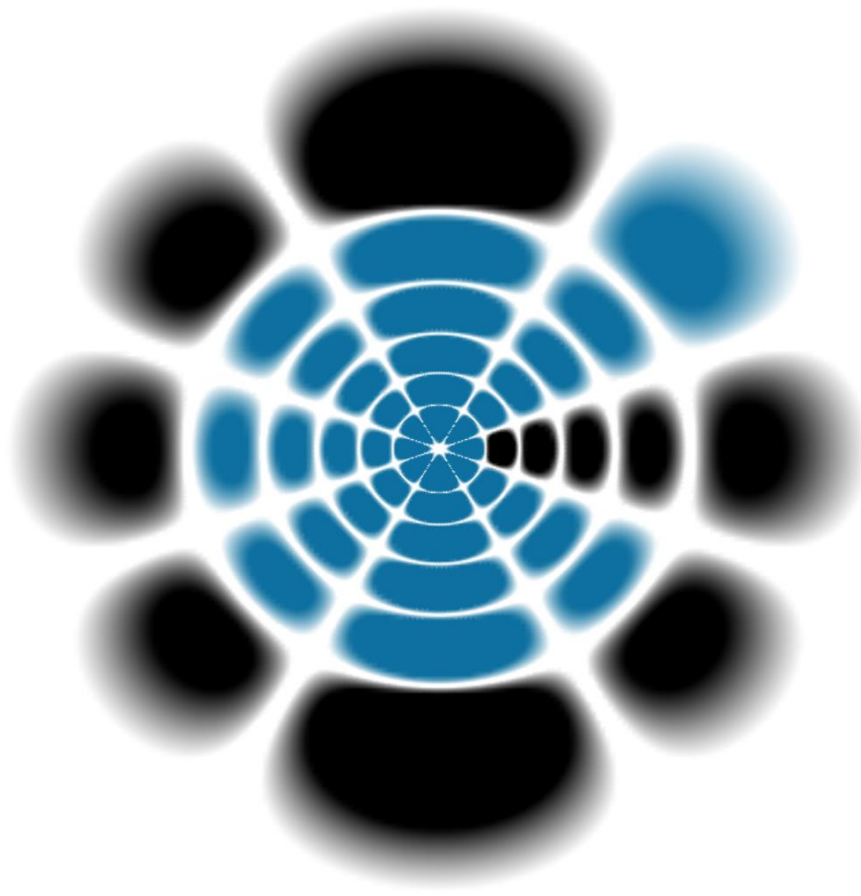


International Workshop of the Schwerpunktprogramm SPP1929
July 3 – 6, 2018

Giant Interactions in Rydberg Systems



Center for Optical Quantum Technologies
Luruper Chaussee 149
22761 Hamburg
Fon +49 40 8998 6501 / Fax +49 40 8998 6516
photon/physnet.uni-hamburg.de/ilp/schmelcher/workshops

Workshop on Giant Interactions in Rydberg Systems

Scientific Organisation

Peter Schmelcher ♦ Universität Hamburg

Tilman Pfau ♦ Universität Stuttgart

Organisation

Anne-Katrin Kriesch ♦ Universität Stuttgart

Anja Cordes ♦ Universität Hamburg



Young Researcher Day

Program

Tuesday, 3 July 2018

14:00 – 14:30

Welcome and General Discussion

Chaired by Peter Schmelcher

- GiRyd Funding Opportunities for PhD Students
- Outlook and Discussion: GiRyd funding period 2
- Questions, Feedback

14:30 – 15:45

Reports on GiRyd Exchanges 2018

- Helge Dobbertin, Universität Rostock
- Christian Fey, Universität Hamburg
- Andrew Hunter, Max-Planck-Institut für Physik komplexer Systeme
- Thomas Stolz, Max-Planck-Institut für Quantenoptik
- Jonas Vogel, Universität Mainz

15:45 – 16:15

Coffee Break

16:15 – 16:30

Planning / Scheduling of Upcoming Exchanges

Chaired by Peter Schmelcher

16:30 – 17:00

Sebastian Weber, Universität Stuttgart

Pairinteraction: An open-source software for calculating Rydberg interaction potentials

17:00 – 17:15

Brief introduction to and discussion of **SRitp and GiRyd Advanced School** (Sep. 20-27, 2018) in Israel
Chaired by Sebastian Hofferberth

17:15 – 17:30

Discussion and closing remarks

Chaired by Peter Schmelcher

18:00

Welcome Reception with other status workshop participants



Workshop on Giant Interactions in Rydberg Systems

Program

Wednesday, 4 July 2018

8:30 Workshop Opening

Chairman: Herwig Ott

8:45 – 9:15 **Barry Dunning**, William Marsh Rice University
Ultralong-range Rydberg molecules

