Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

CUI THE HAMBURG CENTRE FOR ULTRAFAST IMAGING

NEWSLETTER

CUI – Graduate School

No.6, August 2014

Main topics

- Course programme
- Colloquia
- Greene lecture series
- Winter school
- Research highlights
- Important dates

Editorial

We are approaching the second birthday of our cluster of excellence. Since November 2012 many scientific achievements and discoveries have been accomplished, many invited speakers and collaborators visited our centre, and the first Graduate Days of CUI took place.
As far as the number of members of the graduate school is concerned, we have currently 47 PhD students and 31 postdocs. This number is going to increase, as a new recruitment phase will be soon undertaken.
As usual, the forthcoming winter term offers a rich course and guest programme. In particular, the CUI colloquium has very high-profile speakers, such as the 1997 Nobel Prize winner Prof. Phillips.
We wish you a pleasant reading and a successful start into the winter term 2014-15.

Antonio Negretti and Peter Schmelcher

Course programme

The winter term is going to start soon and consequently the course programme has been prepared. As usual, seminars and lectures have been selected on the bases of the interdisciplinary research carried out within our cluster.
The main lecture of this term is *Modern X-Ray Physics - Spectroscopy*, given by Prof. Grübel, Prof. Wurth, and Dr. Martins.
The detailed programme can be downloaded at the CUI webpage.

Colloquia

Prof. Phillips 1997 Nobel Prize winner (University of Maryland, USA) will visit our centre during the period September 10-12, 2014. On this occasion, he will give a colloquium with the following title: *At the crossroads of atomic and solid-state physics: ultra cold atoms as a new condensed matter system*. The talk will take place at 2 pm in the seminar rooms I-III of the CFEL building. The host is Prof. Klaus Sengstock.
Furthermore, for the next winter term the CUI colloquium speakers are:

- Prof. Arwen Pearson (Universität Hamburg, Germany)
  Thursday October 23, 2014
  Using complementary structural techniques to understand the mechanism of the post-translational activation of the enzyme aspartate decarboxylase
- Prof. Jun Ye (University of Colorado, Boulder, USA)
  Thursday December 4, 2014
  Frequency combs from mid-infrared to extreme ultraviolet
  Host: Prof. Klaus Sengstock
- Prof. Hartmut Löwen (Heinrich-Heine-Üniversität Düsseldorf, Germany)
  Thursday January 22, 2015
  Observing colloidal crystallization in real-space
  Host: Prof. Peter Schmelcher

Further information can be found at the CUI webpage.

Greene lecture series

In July we hosted the winner of the 2013 "Hamburg Prize for Theoretical Physics", Prof. Chris H. Greene (Purdue University). This was an occasion for several CUI scientists to interact with one of the most renowned theoretical atomic and molecular physicists. Importantly, our PhD students and postdocs had the great opportunity to attend his series of lectures on *Collisions, Spectroscopy, and Interactions in Atomic and Molecular Systems*. The lectures took place from July 9 to July 11, 2014. About 30-40 participants attended enthusiastically the event. They could interact with him in a very informal way. The participants have definitely profited from the relaxed atmosphere of his lectures.

We are very much looking forward

to his next visit!

Winter school

The PhD students of CUI organise their second winter school at the conference centre Weissenhäuser Strand (Baltic Sea, Germany). The school will take place in the first week of December, that is, from Monday December 1 to Friday December 5, 2014.

Under the coordination of the PhD representatives Kai Bagschik and Johannes Schurer, the different tasks concerning the organisation of the school have been distributed among the PhD students.

Scientists from abroad as well as from Germany have been invited to the school. The topics of the courses held by the invited speakers will cover many research areas of CUI. Additionally, there will be also a selection of presentations of the PhD students of CUI.

In addition to this, a practical course on Matlab, and a series of lectures on ethical implications and social consequences of new technical developments and on gender issues are planned too.

We wish our students a very productive week, but also a lot of fun!

Research highlights

CUI PhD student Thomas Kierspel and colleagues in the research group of Jochen Küpper have recently investigated the spatial separation of conformers, that is, rotational structural isomers, of 3-fluorophenol. Such conformers had previously been separated using the electric deflector and the alternating gradient focuser. Here, the *trans* conformer of 3-flurophenol could be isolated from a 1800 m/s fast beam by means of inhomogeneous electric fields on the order of 100 kV/cm. The *trans* conformer differs from the *cis* conformer by the orientation of the OH group, as can be seen in the insets of Fig. 1. Preparing a slower beam of 900 m/s, the "trans" conformer was depleted from the beam and a pure *cis* sample was obtained. 3-flurophenol is a good candidate molecule for the investigation of conformer-interconversion reactions in ultrafast pump-probe experiments such as, for instance, photoelectron holography measurements.

