## 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 and soft matter, particle astrophysics, and quantum sciences.

## MEMBERS

NBIA staff currently includes about 15 faculty members, 20 postdocs, 15 PhD students, and 15 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 and PhD schools every 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 ASTROPHYSICS

- Martin Pessah
- Andrew Chael

### PARTICLE ASTROPHYSICS

- Irene Tamborra
- Mauricio Bustamante

### GRAVITATIONAL PHYSICS

- Johan Samsing
- Emil Bjerrum-Bohr
- Gang Chen
- Poul Henrik Damgaard
- Andrés Luna Godoy

### THEORETICAL HIGH-ENERGY PHYSICS

- Charlotte Kristjansen
- Emil Bjerrum-Bohr

### BIOPHYSICS & SOFT MATTER

- Amin Doostmohammadi
- Weria Pezeshkian
- Martin Cramer Pedersen
- Kristian Thijssen
- Mary Wood
- Farzan Vafa

Find their e-mails at:

**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 21, 2025

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/mscday2025**

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 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

New measurements of gravitational waves provide fantastic opportunities for comparing the spectacular predictions of general relativity regarding black holes with accurate data. Brand-new ideas on how to apply modern methods from quantum field theory and scattering amplitudes are now used to solve Einstein's field equations to very high precision. The field is rapidly evolving, and there are many opportunities to develop new directions in this competitive field. Applications to astrophysical problems such as the rupture of neutron stars by close encounters with black holes are also possible.

## 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.