SPP 1929 Giant Interactions in Rydberg Systems

Final Colloquium

01 – 03 November 2023

Programme

Venue: Physikzentrum Bad Honnef

Hauptstraße 5

53604 Bad Honnef

Germany

All information as of 12 October 2023

Invited talks:	30 min. talk + 15 min discussion
Project talks (single project):	15 min. talk + 5 min. discussion
Project talks (mult. Projects):	25 min. talk + 5 min discussion

Wednesday, 01 November 2023

Session Chair: Tilman Pfau	
11:30 AM	• Welcome and Workshop Opening • **Invited Talk - Thomas Killian**
12:30 PM	Lunch
Session Chair: Robert Löw	
2:00 PM	• **Aßmann**: Rydberg Exciton Interaction Dynamics (AS 459/2-2) • **Scheel**: Dynamics of interacting Rydberg excitons in inhomogeneous structures (SCHE 612/4-2) • **Giessen**: Towards controlled interaction of Rydberg excitons in integrated and scalable solid state devices (GI 269/14-2) • **Fortagh**: Long-range Rydberg interactions mediated by a microwave cavity at finite temperature (FO 740/2-2)
3:30 PM	Coffee Break
Session Chair: Marc Aßmann	
4:00 PM	• **Löw**: Rydberg atoms inside hollow-core photonic crystal fibres (JO 1090/4-1, LO 1657/6-1, RU 1426/1-1) • **Hofstetter**: Ordered states of Rydberg-dressed ultracold quantum gases in optical lattices (HO 2407/8-1) • **Ott**: Ultracold heavy Rydberg systems and Rydberg molecules under a reaction microscope (OT 222/5-2) • **Schmidt**: Polaron formation in Rydberg systems and Rydberg excitations as a probe of correlated quantum matter(SCHM 3563/1-1)
5:30 PM	Dinner
Session Chair: Tilman Pfau	
7:00 PM	• **Invited Talk – Mark Saffman** • Open discussion

Thursday, 02 November 2023

8:00 AM	Breakfast
Session Chair: Sebastian Hofferberth	
9:00 AM	• **Invited Talk – Gonzalez-Ferez** • **Birkl**: Coherent Spin Dynamics in 2D Arrays of Rydberg Atoms (BI 647/6-2) • **Weimer**: Open system quantum simulation with Rydberg atoms (WE 5306/5-2)
10:30 AM	Coffee Break
Session Chair: Johannes Deiglmayr	

11:00 AM	• **Gross/Lesanovsky**:
	    o Non-equilibrium phenomena in Rydberg lattice gases with facilitation constraints (LE 3522/1-1 & GR 4741/5-1)
	    o Deterministic preparation of single potassium atoms in microtrap arrays for the quantum simulation of spin systems (GR 4741/1-1)
	• **Büchler/Hofferberth**:
	    o From few to many strongly interacting Rydberg polaritons (HO 4787/3-1)
	    o Photons interacting with Rydberg super atoms (BU 2247/4-1)

	• **Dürr**: A photon-photon quantum gate based on Rydberg interactions in a cavity (DU 1138/1-1)
12:30 PM	Lunch
Session Chair: Ferdinand Schmidt-Kaler (tbc)	
2:00 PM	• **Pohl**: Interacting Stationary Rydberg Polaritons in Two Dimensions (PO 1622/1-2 & WE 2661/12-2) • **Pfau**: Rydberg and ion impurities in ultracold quantum matter (PF 381/17-2) • **Schmelcher**: Dynamical processes in ultralong-range Rydberg molecules (SCHM 885/30-2) • **Deiglmayr**: Creating a gas of ultracold ion pairs out of long-range Rydberg molecules (DE 3201/1-1)
3:30 PM	Coffee Break
Session Chair: Hecker Denschlag	
4:00 PM	• **Pfau:** SPP GiRyd: Discussion and outlook • **Invited talk - Hossein Sadeghpour**
5:30 PM	Dinner
7:00 PM	Open Discussion

Friday, 03 November 2023

8:00 AM	Breakfast
Session Chair: Igor Lesanovsky	

9:00 AM	• **Zeiher**:
	   ○ Local and single atom resolved study of non-linear excitation dynamics and dissipation in off-resonantly driven Rydberg gases (BL 574/15-1)
	   ○ Realizing Rydberg induced long-range interactions in itinerant lattice systems (BL 574/18-1)
	 • **Fleischhauer**:
	   ○ Quantum Hall effect and strongly interacting Rydberg polaritons (FL 210/17-1)
	   ○ Spinor Rydberg Polaritons (FL 210/18-1)
	 • **Whitlock**: Non-equilibrium universality in driven Rydberg gases (DI 1745/2-1 & WH 141/3-1)

10:30 AM	Coffee Break
Session Chair: Tilman Pfau	
11:00 AM	• **Hecker Denschlag**: Charged and neutral long-range Rydberg molecules: Internal structure and wave packet dynamics (HE 6195/3-2) • **Schmidt-Kaler**: Trapped Rydberg ions exposed to fast electric field ramps (SCHM 1049/8-2) • **Löw**: A Large Bandwidth Room Temperature Single Photon Source (LO 1657/7-1)
12:00 PM	Lunch
1:00 PM	Final Discussion and Farewell