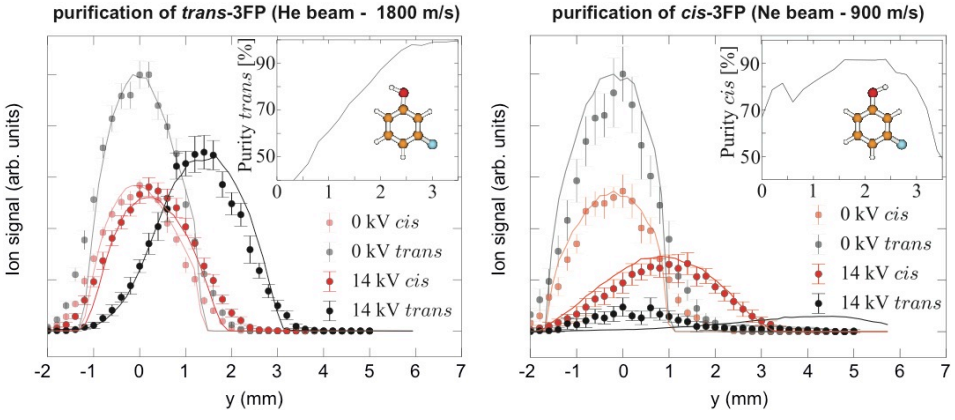

Fig. 1: In the left panel the field-free (0 kV) and deflected (14 kV) spatial beam profiles are illustrated, whereas in the inset the purification of the *trans* conformer is shown. Right panel: Field-free (0 kV) and deflected (14 kV) spatial beam profiles showing the purification of the *cis* conformer in the inset.

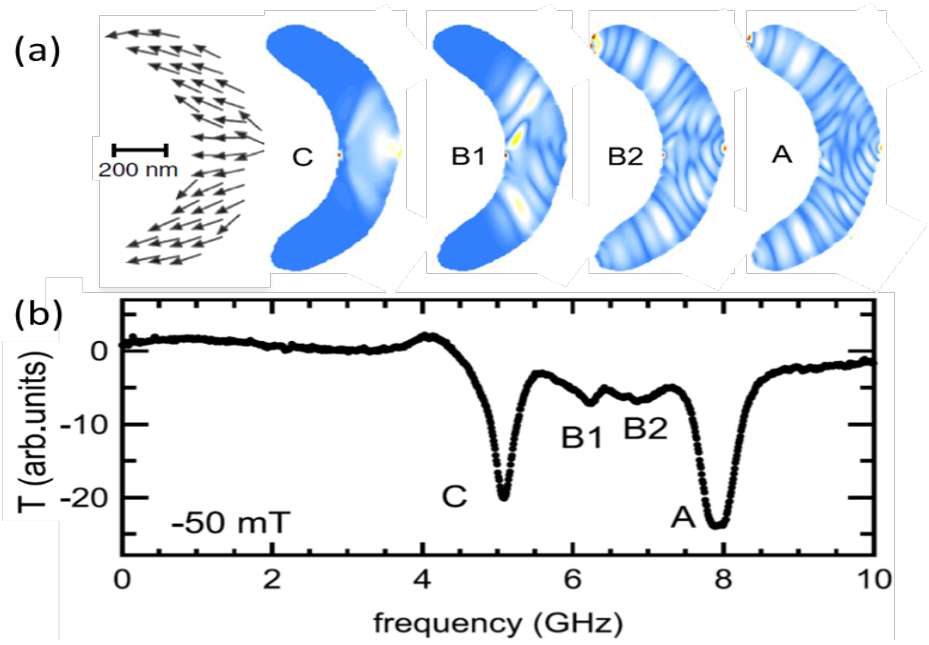

Fig. 2: Spin wave modes in a curved magnetic nanowire. (a) Static magnetization and spatially resolved amplitude of the mode profiles A to C obtained by micromagnetic simulations. (b) Measured absorption spectra identified as modes A, B1, B2, and C as shown in (a).

Reference: Chem. Phys. Lett. 591, 130 (2014).

The CUI postdoc Dr. Lars Bocklage in collaboration with the CUI researcher Dr. Guido Meier (UHH) studied the confinement of spin waves in inhomogeneous internal magnetic fields and the interaction of spin waves with domain walls, which is interesting for possible applications in magnonics. The field dispersion and localization of spin waves in curved ferromagnetic nanowires is revealed by comparison of micromagnetic simulations with microwave absorption spectroscopy. The strong inhomogeneous internal field of the domain wall gives rise to new modes. The scientists find that a domain wall interacts with the spin wave via several dynamic modes.

The work has been published in the Journal of Physics: Condensed Matter 26, 266003 (2014).

Important dates

We remind you that November 12-14, 2014 the next CUI international workshop in conjunction with the Hamburg Prize for Theoretical Physics will take place. Besides, the second edition of the Graduate Days of CUI is scheduled for March 9-11, 2015. Please, mark these dates in your calendar!