

## DFG Priority Programme 1929: Giant Interactions in Rydberg Systems

### Kickoff-Workshop 2016 - Programme -

**Location:** Internationales Wissenschaftsforum Heidelberg  
**Arrival:** Sunday, 13.11.2016 before dinner  
**Departure:** Tuesday, 15.11.2016 after lunch

#### Sunday, 13 November 2016

Before 6 pm: Arrival and checkin at hotel or IWH

6 – 8 pm: Dinner at IWH

#### Monday, 14 November 2016

7:30 – 8:30 am: Breakfast at accommodation

8:30 – 8:40 am: Welcome

8:40 – 10:20 am: *Chair: Tilman Pfau*

- **Sebastian Hofferberth:** Interacting Rydberg polaritons in an ultracold gas
- **Stephan Dürr:** Optical pi phase shift created with a single-photon pulse
- **Michael Fleischhauer:** Quantum Hall phases of Rydberg-dressed atoms and Rydberg polaritons
- **Robert Löw and Nicolas Joly:** Rydberg atoms in hollow core fibers
- **Patrick Windpassinger:** Cold Rydberg atoms – hollow core fiber interface

10:20 – 10:50 am: Coffee break

10:50 am – 12:30 pm: *Chair: Michael Fleischhauer*

- **Matthias Weidemüller:** Imaging non-local photon interactions with structured light
- **Thomas Wellens:** Excitation transport in ultracold Rydberg gases
- **Stefan Yoshi Buhmann:** Rydberg-surface interactions
- **Stefan Scheel and Peter Grünwald:** Coherence properties of Rydberg excitons in cuprous oxide
- **Marc-Alexander Aßmann:** Rydberg excitons in cuprous oxide

12:30 – 2:00 pm: Lunch at IWH

2:00 – 3:40 pm: *Chair: Matthias Weidemüller*

- **Harald Giessen:** Towards controlled interaction of Rydberg excitons in integrated and scalable solid state devices
- **Jörg Main:** Rydberg excitons in external fields
- **József Fortágh:** Long-range Rydberg interactions mediated by a microwave cavity at finite temperature
- **Herwig Ott:** A reaction microscope for few-body Rydberg dynamics
- **Thomas Schmid:** Heteronuclear Rydberg molecules to study correlated quantum systems and ultracold atom-ion collisions

## Monday, 14 November 2016 (cont.)

- 3:40 – 4:10 pm: Coffee break
- 4:10 – 5:00 pm: Coordination project
- 5:00 – 6:00 pm: *Chair: Giovanna Morigi*
- **Johannes Hecker Denschlag**: Controlling cold atom-ion collisions using Rydberg states
  - **Christian Groß**: Towards high fidelity loading of single potassium atoms in microtraps for quantum simulations of magnetic Hamiltonians
  - **Ferdinand Schmidt-Kaler and Jochen Walz**: Rydberg excitation of cold, trapped ions
- 6:00 – 7:30 pm: Dinner at IWH
- 7:30 – 9:30 pm: Poster session

## Tuesday, 15 November 2016

- 7:30 – 8:30 am: Breakfast at accommodation
- 8:30 – 10:30 am: *Chair: Gerhard Rempe*
- **Tommaso Calarco**: Quantum optimal control for many-atom systems
  - **Hendrik Weimer**: Open system quantum simulation with Rydberg atoms
  - **Johannes Zeiher**: Local and single atom resolved study of non-linear excitation dynamics and dissipation in off-resonantly driven Rydberg gases
  - **Christian Fey**: Rovibrational dynamics in triatomic Rydberg molecules
  - **Martin Zeppenfeld**: Nondestructive detection of polar molecules via Rydberg atoms
  - **Axel Görlitz**: Towards Ytterbium Rydberg atoms in optical dipole traps
- 10:30 – 11:00 am: Coffee break
- 11:00 am – 12:40 pm: *Chair: Stefan Scheel*
- **Giovanna Morigi**: Quantum Structures of photons and Rydberg atoms
  - **Walter Hofstetter**: Ordered states of Rydberg-dressed ultracold quantum gases in optical lattices
  - **Gerhard Birkl**: Coherent spin dynamics in 2D arrays of Rydberg atoms
  - **Shannon Whitlock**: Scaling of a driven atomic gas from the weakly-dressed to the quantum critical regime
  - **Alexander Eisfeld**: Rydberg atoms interfaced: Coherence and Entanglement
- 12:40 – 12:50 pm: Closing Remarks
- 12:50 – 2:30 pm: Lunch at IWH