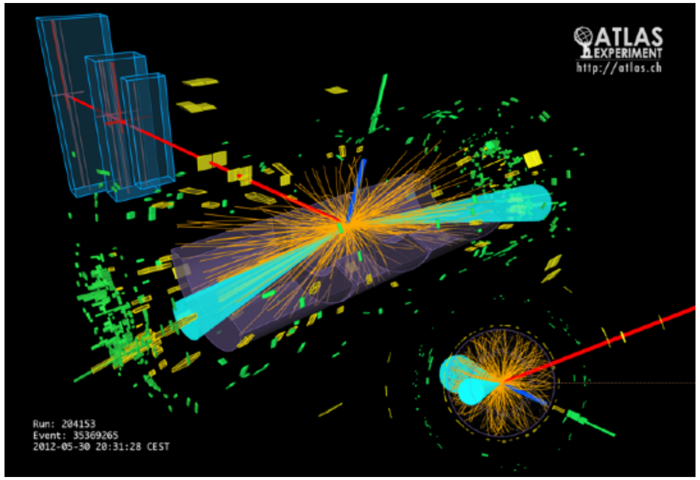

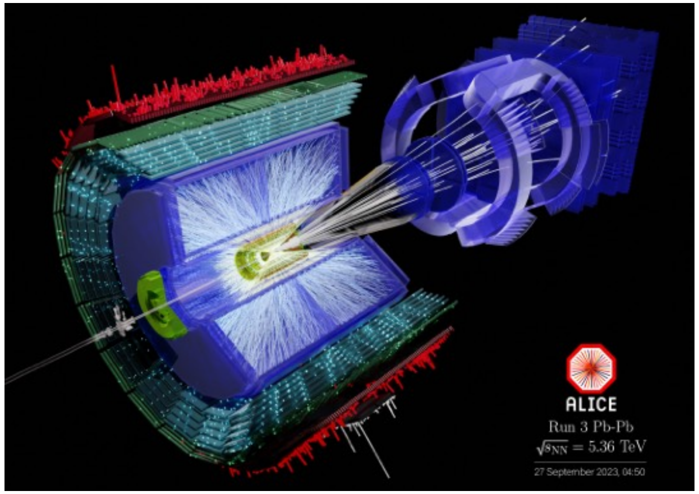

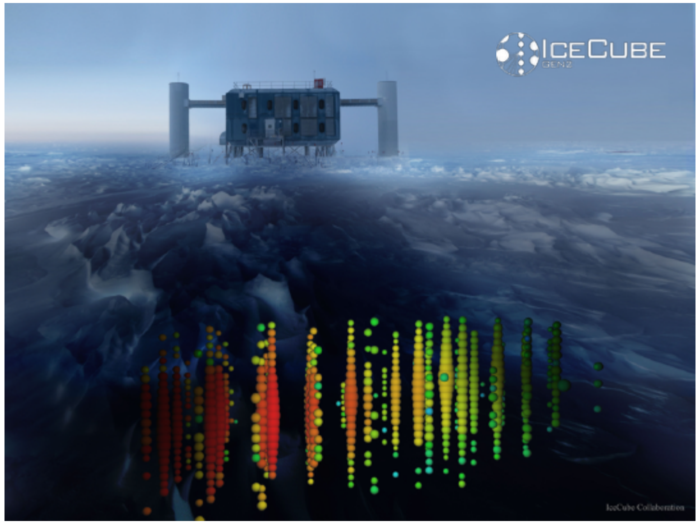

The Subatomic Physics Group at NBI investigates the fundamental properties of matter and its constituents revealed by high-energy particle interactions. We are part of the high-energy experiments ATLAS, ALICE and (soon) SHiP located at CERN, the European laboratory for atom research in Geneva, Switzerland, that hosts the Large Hadron Collider (LHC). We are also part of the IceCube experiment at the South Pole that observes the mysterious neutrinos produced by energetic particle collisions in the atmosphere or throughout the Universe. Our groups are analyzing these data with the help of modern machine-learning tools and phenomenological models. We are strongly involved in the design and development of experimental upgrades at CERN (FoCal, HL-LHC & FCC) and the IceCube-Upgrade.