9:30 – 9:45 **Christian Veit**, Universität Stuttgart
Rydberg molecules for ion-atom scattering in the ultracold regime

9:55 – 10:10 **Johannes Hecker Denschlag**, Universität Ulm
Collisions of ions and Rydberg atoms

10:15 – 10:45 Coffee Break

Chairman: Johannes Hecker-Denschlag

10:45 – 11:00 **Christian Fey**, Universität Hamburg
Ultralong-range Rydberg molecules: Spin-interactions, external fields and triatomics

11:10 – 11:25 **Alexander Eisfeld**, Max-Planck-Institut für die Physik komplexer Systeme
Decoherence and entanglement of Rydberg Units

11:35 – 11:50 **Fabio Revuelta**, Universidad Politecnica de Madrid
Rydberg atoms immersed in ultracold quantum gases

12:00 – 12:15 **Javad Kazemi**, Leibniz-Universität Hannover
Long-range correlations in driven-dissipative Rydberg gases

12:30 – 14:00 Lunch at DESY canteen



Workshop on Giant Interactions in Rydberg Systems

Program

Wednesday, 4 July 2018

Chairman: Jozsef Fortagh

- 14:00 – 14:30 **Markus Hennrich**, Stockholm University
Interacting Rydberg ions
- 14:45 – 15:00 **Jochen Walz**, Johannes Gutenberg Universität Mainz
Single-photon Rydberg excitation of trapped ions
- 15:10 – 15:25 **Herwig Ott**, Technische Universität Kaiserslautern
A reaction microscope for few-body Rydberg physics
- 15:30 – 16:00 Coffee Break

Chairman: Stefan Scheel

- 16:00 – 16:15 **Parvez Islam**, Universität Mainz
Rydberg excitation inside a hollow core fiber
- 16:25 – 16:40 **Annika Tebben**, Universität Heidelberg
Resonant enhancement of the optical nonlinearity in a Rydberg gas
- 16:50 – 17:05 **Julian Heckötter**, Technische Universität Dortmund
Interactions of Rydberg excitons: Towards time-resolved spectroscopy
- 17:15 – 17:30 **Jörg Main**, Universität Stuttgart
Magnetoexcitons in cuprous oxide: Investigating the GOE-GUE-Poisson crossover
- 18:00 **GiRyd coordination meeting**
Center for Optical Quantum Technologies, Seminar room, ground floor
- 19:00 **Poster Session** and buffet style dinner



Workshop on Giant Interactions in Rydberg Systems

Program

Thursday, 5 July 2018

Chairman: Mark Saffman

- 8:45 – 9:15 **Robin Côté**, University of Connecticut
Binding Rydberg-dressed atoms into molecules
- 9:30 – 9:45 **Stephan Dürr**, Max Planck Institut für Quantenoptik
Rydberg based photon photon quantum gate
- 9:55 – 10:10 **Matthias Zeppenfeld**, Max Planck Institut für Quantenoptik
State resolved collision studies between polar molecules and Rydberg atoms
- 10:15 – 10:45 Coffee Break

Chairman: Jochen Walz

- 10:45 – 11:00 **Johannes Zeiher**, Max Planck Institut für Quantenoptik
Quantum gas microscopy of an off-resonantly driven Rydberg lattice gas
- 11:10 – 11:25 **Lorenzo Festa**, Max Planck Institut für Quantenoptik
Progress towards deterministic single atom loading in optical tweezers
- 11:35 – 11:50 **Jaromir Panas**, Universität Frankfurt
Ordered states of Rydberg-dressed ultracold quantum gases in optical lattices
- 12:00 – 12:15 **Rebecca Kraus**, Universität des Saarlandes
Quantum and topological phases of long-range interacting bosons
- 12:30 – 14:00 Lunch at DESY canteen



Workshop on Giant Interactions in Rydberg Systems

Program

Thursday, 5 July 2018

Chairman: Michael Fleischhauer

- 14:00 – 14:30 **Ashok Mohapatra**, NISER
Study of Rydberg blockade in thermal vapor
- 14:45 – 15:00 **Sebastian Hofferberth**, University of Southern Denmark
From few to many strongly interacting polaritons
- 15:10 – 15:25 **David Petrosyan**, Institute of Electronic Structure & Laser
Quantum gates between Rydberg atoms in thermal microwave cavities
- 15:30 – 16:00 Coffee Break

Chairman: Barry Dunning

- 16:00 – 16:15 **Stefan Scheel**, Universität Rostock
Rydberg excitons in external fields -- strain waveguides and giant-dipole states
- 16:25 – 16:40 **Shannon Whitlock**, IPCMS & ISIS
Non-equilibrium phase structure and dynamics of a driven-dissipative Rydberg spin system
- 16:50 – 17:05 **Axel Goerlitz**, Heinrich-Heine-Universität Düsseldorf
Stark spectroscopy of ytterbium Rydberg states
- 17:15 – 17:30 **Johannes Schmidt**, Universität Stuttgart
An opto-galvanic flux sensor based on Rydberg excitation
- 17:45 **Excursion**
- 20:00 **Conference dinner**



