

NBIA NEWSLETTER

NEWS IN BRIEF

MOU WITH WEIZMANN

The NBIA and Weizmann Institute of Science have signed a Memorandum of Understanding to strengthen scientific collaborations via the exchange of scholars and joint workshops. A first joint workshop will be held in Copenhagen in 2015.

FRONT PAGE CERN NEWS

Based on ideas put forward by NBIA scientist Ciaran Williams, and John Campbell and Keith Ellis from Fermilab, the limits of the Higgs particle have now been reduced by a factor of 200 from its original first rough bound of 3 GeV. This remarkable development was front-page news at CERN earlier this year.

YOUNG INVESTIGATOR AWARD

Michael Kastoryano has received a Young Investigator Award from the Villum Foundation to start a new group and work at the forefront of quantum information theory.

NEW COMPUTER CLUSTER

With the support of the EU and the Villum Foundation, the Theoretical Astrophysics Group has acquired the largest computer clusters dedicated to astrophysics in Scandinavia.

UPCOMING WORKSHOPS

- The Early Life of Stellar Clusters: Formation and Dynamics (November 3-7, 2014)
- Fourth Annual NBIA Workshop on ESS Science (Nov. 10-14, 2014)
- Nordic Winter School on Cosmology and Particle Physics (Jan 2-7, 2015)
- Cosmology and astro-particle physics: from the LHC to PLANCK (April 13-15, 2015)

www.nbia.dk/workshops

Niels Bohr International Academy
Niels Bohr Institute
Blegdamsvej 17, DK-2100 CPH
Phone no. +45 3045 0072



The Niels Bohr
International Academy

A MESSAGE FROM THE DIRECTOR

Poul Henrik Damgaard

The Niels Bohr International Academy (NBIA) is an independent center of excellence hosted by the Niels Bohr Institute. Our mission is to attract the best and the brightest to Denmark and provide the environment to enable breakthrough research in the physical sciences and mathematics. In its few years of existence, the NBIA has been involved in attracting two renowned scientists to Copenhagen: Professor Charles Marcus, who is Villum Kann Rasmussen Professor, and now also Director of Center for Quantum Devices, and Niels Bohr Professor Subir Sarkar, who is in the process of starting up an astroparticle physics group at NBIA. The NBIA has presently a staff of twelve young Assistant Professors and Associate Professors, several of whom have started new research groups in their disciplines by attracting prestigious national and European grants. The NBIA also hosts twelve post-docs and around 18 PhD-students and M.Sc-students. Typically one Visiting Professor is present at the NBIA at any given time, and we have a steady stream of international visitors, who are invited to give seminars or collaborate with NBIA members. With this Newsletter, which we initially aim to send out twice a year, we wish to provide information about our recent and future activities. The NBIA hosts around ten workshops, symposia and PhD-schools every year. Our doors are always open for these activities, as long as there is space in the room! We also reach out to the public with a number of activities, including an annual series of public lectures in collaboration with the Danish Open University (Folkeuniversitetet). We wish to benefit the surrounding community, and hope that this Newsletter will bring more attention to activities at the NBIA that may be of wider interest. If you are not already on our email list and you are interested in subscribing please contact the NBIA Coordinator, Anette Studsgård - studsgaard@nbi.ku.dk.



RECENT EVENTS AT NBIA

Raymond and Beverly Sackler Distinguished Lecture

- Michael B. Green (Cambridge) "The Scope of String Theory" (Aug. 22)

Workshops

- Current Themes in High Energy Physics and Cosmology (Aug. 25-29)
- APCTP-NBIA Workshop on Cosmology and Astroparticle Physics (Aug. 18-23)
- 3rd ICM Theory and Computation Workshop (Aug. 11-14)
- Non-ideal MHD, Stability, and Dissipation in Protoplanetary Disks (Aug. 4-8)
- Quantum Effects in Low-Dimensional Systems (June 29 - July 4)
- Neutrinos Underground & in the Heavens, Elite PhD-course (June 23-27)
- Facing Strong Dynamics (June 2-6)

