

# NBIA NEWSLETTER

## NEWS IN BRIEF

### FEENBERG MEDAL

The Feenberg Medal for 2015 has been awarded to Chris Pethick for his work on ultracold atomic gases, liquid helium, and dense matter in neutron stars and stellar collapse.

### JOHANN WEMPE AWARD

Oliver Gressel has been recognized as an outstanding young scientist with the Johann Wempe award by the Leibniz-Institut für Astrophysik at Potsdam in Germany.

### PUBLIC LECTURES AT NBIA

Thanks to the tremendous success we have had in previous years, we are proud to announce that NBIA is expanding the program of public lectures that we regularly organize with Folkeuniversitetet. The talks will be held at the historic Auditorium A at the Niels Bohr Institute, 29/9/15-29/10/15, 5.15pm-7.00pm. Sign up for courses 1066 or 1067 at <http://www.fukbh.dk>. More information is available on the next page.

## A MESSAGE FROM THE DIRECTOR

**Poul Henrik Damgaard**

Earlier this year, the NBIA reached an important landmark with the establishment of a Director's Council composed by distinguished members of Danish society. The members of the Council, Connie Hedegaard, Niels Due Jensen, Per Magid, Bjørn Nørgaard, Lars Kann Rasmussen, and Michael Rasmussen, held the founding meeting on May 27, 2015. Just a few weeks ago the Council held a second, joint meeting with representatives of the Scientific Advisory Board, which is composed by Andrew D. Jackson (Chairman, Niels Bohr Institute), David Gross (Kavli Institute for Theoretical Physics at Santa Barbara), Charles Marcus (Niels Bohr Institute), Itamar Procaccia (Weizmann Institute), Herbert Spohn (Technical University of Munich), Paul Steinhardt (Princeton University), and Frank Wilczek (MIT). The support and advice we receive from these two Boards is incredibly vital to us, and we are most appreciative of their willingness to get involved. We are looking forward to working together in order to consolidate the NBIA as a beacon of academic excellence in Europe.

The NBIA continues expanding and advancing its tradition of attracting the best and the brightest. New post-docs are arriving in these days, and from January 1, 2016 we will also be joined by the new Knud Højgaard Assistant Professor Irene Tamborra, who works on neutrino astrophysics. One more NBIA member has received a tenured position at the Niels Bohr Institute: Emil Bjerrum-Bohr was appointed Associate Professor in April 2015. Emil will give one of the popular lectures in the series that starts October 1, and where you will have a chance to hear about some of his current research as well as that of other members of the NBIA. Finally, this Fall two NBIA members have received prestigious awards, Chris Pethick obtained the Feenberg Medal and Oliver Gressel received the Johann Wempe award given by AIP, Potsdam, DE.

## THE VIEW FROM THE BOARD

**Andrew D. Jackson**

As promised in the last newsletter, an NBIA Director's Council has now been formed and has held its first meetings. The photo below is from its recent joint meeting with the NBIA Board. The Director's Council has a remarkably broad composition. With innovative leaders of industry, the arts, and European politics, the Director's Council is representative of the best of Denmark and a worthy supplement to our Scientific Advisory Board. (See the NBIA homepage for brief CVs.) The goals of the Director's Council are to work with the Board and NBIA staff to improve the visibility of the NBIA in Denmark and to help us attain a greater degree of financial stability.



## UPCOMING EVENTS AT NBIA

### Workshops & PhD Schools

- Fifth Annual NBIA Workshop-School on ESS Science (November 9-13)
- Solar Storm Early Forecasting (November 9-11)
- Holography: Entangled, Applied, and Generalized (October 26-30)
- IceCube Collaboration Meeting 2015 (October 10-17)

Niels Bohr International Academy  
Niels Bohr Institute  
Blegdamsvej 17, DK-2100 CPH

Coordinator: Anette Luff Studsgård  
+45 3533 7870 - [studsgaard@nbi.dk](mailto:studsgaard@nbi.dk)