Workshop on Giant Interactions in Rydberg Systems

Program

Friday, 6 July 2018

Chairman: Sebastian Hofferberth

- 8:45 – 9:15 **Mark Saffman**, University of Wisconsin-Madison
Rydberg Mediated entanglement for atom-atom to atom-field
- 9:30 – 9:45 **Malte Schlosser**, Technische Universität Darmstadt
Coherent Spin Dynamics in Two-Dimensional Arrays of Rydberg Atoms – Project Update
- 9:55 – 10:10 **Jian Cui**, Universität Ulm
Large-scale Greenberger-Horne-Zeilinger states preparation on Rydberg lattice gases
- 10:15 – 10:45 Coffee Break

Chairman: Hossein Sadeghpour

- 10:45 – 11:00 **Harald Giessen**, Universität Stuttgart
Rydberg excitons in Cu₂O and their interaction with light
- 11:10 – 11:25 **Michael Fleischhauer**, Universität Kaiserslautern
Preparing and detecting fractional quantum Hall states of light with Rydberg polaritons
- 11:35 – 11:50 **Hans Peter Büchler**, Universität Stuttgart
Topologically protected edge states in small Rydberg systems
- 12:00 – 12:15 **Nicolas Joly**, Friedrich-Alexander-Universität Erlangen-Nürnberg
Special hollow-core fibre for Rydberg and quantum experiments
- 12:30 – 14:00 Lunch at DESY canteen



Workshop on Giant Interactions in Rydberg Systems

Program

Friday, 6 July 2018

Chairman: Axel Görlitz

- | | |
|---------------|---|
| 14:00 – 14:30 | Tom F. Gallagher , University of Virginia
<i>Forster Resonant Energy Transfer of Floquet States</i> |
| 14:45 – 15:00 | Christiane Koch , Universität Kassel
<i>Fast and accurate circularisation of a Rydberg atom</i> |
| 15:10 | End of workshop |



Workshop on Giant Interactions in Rydberg Systems

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Workshop on Giant Interactions in Rydberg Systems

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Workshop on Giant Interactions in Rydberg Systems

Sightseeing in Hamburg

With 1.8 million inhabitants, Hamburg is the second-biggest city in Germany and it offers singular features to its guests: Arts and culture at its finest, worldwide successful musicals, superior and entertaining theatre, excellent restaurants, exquisite shopping possibilities, exciting night life and loads of historical landmarks, that were left by the 1200 years old history of the city.

„Michel“ Church – Hamburg’s Landmark

St. Michaelis church, built from 1751 – 1762, is not only the most important baroque church building in northern Germany but also features the biggest German church clock. Its tower, the „Michel“, is 132 metres high and has a viewing platform from which you can watch Port and City undisturbedly. Every day at 10 a.m. and 9 p.m. Turmblasen (tower music) takes place.

Englische Planke 1a, 20459 Hamburg

Port of Hamburg

Germany’s largest seaport is also one of Europe’s leading transit ports. Tour this world-class container port on a harbour barge, take in the unique warehouse complex on a fleet tour or stroll along the Elbe river.

HafenCity

HafenCity is a new district of Hamburg and covers an area of 157 hectares, making it one of the most prominent inner-city waterfront development projects in the world. Based on a new concept for urban living, it will increase the size of Hamburg City by 40 percent. Between the historic Speicherstadt warehouse district and the River Elbe a new city with a cosmopolitan mix of homes, service businesses, culture, leisure, tourism and commerce is emerging. Structures typical of a port will be retained.

Hamburger Kunsthalle

The museum houses an important collection of painting from the 19th century with works from Max Liebermann, Philipp Otto Runge, Caspar David Friedrich, Adolf Menzel. The *Galerie der Gegenwart* is devoted to modern arts from the early 20th century, e.g. Pablo Picasso, Paul Klee, and Max Beckmann, and art after 1945. www.hamburger-kunsthalle.de

Glockengießerwall, 20095 Hamburg



Workshop on Giant Interactions in Rydberg Systems

Sightseeing in Hamburg

International Maritime Museum Hamburg

The exhibition at the International Maritime Museum Hamburg (IMMH) focuses on new horizons, it tells the stories of discoverers and conquerors, of captains and seamen. In short, an expedition through 3,000 years of the history of humanity. On 10 stories and more than 11,000 square metres of exhibition space, the visitors can experience shipping and marine history from 3,000 years. Over several decades, Professor Peter Tamm senior has collected about 26,000 ship models, 50,000 construction plans, 5,000 paintings and graphics, more than 2,000 films, 1.5 million photos, 120,000 books and numerous nautical devices, historical uniforms, militaries and maritime objects. www.internationales-maritimes-museum.de

