granted DKK 10m



Postdoc

Electrical engineering, Electronic engineering, Information engineering

#### 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 guestions 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.

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.

#### 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.

### 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.

#### A partial cumulate origin of the subcontinental lithospheric mantle



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.



## Assistant Professor Maria 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.



## 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.



## 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 **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 Efren

Fernandez-Grande Technical University of Denmark Department of Electrical

Engineering DKK 7.2m

Electrical engineering, Electronic engineering, Information engineering

#### Associate Professor Jonas Peters

University of Copenhagen Department of Mathematics

**DKK 8.2m** 

Mathematics

## Associate Professor

Luca Camilli Technical University of Denmark

Department of Micro- and Nanotechnology **DKK 9.6m** 

Nanotechnology

## Associate Professor

Nanna Bjarnholt University of Copenhagen, Department of Plant and Environmental Sciences

**DKK 10m** 

Molecular and Structural Biology and Biochemistry

## Associate Professor Vito Foderà

University of Copenhagen Department of Pharmacy and Analytical Chemistry DKK 8.6m

Condensed Matter Physics



#### 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.

#### 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.

#### Two-dimensional silicon for electronics

In the guest 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.

#### 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.

#### 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.