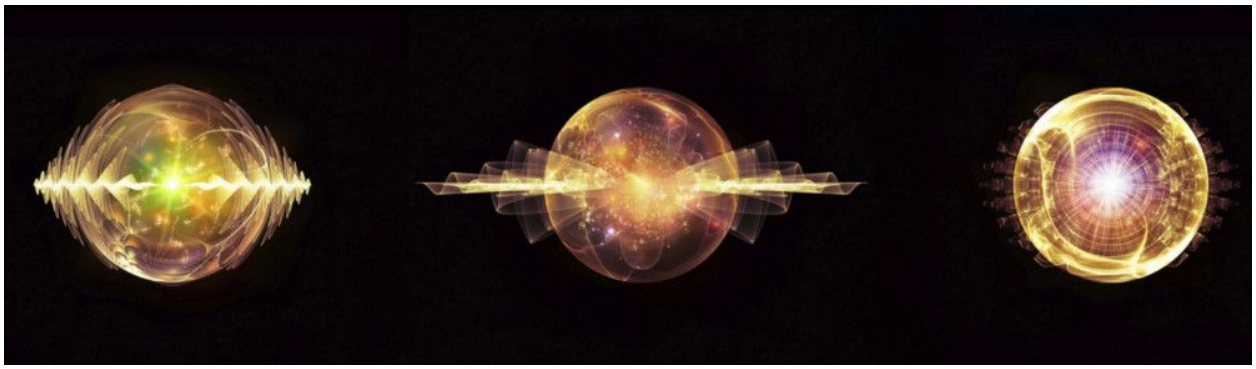
The Batsheva de Rothschild Seminar on Quantum Simulations using Photons, Atoms, and Molecules



Program

February 23-27, 2020

Tze'elim, Israel

Quantum Simulations using Photons, Atoms, and Molecules

Tze'elim (Israel), February 23-27, 2020

		Sunday	Monday	Tuesday	Wednesday	Thursday	
	9:00 - 9:35		**Schleier-Smith**	**Plenio**	**Narevicius**	**Segev**	
	9:35 - 10:10		**Simon**	**Ilan**	**Knap**	**Dalla Torre**	
	10:10 - 10:45		**Klembt**	**Sagi**	**Lindner**	**Khaykovich**	
	10:45 - 11:15		Coffee break		Coffee break	Coffee break	
	11:15 - 11:50		**Szameit**		**Hazzard**	**Langen**	
	11:50 - 12:25		**Aidelsburger**		**Davidson**	**Bloch**	
	12:25 - 12:45		**Alberti**		**Strinati**		
	12:45 - 14:15		Lunch break		Lunch break	Lunch and departure	
	14:15 - 14:50		**Schneider**		**Banuls**		
	14:50 - 15:25		**Eisert**	Excursion to the desert	**Oberthaler**		
	15:25 - 15:45		**Gall**		**Robens**		
	15:45 - 16:05		**Weidner**		**Bar Lev**		
	16:05 - 16:35		Coffee break		Coffee break		
	16:35 - 17:10		**Zohar**		**Firstenberg**		
	17:10 - 17:45		**Peschel**		**Pe'er**		
	17:45 - 18:05		**Sesses**		**Chiocchetta**		
	18:05 - 19:00		Poster flash session		Poster flash session		
	19:00 - 20:00		Dinner	Dinner	Dinner		
	20:00 - 21:30	Dinner & Registration	Poster session		Poster session		

List of Talks

Monday - Session 1 (9:00 - 10:45)

Monika Schleier-Smith (Stanford)	*Choreographing Quantum Spin Dynamics with Light*
Jonathan Simon (Chicago)	*Making Matter from Light*
Sebastian Klembt (Würzburg)	*Topological physics with a hybrid light-matter system*

Monday - Session 2 (11:15 - 12:45)

Alex Szameit (Rostock)	*Z2 photonic topological insulators*
Monika Aidelsburger (Munich)	*Floquet topological phases with ultracold atoms in periodically-driven hexagonal optical lattices*
Andrea Alberti (Bonn)	*Observing the evolution of atomic wave packets at the Mandelstam-Tamm speed limit*

Monday - Session 3 (14:15 - 16:05)

