

“Applications of Ultracold Rydberg Gases”

792. WE-Heraeus-Seminar

23 – 28 July 2023

at the Physikzentrum Bad Honnef/Germany

**WILHELM UND ELSE
HERAEUS-STIFTUNG**



Program (CEST)

Sunday, 23 July 2023

17:00 – 21:00 ARRIVAL and REGISTRATION

18:30 *BUFFET SUPPER*

Monday, 24 July 2023

07:30 *BREAKFAST*

Quantum Optics

Session chair: Florian Meinert

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| 08:45 – 09:45 | Nina Stiesdal | Waveguide QED with Rydberg Superatoms |
| 09:45 – 10:30 | Pascal Weckesser | Controlling a Subwavelength Atomic Mirror Using a Single Rydberg Atom |
| 10:30 – 11:00 | <i>COFFEE BREAK</i> | |
| 11:00 – 11:45 | Sven Jandura | Novel Two- and Multi-Qubit Entangling Gates on Rydberg Atoms |
| 11:45 – 12:30 | Stephan Dürr | Quantum-logic Gate between Two Optical Photons with an Average Efficiency above 40% |
| 12:30– 12:45 | Conference Photo (outside at the main entrance) | |
| 12:45 – 14:00 | <i>LUNCH BREAK</i> | |

Session chair: Matthew Eiles

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| 14:00 – 14:45 | Alex Guttridge | Observation of Rydberg Blockade Due to the Charge-dipole Interaction Between an Atom and a Polar Molecule |
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Program (CEST)

14:45 – 15:30	Thomas Pohl	Collective Light-Matter Interactions in Ultracold Rydberg Ensembles
15:30 – 16:15	Dylan Brown	Rydberg Excitation and Casimir-Polder Interaction of 87Rb Atoms Mediated by an Optical Nanofiber
16:15 – 16:45	<i>COFFEE BREAK</i>	
16:45 – 17:30	Wenchao Xu	Atomic Ensembles Meet Qubits
17:30 – 17:45	Stefan Jorda	About the Wilhelm and Else Heraeus Foundation
17:45 – 18:30	Flash Presentations	
18:30	<i>DINNER</i>	

Program (CEST)

Tuesday, 25 July 2023

07:30 *BREAKFAST*

Quantum Simulation

Session chair: Thomas Pohl

08:45 – 09:45	Antoine Browaeys	Magnetism and Spin Squeezing with Arrays of Rydberg Atoms
09:45 – 10:30	Giulia Semeghini	Towards New Frontiers of Quantum Science with Dual-species Atom Arrays
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:45	Malte Schlosser	Scalable Architecture of Assembled Single-Atom Qubit Arrays in Two and Three Dimensions
11:45 – 12:30	Lea-Marina Steinert	Designing Tunable Spin Interactions in Rydberg Tweezer Arrays
12:30 – 14:00	<i>LUNCH BREAK</i>	

Session chair: Antoine Browaeys

14:00 – 14:45	Hans Peter Büchler	Functional Completeness of Planar Rydberg Structures
14:45 – 15:30	Hannes Pichler	Universal Quantum Computation with Globally Driven Rydberg Atom Arrays
15:30 – 16:15	Sebastian Weber	QRydDemo - Quantum Computing with Rydberg Atoms
16:15 – 16:45	<i>COFFEE BREAK</i>	
16:45 – 18:30	Poster Session 1	
18:30 – 19:30	<i>DINNER</i>	
19:30	Discussion	

Program (CEST)

Wednesday, 26 July 2023

07:30 *BREAKFAST*

Quantum Computing

Session chair: Hans Peter Büchler

08:45 – 09:45	Adam Kaufman	Microscopically-controlled Arrays of Alkaline-earth Atoms
09:45 – 10:30	Jonathan Pritchard	Scalable Qubit Arrays for Quantum Computation and Optimisation
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:45	Markus Saffman	Circuit Model Quantum Computing with Neutral Atom Arrays
11:45 – 12:30	Alexander Lukin	Quench Dynamics as a Shortcut to Adiabaticity in Rydberg Atoms Arrays
12:30 – 14:00	<i>LUNCH BREAK</i>	

Session chair: Adam Kaufman

14:00 – 14:45	Loïc Henriët	Quantum Feature Maps for Graph Machine Learning on a Neutral Atom Quantum Processor
14:45 – 15:30	Sebastian Blatt	Neutral-Atom Quantum Computing in the Munich Quantum Valley
15:30 – 16:15	Ben Bloom	Building Utility-Scale Machines with AE-Qubits
16:15 – 16:45	<i>COFFEE BREAK</i>	
16:45 – 18:30	Time for Excursion	
18:30	<i>HERAEUS DINNER at the Physikzentrum (cold & warm buffet, with complimentary drinks)</i>	

Program (CEST)

Thursday, 27 July 2023

07:30 *BREAKFAST*

Emerging Platforms

Session chair: Giulia Semeghini

08:45 – 09:45	Tilman Pfau	A Molecular Bond Between Ions and Rydberg Atoms
09:45 – 10:30	Markus Hennrich	Speeding up Trapped Ion Quantum Processors via Rydberg Interaction
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:45	Daniel Grün	Quantum Simulation with Rydberg States of Erbium
11:45 – 12:30	Jeff Thompson	Quantum Computing with Yb Rydberg Atoms
12:30 – 14:00	<i>LUNCH BREAK</i>	

Session chair: Sebastian Hofferberth

14:00 – 14:45	Sylvain de Léséleuc	Ultrafast Rydberg Experiments with Ultracold Atoms in Arrays of Optical Tweezers
14:45 – 15:30	Jacob Hines	Spin Squeezing by Rydberg Dressing in an Array of Atomic Ensembles
15:30 – 16:15	Anna Dawid	Towards Learning Interactions Between Rydberg Atoms from Experimental Snapshots
16:15 – 16:45	<i>COFFEE BREAK</i>	
16:45 – 18:30	Poster Session 2	
18:30 – 19:30	<i>DINNER</i>	
19:30	Discussion	

Program (CEST)

Friday, 28 July 2023

07:30 *BREAKFAST*

Rydberg Molecules

Session chair: Johannes Zeiher

08:45 – 09:45	Sébastien Gleyzes	Circular Rydberg Atoms of Strontium
09:45 – 10:30	Thomas Niederprüm	The many Faces of Ultracold Rydberg Interaction
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:45	Andreas Kruckenhauser	High-dimensional SO(4)-Symmetric Rydberg Manifolds for Quantum Simulation
11:45 – 12:30	Matthew Eiles	Rydberg Molecules, Composites, and Polarons
12:30 – 12:45	Closing Remarks and Poster Prizes	
12:45	<i>LUNCH</i>	

End of Seminar / Departure