

# NEWSLETTER

*CUI – Graduate School*

No.7, December 2014

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## Editorial

*When assembling the material for this newsletter we ourselves were surprised by the impact and appreciation of the scientific work performed within CUI. In the past few months no less than 8 investigators of our cluster have received international and national prestigious awards. This adds to the substantial number of grants received by the European Research Council in the previous and current application rounds. We feel, it is an overall very impressive demonstration of the outstanding science performed within CUI, which should substantially add to its visibility worldwide.*

*We wish you a merry Christmas and a good start into the New Year 2015!*

*Antonio Negretti and Peter Schmelcher*

## The Hamburg Prize for Theoretical Physics 2014

The recipient of the Hamburg Prize for Theoretical Physics 2014 is Prof. Antoine Georges of the Collège de France, École Polytechnique, and University of Geneva. The Joachim Herz Stiftung and CUI awarded the prize jointly on November 13, 2014.

Prof. Antoine Georges developed novel methods to describe strongly correlated systems. These methods enable to better understand how the properties of materials (e.g., the electric conductivity) are influenced by their structure and by the interaction between the electrons.

Prof. Antoine Georges as well as our excellence cluster are looking forward to his stay in Hamburg, where lectures, seminars, and discussions with scientists at UHH will take place. Indeed, his expertise will be very valuable for our centre, as some of the research activities of CUI aim at a better understanding of high-temperature superconductivity and strongly

correlated ultracold gases.

We congratulate him and look forward to hosting him soon in Hamburg.

## Winter school

Our PhD students have organized their second winter school of CUI at the Tagungscenter Weissenhäuser Strand (Baltic Sea, Germany). The school took place from December 1 to December 5, 2014.

The scientific programme covered the following topics: non-linear optics, molecular machines in biology, magnetism, static and dynamic properties of ferromagnetic nanostructures. Besides the lectures, there were presentations by the PhD students.

In addition to the scientific programme, they have also invited two experts on gender studies and on social and ethical consequences of new technological developments.

Both speakers from CUI as well as international scientists have been invited to contribute to the programme. There were many oppor-

tunities for the PhD students and postdocs to interact with the invited speakers and discuss about their own research activities. Interestingly, they organised a discussion forum, where the PhD students had to identify connections between their specific research topics, also in order to better understand each others language.

## Graduate Days

From March 9 to March 11 the Graduate Days of CUI will take place at the Bahrenfeld campus.

This year the course programme is very rich with six scientific courses and four soft-skill courses. Additionally, each evening at 6 pm in the CFEL lecture hall there will be a presentation: A special talk by Dr. Pattard, managing editor of the American Physical Society, a scientific colloquium by Prof. Imamoglu (ETH Zurich, Switzerland), and an industry presentation by Dr. Becken of the Rodenstock GmbH (Munich, Germany).

Further information on the pro-

## Personalia

Prof. Henry Chapman (CFEL) has been awarded the Gottfried Wilhelm Leibniz Prize 2015 by the German Research Foundation for his pioneering work in the development of femtosecond crystallography.

Prof. R. J. Dwayne Miller (MPSD) has received the E. Bright Wilson Award for Spectroscopy from the American Chemical Society for the development of femtosecond electron diffraction and coherent spectroscopic methods for the direct observation and control of chemical dynamics at the atomic level.

Prof. Andrea Cavalleri (MPSD) has received the Max Born Prize 2015 for his time-resolved measurements of photon-induced phase transitions in correlated electronic materials.

Prof. Robin Santra (CFEL) and Prof. Klaus Sengstock (ILP) have been nominated Fellows of the American Physical Society: The former for his theory work on light-matter interactions, while the latter for his experimental studies on quantum gases especially in their application to quantum simulation.

Prof. Horst Weller (IPC) has been listed among the world's most influential scientific minds, as compiled by the publisher Thomson Reuters.

Dr. Melanie Schnell (MPSD) has been awarded a Starting Grant of the European Research Council. The project consists in combining broadband microwave spectroscopy and observation data from next generation telescope arrays to investigate chemical processes in the universe.

Dr. Christian Kränkel (ILP) has been recognized as one of the twenty recipients of the inaugural Optical Society of America outstanding reviewer awards.

We congratulate all of the awardees!



Henry Chapman



Dwayne Miller



Andrea Cavalleri



Robin Santra



Klaus Sengstock



Horst Weller



Melanie Schnell



Christian Kränkel

gramme and the registration can be found at the webpage of the Graduate School of CUI.

## Research highlights

The CUI PhD student Salah Awel, who is working in the group of Prof. H. Chapman, and the assistant professor Richard Kirian of the physics department of Arizona State University, who has worked in the group of Prof. J. Küpper, are collaborating with a research group at the Australian National University in order to develop a precision-sample-delivery method for femtosecond diffractive imaging experiments. Their novel approach uses thermal and radiation pressure forces induced by the interaction of a counter-propagating hollow Bessel-like laser beam of high aspect ratio [Eckerskorn, Opt. Exp. 21, 30492 (2013)] against an aerodynamically focused stream of microparticles in a low-pressure environment. The goal is to focus the stream of particles in free flight as they exit the aerosol injector in such a way as to transversely confine them to a small spot, which could dramatically improve the efficiency of diffractive imaging

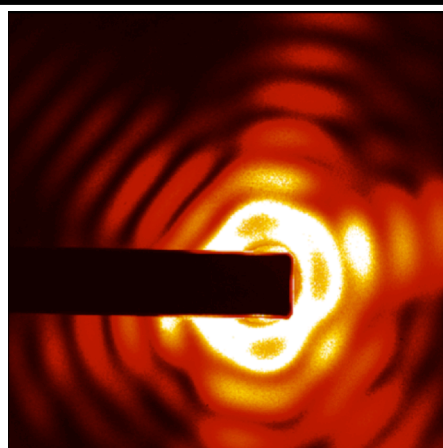


Fig. 1: A single-shot coherent diffraction pattern from a granulovirus particle (size 160 nm x 300 nm) captured in flight at the FLASH facility.

experiments using X-ray FEL pulses.

So far, as a proof of principle, they have demonstrated the deflection of a beam of 2- $\mu\text{m}$ -diameter latex particles by more than  $0.11^\circ$  from its original path using a counter-propagating 2 W Gaussian laser beam. The particle velocity in the beam was 20 m/s. In a recent experiment at FLASH they attempted to guide virus particles using a 5 W laser beam and they also manage to record coherent diffraction patterns of viruses in flight (see Fig.1).

## New professors at CUI

We warmly welcome Dr. Martin

Trebbin (Universität Bayreuth, Germany), who became recently Junior Professor at the UHH.

We also warmly welcome the Mildred Dresselhaus Guest Professor Prof. Roseanne Sension (University of Michigan, Ann Arbor, USA) and Dr. Anouk Rijs (Radboud Universiteit in Nijmegen, Netherlands). To all of them we wish a very good start and successful work at CUI.

## New representatives of the PhD students of CUI

We warmly welcome Ms. Neele Grenda and Mr. Bernhard Ruff as the new representatives of the PhD students of CUI. They follow the appointment of Mr. Kai Bagschik and Mr. Johannes Schurer.

We would like to thank the previous representatives, with whom we worked extremely well, and wish the new ones a successful coordination of the CUI PhD student's activities.

## Important dates in 2015

On January 15 there will be the CUI New Year Event. The annual meeting will take place on March 26. Finally, from 11 to 13 of November the next CUI international workshop will take place.