Contacts

Markus Ahlers	markus.ahlers@nbi.ku.dk
Ian Bearden	bearden@nbi.ku.dk
Alessandra Camplani	a.camplani@nbi.ku.dk
Mogens Dam	dam@nbi.dk
Jens Jørgen Gaardhøje	gardhoje@nbi.ku.dk
Kristjan H. Gulbrandsen	gulbrand@nbi.ku.dk
Jørgen Beck Hansen	beck@nbi.ku.dk
D. Jason Koskinen	koskinen@nbi.ku.dk
Børge Svane Nielsen	borge@nbi.ku.dk
Troels Christian Petersen	petersen@nbi.ku.dk
Oleg Ruchayskiy	oleg.ruchayskiy@nbi.ku.dk
Craig Wiglesworth	wigleswt@nbi.ku.dk
You Zhou	you.zhou@nbi.ku.dk

NBB, tower I, 3rd floor, Jagtvej 155A

Subatomic Physics Group

Learn more about our activities and range of BSc & MSc projects on:

November 29
15:00 - 17:00

For registration, please visit:
nbi.ku.dk/subatomic_projects_2024

Niels Bohr Building tower I, 3rd floor

ALICE Experiment

The ALICE detector exploits the unique physics potential of nucleus-nucleus collisions at LHC energies. Our aim is to study the physics of strongly interacting matter at the highest energy densities. Under these conditions, an extreme phase of matter - the quark-gluon plasma - is formed. The Universe is thought to have been in such a primordial state for the first few millionths of a second after the Big Bang. The NBI group is leading studies of collective flow effects in collisions and in the Forward Calorimeter (FoCal) upgrade.

ATLAS Experiment

The main goal of the ATLAS detector is to discover new properties of elementary particles and forces in the head-on collisions of protons of extraordinarily high energy. The ATLAS group at the Niels Bohr Institute is active in several areas of the experiment: data analysis and theoretical interpretations of the results; silicon detector, trigger and data acquisition system design upgrades for the High-Luminosity LHC (HL-LHC); transition radiation detector operation; machine-learning tools in new physics searches.

IceCube Experiment

The IceCube experiment is the world's largest and most sensitive telescope for high-energy neutrinos. IceCube members at NBI have a broad science portfolio: from searches for high-energy neutrinos from the most violent astrophysical phenomena in the Universe to probes of fundamental neutrino physics revealed in neutrino flavour oscillations. We are leading the simulation development of the near-future IceCube Upgrade and actively work on improved neutrino event reconstructions using modern machine-learning tools.

Particle & Astroparticle Phenomenology

The scientific knowledge generally advances in two ways: "top-down" and "bottom-up." Phenomenological particle physics is a bottom-up theoretical research. Our group is searching for new particles at both accelerator and cosmic frontiers. We explore the hypothesis that new particles are light, and very feebly interacting. In particular we search for heavy neutral leptons, such as sterile neutrinos - particles that may be responsible for some (maybe even all) beyond-the-Standard-Model phenomena.

Future Circular Collider (FCC)

The NBI group is active in ongoing design studies of the FCC, a next-generation high-performance collider at CERN following the LHC. A new tunnel of 91 km circumference would initially house the FCC-ee, an electron–positron collider for precision measurements offering a 15-year research programme from the mid-2040s. A second machine, the FCC-hh, installed in the same tunnel, aims to reach collision energies of 100 TeV, colliding protons and also heavy-ions, and running until the end of the 21st century.

SHiP Experiment

SHiP is a future CERN experiment to search for "hidden" particles as predicted by a large number of Standard Model extensions that are capable of explaining, for instance, dark matter, neutrino oscillations, and the origin of the baryon asymmetry in the Universe. The experiment is designed to search for any type of feebly interacting long-lived particles, among which are found heavy neutral leptons, dark photons, dark scalars, axion-like particles, light supersymmetric particles, as well as certain types of dark matter.