Kaispeicher B, Koreastrasse 1, 20457 Hamburg

State Opera

04.07.2018 Georg Philipp Telemann "Miriways"

opera stabile, Kleine Theaterstraße 20354 Hamburg

20:00 (28 Euro)

06.07.2018 John Neumeier "Bethhoven Projekt"

19:30 – 21:30 (7 - 119 Euro)

www.hamburgische-staatsoper.de

Dammtorstraße 28, 20354 Hamburg

Shopping

Hamburg is a wonderful city for shopping. No other city boasts as many elegant, covered arcades but what makes it particularly special is the variety of shops and merchandise. Leading department stores, designer boutiques and unique shops mingle with fine restaurants, trendy cafés, coffee, snack and wine bars. Shopping concentrates around Mönckebergstrasse and the area between Rathausmarkt and Jungfernstieg. Several shopping malls, such as the Europa Passage (www.europa-passage.de) and the Hanseviertel (www.hanseviertel.de) with a wide range of shops are located here.

Shops in the city center are open Monday to Saturday from 9.00 – 20.00.



Workshop on Giant Interactions in Rydberg Systems

Restaurants in Hamburg

Vapiano

Italian Restaurant with show cooking
Hohe Bleichen 10
20354 Hamburg
www.vapiano.de

Parlament

Traditionell restaurant in Hamburg townhall
Rathausmarkt 1
20095 Hamburg
www.parlament-hamburg.de

Meatery

Fine steak restaurant
Drehbahn 49
20354 Hamburg
www.meatery.de

Sushi Circle

Sushi restaurant
Collonaden 5
20354 Hamburg
www.suhsi-circle.de

Brauhaus Joh. Albrecht

Brewery and traditional restaurant
Adolfsbrücke 7
20457 Hamburg
www.brauhaus-joh-albrecht.de

Skyline bar 20up

Cocktail bar in the 20th floor of the Empire Riverside Hotel
Bernhard-Nocht-Straße 97
20359 Hamburg
www.empire-riverside.de



Workshop on Giant Interactions in Rydberg Systems

Workshop Secretariat

WORKSHOP SECRETARIAT: Anja Cordes, office 103, 1st floor, ZOQ

Please contact Anja Cordes for the following issues:

PERSONAL LAPTOP/WLAN: You can connect your private Laptop to the WLAN system via several networks. You can get a password to log into the GUEST network. Besides, EDUROAM is also provided. Local participants may also use the UHH, UHH/WPA and DESY nets.

OFFICE SUPPLIES & INFORMATION DESK: For sending mail and faxes and getting any information concerning transportation (public transport, taxi)

PRIVATE CARS: You need a special permit to park your car on the institute's area.

LUGGAGE: If you want to store your luggage in a secure place on your departure day.

Your suggestions and questions are always welcome!



Workshop on Giant Interactions in Rydberg Systems

Accommodation

Mercure Hotel Hamburg am Volkspark

Albert-Einstein-Ring 2, 22761 Hamburg

H1659@accor.com, phone: (+49)40 899 520

<http://www.accorhotels.com/gb/hotel-1659-mercure-hotel-hamburg-am-volkspark-ex-novotel-hamburg-arena/index.shtml>

Bus stop: Trabrennbahn Bahrenfeld (bus 1, 2, 3)

DESY Guest House

Notkestraße 85, 22607 Hamburg

Keys for the rooms are to be collected at the DESY main gate.

Breakfast is available at the DESY canteen from 7 a.m. – 10. a.m.

hostel@desy.de, phone: (+49)40 8998 2740

Buildings 32/33 on the DESY campus, close to the main entrance facing Notkestraße

Bus stop: *Zum Hünengrab* (bus 1)



Workshop on Giant Interactions in Rydberg Systems

Directions

Center for Optical Quantum Technologies (ZOQ), Luruper Chaussee 149, 22761 Hamburg, building 90 on the DESY/University campus, directly on your right when entering the campus through the side entrance facing Luruper Chaussee (see map below)

Coming from the airport:

- Public transport: Take the train S1 to *Othmarschen* (45 minutes), then bus 1 to *Trabrennbahn Bahrenfeld* (5 minutes). From here it is a short walk down Luruper Chaussee to the hotel and the side entrance of the campus.
- Taxi: Going by taxi will take around 35 minutes.

Coming from Hamburg Altona train station:

- Take bus 2 to *Luruper Chaussee/DESY* (15 minutes). The hotel and side entrance of the campus are on the opposite side of the street.



