

Program

Sunday, 30 November 2014

17:00 – 21:00 Registration

18:30 *DINNER / Informal get together*

Monday, 1 December 2014

08:00 *BREAKFAST*

08:45 – 09:00 Scientific organizers **Welcome and opening remarks**
Ernst Dreisigacker **About the Wilhelm and Else Heraeus Foundation**

Session 1:

Atom-Photon Entanglement & Cavity QED

09:00 – 09:45 Jakob Reichel **Generating multi-atom entanglement in optical fiber microcavities**

09:45 – 10:30 Tracy Northup **Designed states of ions and photons in an optical cavity**

10:30 – 11:00 *COFFEE BREAK*

11:00 – 11:45 Arno Rauschenbeutel **Breaking the mirror symmetry of spontaneous emission via spin-orbit interaction of light**

11:45 – 12:30 Tatjana Wilk **Antiresonance and electromagnetically induced transparency in a single-atom-cavity system**

12:30 **Conference Photo** (in the foyer of the lecture hall)

12:35 *LUNCH*

Program

Monday, 1 December 2014

Session 2:

Quantum State Engineering

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| 14:00 – 14:45 | David Wineland | Trapped-ion quantum-control experiments at NIST |
| 14:45 – 15:30 | Christopher Monroe | Tunable long-range spin models with trapped ions |
| 15:30 – 16:15 | Ben Lanyon | Building and characterizing a quantum many-body system |
| 16:15 – 16:45 | <i>COFFEE BREAK</i> | |
| 16:45 – 17:30 | Giovanna Morigi | Prethermalization of atoms due to photon-mediated long-range interactions |
| 17:30 – 18:15 | Philipp Hauke | Non-equilibrium dynamics of long-range Ising models: Testing many-body localization, ergodicity, and more in trapped ions |
| 18:15 – 19:00 | Discussions | |
| 19:00 | <i>DINNER</i> | |

Program

Tuesday, 2 December 2014

08:00 *BREAKFAST*

Session 3:

Atomic Clocks and Fundamental Tests

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| 09:00 – 09:45 | Christophe Salomon | Atomic clocks and tests of fundamental physics |
| 09:45 – 10:30 | James Chin-wen Chou | Next generation Al⁺ optical clock at NIST |
| 10:30 – 11:00 | <i>COFFEE BREAK</i> | |
| 11:00 – 11:45 | Tanja Mehlstäubler | Towards optical clocks based on ion Coulomb crystals |
| 11:45 – 12:30 | Tanya Zelevinsky | Precision measurements with a molecular clock |
| 12:30 | <i>LUNCH</i> | |

Program

Tuesday, 2 December 2014

- 14:00 – 14:45 Markus Arndt **On the role of absorption in diffraction and interferometry of clusters and molecules**
- 14:45 – 15:30 Monika Schleier-Smith **Ramsey interferometry meets quantum engineering**

Session 4:

Quantum Metrology

- 15:30 – 16:15 Augusto Smerzi **Quantum interferometry**
- 16:15 – 16:45 *COFFEE BREAK*
- 16:45 – 17:30 Rafal Demkowicz-Dobrzanski **A brief history of quantum metrology: From GW detectors to CP maps and back**
- 17:30 – 18:15 Michael Foss-Feig **Steady-state entanglement of hot reactive fermions**

Session 1 (continued):

Atom-Photon Entanglement & Cavity QED

- 18:15 – 19:00 Tilmann Esslinger **Bands with a twist and quantum sized steps**
- 19:00 *DINNER*

Program

Wednesday, 3 December 2014

08:00 *BREAKFAST*

Session 5:

Opto-Mechanical Systems

09:00 – 09:45 Konrad Lehnert

Analog quantum information processing with mechanical oscillators

09:45 – 10:30 Eva Weig

What limits the coherence of a high Q nanomechanical string resonator?

10:30 – 11:00 *COFFEE BREAK*

Session 6:

Atom Interferometry Using Entangled States

11:00 – 11:45 Wolfgang Schleich

From interference in phase space via count statistics to phase uncertainties

11:45 *LUNCH*

from 13:15 **Discussions / Excursions (guided tours)**

- 1) visit of the Kölner Dom (Cologne Cathedral)
- 2) visit of the Deutsches Museum, Bonn
- 3) no excursion or self-organized

followed by a visit of the Christmas Market in Cologne (1, 2 or 3)

19:00 *DINNER (at the Physikzentrum)*

Program

Thursday, 4 December 2014

08:00 *BREAKFAST*

Session 5 (continued):

Opto-Mechanical Systems

09:00 – 09:45 Tobias Kippenberg **Measurement and control of a mechanical oscillator at its thermal decoherence rate**

09:45 – 10:30 Markus Aspelmeyer **Quantum optical control over nano-, micro- and macromechanics: Recent challenges and surprises**

10:30 – 11:00 *COFFEE BREAK*

11:00 – 11:45 Albert Schliesser **Nanomechanical membranes as transducers for classical and quantum signals**

11:45 – 12:30 Florian Marquardt **Synthetic gauge fields and topological phases of sound and light**

12:30 *LUNCH*

Session 6 (continued):

Atom Interferometry Using Entangled States

14:00 – 14:45 Markus Oberthaler **Detecting entanglement of non-gaussian atomic states & upscaling of squeezing to large atom numbers**

14:45 – 16:15 **90 second poster flashes (one slide only)**

16:15 – 16:45 *COFFEE BREAK*

16:45 – 19:00 **Poster session**

19:00 *HERAEUS DINNER*
(cold & warm buffet, free beverages)

Program

Friday, 5 December 2014

08:00 *BREAKFAST*

Session 6 (continued):

Atom Interferometry Using Entangled States

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|---------------|-----------------------|---|
| 09:00 – 09:45 | Tarik Berrada | Interferometry with the external modes of an interacting Bose-Einstein condensates |
| 09:45 – 10:30 | Carsten Klempt | Many-particle entangled states of neutral atoms |
| 10:30 – 11:00 | <i>COFFEE BREAK</i> | |
| 11:00 – 11:45 | Philipp Treutlein | Quantum metrology and entanglement on atom chip |
| 11:45 – 12:30 | Scientific organizers | Poster awards & closing remarks |
| 12:30 | <i>LUNCH</i> | |

End of the seminar and FAREWELL COFFEE / Departure

NO DINNER for participants leaving on Saturday morning