OPEN POSITIONS AT NBIA

www.nbia.dk/join

- Associate Professorship in Theoretical Astrophysics - Apply by Nov. 15, 2014
- Assistant Professorship in Theoretical Astrophysics - Apply by Nov. 15, 2014
- Postdoctoral Fellowships in Theoretical Astrophysics - Apply by Nov. 15, 2014
- Postdoctoral Fellowships in High Energy Physics - Apply by Dec 1, 2014
- Postdoctoral Fellowships in Condensed Matter Theory - Apply by Dec. 12, 2014

RESEARCH HIGHLIGHT on Theoretical Astrophysics

Martin Pessah

The most abundant form of visible matter in the Universe is in the plasma state, which consists of ions and electrons. Understanding the Universe as we observe it involves unraveling the dynamics of the ionized gas subject to gravitational and electromagnetic fields. These are the basic physical ingredients that dictate the formation and evolution of all celestial objects, from planets to stars and black holes, and from galaxies to galaxy clusters. The equations describing these processes are well known, however, because of the immense dynamic range involved, solving the problems they pose is a formidable task, usually involving a strong synergy between theoretical developments, numerical techniques, and computational methods. The Theoretical Astrophysics Group at the NBIA strives for a comprehensive approach to address these problems in astrophysical fluid dynamics and magnetohydrodynamics. In collaboration with the Computational Astrophysics Group at the Niels Bohr Institute, and thanks to the valuable support of the European Research Council and the Villum Foundation, we have recently acquired some of the largest computer resources dedicated to astrophysics in Scandinavia. These consist of a new general-purpose cluster with more than 3000 cores, including 80 Xeon-Phi cards, 120 GPUs, almost a petabyte of storage, and powerful dedicated data analysis servers. The stimulating academic environment of the Niels Bohr International Academy, coupled to these powerful resources, allows the group to work at the international forefront addressing the complex dynamical processes that shape the Universe as we see it.



NEWS FROM THE NIELS BOHR INTERNATIONAL ACADEMY

These public lectures will be held at the historic Auditorium A at the Niels Bohr Institute, 14/11/14-8/12/14, 5.15pm-7.00pm.

The lectures will be given by five NBIA members presenting different topics in modern theoretical physics. The purpose will be to give a glimpse of the questions, ideas, and approaches which are right now at the scientific forefront.

1. Revolutions in our understanding of the laws of nature (J. Bourjaily, 14/11)
2. The Higgs particle was found - what is next? (C. Hartmann, 21/11)
3. How we think the planets were born (O. Gressel, 28/11)
4. The earliest picture of the Universe (A. Ben-David, 1/12)
5. Discovering dark matter (S. Sarkar, 8/12)

NEW NBIA MEMBERS IN 2014



Michael Trott joins the NBIA and Discovery Center as an Associate Professor in theoretical particle physics. He works on the phenomenology of particle physics and is one of the leading figures in understanding how physics beyond the Standard Model can represent itself through the Higgs sector.



Jacob Bourjaily joins the NBIA and Discovery Center as Assistant Professor in theoretical particle physics. His work is at the forefront of a program to develop a new formulation of quantum field theory, which promises to greatly improve our ability to make predictions for experiment, and has deep connections to active fields in mathematics.

Michael Kastoryano joins the NBIA as postdoc with a Villum Young Investigator grant and will build a quantum information group as part of a larger operation to make Copenhagen a pole of excellence in this field. He works on quantum information and has recently become interested in topological order and topological computation.



Kjetil Hals joins the NBIA and the Center for Quantum Devices as a new postdoc in theoretical condensed matter physics. His main research area is spintronics and his research is currently focused on helical spin textures formed in one-dimensional electronic systems.



New students at NBIA

This year, several students have joined us: **Thomas Berlok** (PhD, theoretical astrophysics), **Laure Berthier** (PhD, particle physics), **Jeppé Trøst Nielsen** (PhD, astroparticle physics), **Alexander Andersen** (MSc, particle physics), **Christian Brønnum-Hansen** (MSc, particle physics), **Christian Baadsgaard Jepsen** (MSc, particle physics), **Emil Cortes André** (MSc, particle physics), **Asta Heinesen** (MSc, astroparticle physics).



Anette Luff Studsgård joins NBIA as administrative coordinator. She graduated with a Bachelor of Arts in Linguistics and a Masters in Cognitive Science. Anette will be assisting the members of the Academy in running events, planning and coordinating activities, and managing resources to ensure a productive environment.