

## MISSION

The Niels Bohr International Academy (NBIA) is a center of excellence for theoretical physics and neighboring disciplines at the Niels Bohr Institute. Our mission is to attract the best and the brightest to Denmark and provide the environment to foster curiosity-driven research to enable breakthrough science in theoretical particle physics, gravitational physics & astrophysics, theoretical astrophysics, biophysics & soft matter, particle astrophysics, and quantum sciences.

## MEMBERS

NBIA staff currently includes about 35 faculty members, 35 postdocs, 35 PhD students, and 20 MSc students. A significant number of NBIA Assistant Professors and Associate Professors have started new research groups in their disciplines by attracting prestigious national and European grants. NBIA has a steady stream of international visitors who participate actively in daily activities collaborating with NBIA members and giving seminars. NBIA continually hosts visiting professors from all over the world.

## ACTIVITIES

NBIA hosts a weekly colloquium and around ten workshops, symposia, and PhD schools a year. We also engage the public with several activities, including an annual series of lectures with the Danish Open University. NBIA is a stimulating environment for students!

## FIND YOUR SUPERVISOR

### THEORETICAL & GRAVITATIONAL WAVE ASTROPHYSICS

Martin Pessah • Johan Samsing • Sarah Pearson

### PARTICLE ASTROPHYSICS

Irene Tamborra • Markus Ahlers • Mauricio Bustamante • Jason Koskinen • Oleg Ruchayskiy • Shashank Shalgar

### GRAVITATIONAL PHYSICS

Emil Bjerrum-Bohr • Vitor Cardoso • Gang Chen • Poul Henrik Damgaard • Jose María Ezquiaga • Troels Harmark • Zhengwen Liu • Andrés Luna Godoy • Niels Obers • Maarten van de Meent

### THEORETICAL HIGH-ENERGY PHYSICS

Troels Harmark • Charlotte Kristjansen • Niels Obers

### BIOPHYSICS & SOFT MATTER

Amin Doostmohammadi • Weria Pezeshkian • Martin Cramer Pedersen • Karel Proesmans • Kristian Thijssen • Mary Wood

### QUANTUM SCIENCES

Klaus Mølmer

Find their e-mails at:

[nbia.nbi.ku.dk/members](http://nbia.nbi.ku.dk/members)

# THE NIELS BOHR INTERNATIONAL ACADEMY



The NBIA invites prospective MSc students to an informal event

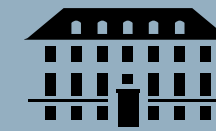
## MSc Projects @ NBIA

on October 8, 2024

Join us to learn more about our diverse research program and the possibilities to carry out your MSc project at NBIA.

For registration and further information please visit:

[www.nbia.nbi.ku.dk/mscday2024](http://www.nbia.nbi.ku.dk/mscday2024)



The Niels Bohr  
International Academy

## PARTICLE ASTROPHYSICS

Research in this field lies at the rich interface between astrophysics, cosmology, and fundamental physics. We are particularly interested in exploring the Universe through cosmic rays, photons, neutrinos, and gravitational waves. A strong focus at NBIA lies on neutrino astrophysics. We study the role of neutrinos in powering sources, their use as powerful probes of hidden source interiors, and seek to unveil the fundamental properties of neutrinos from studying their interactions in dense environments and on cosmic backgrounds, and from their detection in neutrino telescopes.

## THEORETICAL & GRAVITATIONAL WAVE ASTROPHYSICS

This line of research spans several topics using a broad range of theoretical and numerical tools. Our current interests encompass accretion flows around stars and compact objects, the formation of black hole binary systems and subsequent mergers, the interstellar medium, the intergalactic medium in galaxy clusters, dark matter, galactic dynamics, and the early evolution of our solar system and exoplanetary systems. We have access to powerful computer resources and interact regularly with the Computational Astrophysics Group.

## QUANTUM SCIENCES

Tremendous developments have happened in the last decade in the field of quantum computation. The broadly defined field of Quantum Sciences has ramifications in a number of different sub-fields, from Quantum Mathematics, Quantum Optics, Quantum Information Theory, to Condensed Matter Physics. At NBIA we aim to establish links between the Novo Nordisk Foundation Quantum Computing Program (NQCP), the NBI Quantum Optics groups and the NBI Condensed Matter theory group.

## THEORETICAL HIGH-ENERGY PHYSICS

The idea of particles and strings being related by holography has led to amazing new insights in many different fields ranging from black hole physics and quantum gravity to CERN experiments and the strong coupling behavior of condensed matter systems. In theoretical high-energy physics we study all of these topics. In particular, we develop new mathematical tools for scattering amplitudes, we investigate extensions and non-relativistic limits of general relativity and holography, and we develop exact methods to solve conformal field theories with boundaries.

## GRAVITATIONAL PHYSICS

Measurements of gravitational waves by LIGO/Virgo and forthcoming detectors deliver compelling opportunities for testing theories of fundamental physics, including the regime of strong gravity as probed by black holes just before merging. To this end, it helps to use ideas and methods from quantum field theory and scattering amplitudes to produce new theoretical precision. Other queries are more phenomenological. Are black holes the simplest possible macroscopic objects? Do event horizons exist? Can gravitational waves convey information about inaccessible dark matter in the Universe?

## BIOPHYSICS & SOFT MATTER

The NBIA Biophysics and Soft Matter Division consists of five research groups that explore a diverse range of soft matter and biological systems, theoretically, computationally, and experimentally. Examples include studying how active matter self-organizes collectively, the fundamental constraint in non-equilibrium processes, and individual and collective behavior of biomolecules. The focus is on basic science and technology, addressing challenges in society such as understanding diseases, engineering targeted drug delivery vehicles, and using biological systems for renewable energy solutions.