The Niels Bohr  
International Academy

## RESEARCH HIGHLIGHT on Condensed Matter Physics

Mark Rudner

If the twentieth century was about discovering the basic laws of quantum mechanics, then the twenty first century will be about pushing them to new frontiers, and learning how to control them. In the past decade, condensed matter systems have been predicted to host wide range of intriguing quantum phenomena, including the emergence of new types of exotic particles with properties that are both intellectually interesting and potentially useful, for example in classical and quantum information processing. Despite several major triumphs, finding materials or physical systems where many of these exciting phenomena can be realized remains a major challenge. Meanwhile, experimentalists have made impressive progress in developing new tools for controlling a variety of quantum systems using laser and microwave driving fields. With these advances as inspiration, one of the major research themes within the Condensed Matter Theory group at NBIA is to seek out novel means of *dynamically controlling* many body systems in order to gain access to these previously untappable resources – to make lemonade from nature's lemons. We are in particular investigating the new types of non-equilibrium phases of matter and topological phenomena that can be realized through time-dependent driving. This work both brings new fundamental insight into the dynamics of quantum many-body systems driven out of equilibrium, and will hopefully provide new routes for harnessing the power of these systems for applications. We thank the Villum Foundation and the EU's Marie Curie Fellowship program for generously supporting our endeavors.



## NEWS FROM THE NIELS BOHR INTERNATIONAL ACADEMY

These public lectures are organized jointly with Folkeuniversitetet and will be held at the Niels Bohr Institute in the historic Auditorium A, from 5.15pm to 7.00pm. The talks on various topics in modern theoretical physics will be given in English by NBIA members on two different dates. They will give you a glimpse of the questions, ideas and approaches that are right now at the scientific forefront. Sign up for courses 1066 or 1067 at <http://www.fukbh.dk>

1. Quantum Gravity (Emil Bjerrum-Bohr, 29/9 & 1/10)
2. Black Holes and Entropy (Cindy Keeler, 6/10 & 8/10)
3. The Dark Energy of the Universe (James Cline, 13/10 & 15/10)
4. Plasmas and the Sun-Earth Connection (Jacob Frederiksen, 20 & 22/10)
5. Quantum Information Theory (Michael Kastoryano, 27/10 & 29/10)

## NEW NBIA MEMBERS AND VISITORS

This Fall, NBIA is joined by several new members, as well as visitors **Changyong Liu** (1.6.15-31.5.15), **Roya Mohayaee**, (1.9.15-31.8.15), and **Jacques Colin** (1.9.15-31.8.16), and a number of new students **Meera Machado** (PhD), **Gitte Elgaard** (MSc), **Janet Raner** (MSc), and **Mikkel Bjørn** (MSc).



**Christian Brinch** studies the origin and distribution of water molecules in protoplanetary disks as well as the gas kinematics throughout the various stages of the star formation process. He is interested in contrasting theoretical models with observations.



**Jim Cline** James Cline is a visiting professor from McGill University (Montreal) during Fall 2015. His interests include astroparticle and collider phenomenology, models of dark matter, and the baryon asymmetry of the universe.



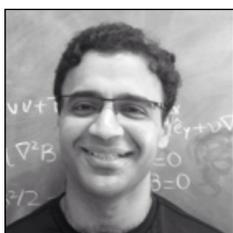
**Yuri Fujii** joins the NBIA as a postdoc. She received her PhD at Nagoya University in 2015. Her research focuses on modeling protoplanetary and circumplanetary disks. She is also interested in the formation of satellites in exoplanetary systems.



**Tobias Heinemann** joins the NBIA as an Associate Professor after postdoctoral experiences at IAS, Berkeley and KITP. His research interests span a wide spectrum of problems in astrophysical fluid dynamics, dynamo theory and plasma astrophysics.



**Yun Jiang** joins the NBIA as a postdoc. He obtained his Ph.D. at U.C. Davis in 2015. His research focuses on New Physics beyond the Standard Model, including Higgs physics and dark matter. He is interested in phenomenology and model building.



**Farrukh Nauman** joins the NBIA as a postdoc. He received his PhD from the University of Rochester in 2015. His research focuses on understanding the physical mechanisms that drive the generation of large scale magnetic fields in astrophysics.



**Will Shepherd** works on HEP phenomenology, tagging techniques for boosted hadronic resonances, collider search design, and understanding the complementarity between different searches for new physics in the dark matter and electroweak sectors.