Ulrich Schneider (Cambridge)	*Ultracold atoms in optical quasicrystals: From many-body localization to fractal structures and topology*
Jens Eisert (Berlin)	*Quantum readout of and quantum advantages for quantum simulators*
Marcell Gall (Bonn)	*Simulating a Mott insulator using attractive interaction*
Carrie Weidner (Aarhus)	*Flexible Quantum Control and Simulation in a Quantum Gas Microscope*

Monday - Session 4 (16:35 - 19:00)

Erez Zohar (Hebrew University)	*Quantum Simulation of Gauge Theories using Ultracold Atoms*
Ulf Peschel (Jena)	*Quantum simulations in coupled fiber loops*
Shai Tsesses (Technion)	*Optical Skyrmions - a new texture of light*
Poster Flash Session 1	*Short presentations of the posters - 2 min each*

Tuesday - Session 1 (9:00 - 10:45)

Avi Pe'er (Bar-Ilan)	*Harnessing multi-dimensional entanglement for quantum sensing and communication*
Roni Ilan (Tel Aviv)	*t.b.a.*
Yoav Sagi (Technion)	*The fermionic impurity problem - an experimental study with an ultracold Fermi gas*

Wednesday - Session 1 (9:00 - 10:45)

Ed Narevicius (Weizmann)	*t.b.a.*
Michael Knap (Munich)	*Constrained Quantum Dynamics in Rydberg Systems and in Fractonic Matter*
Netanel Lindner (Technion)	*t.b.a.*

Wednesday - Session 2 (11:15 - 12:45)

Kaden Hazzard (Rice)	*The power within: Using internal states of ultracold atoms and molecules to create new forms of matter*
Nir Davidson (Weizmann)	*t.b.a.*
Marcello Strinati (Bar-Ilan)	*Persistent coherent beating in coupled parametric oscillators*

Wednesday - Session 3 (14:15 - 16:05)

Mari Carmen Banuls (MPQ)	*Entanglement and energy variance*
Markus Oberthaler (Heidelberg)	*How ultracold gases connect to quantum field theory predictions in the context of quark gluon plasma*
Carsten Robens (MIT)	*Bose polarons near quantum criticality*
Yevgeny Bar Lev (Ben Gurion University)	*Emergent locality in long-range interacting systems*

Wednesday - Session 4 (16:35 - 19:00)

Ofer Firstenberg (Weizmann)	*Coherent and collective phenomena in dense spin gases*
Krzysztof Jachymski (Jülich)	*Quantum simulation of extended polaron models using hybrid ion-atom platform*
Alessio Chiocchetta (Köln)	*Ultracold quantum wires with localized losses: many-body quantum Zeno effect*
Poster Flash Session 2	*Short presentations of the posters - 2 min each*

Thursday - Session 1 (9:00 - 10:45)

Moti Segev (Technion)	*Topological photonics*
Emanuele Dalla Torre (Bar-Ilan)	*Prethermalization in periodically-driven systems with unbounded spectrum: quantum and classical*
Lev Khaikovich (Bar-Ilan)	*Coherent superposition of diatomic and triatomic molecules*

Thursday - Session 2 (11:15 - 12:45)

Tim Langen (Stuttgart)	*Observing the supersolid state of matter using ultracold magnetic atoms*
Immanuel Bloch (Munich)	*t.b.a.*

List of Posters

Session 1: (Monday)

1. Abhishek Shukla (Hebrew University): *Rapid Equilibration of a nonadiabatically driven NV center quantum system coupled with a bath.*
2. Alon Beck (Tel Aviv): *Disorder in dissipation-induced cold-atom topological states: Evidence for novel localization transition.*
3. Anal Bhowmik (Haifa): *Many-body quantum dynamics of a two-dimensional symmetric bosonic Josephson junction.*
4. Apoorva Hegde (Heidelberg): *Quantum simulation of dynamical gauge fields: Experimental approach.*
5. Avi Pe'er (Bar-Ilan): *Ultra-broadband, Frequency-Multiplexed Quantum Information Processing.*
6. Avihai Didi (Bar-Ilan): *t.b.a.*
7. Constantine Shkedrov (Technion): *Probing homogeneous Fermi gas in the BEC-BCS crossover using Raman and rf spectroscopy.*
8. David Dentelski (Bar-Ilan): *Identifying charge and pairing density waves in X-ray scattering experiments.*
9. Gerard Valenti-Rojas (Heriot-Watt): *Synthetic Flux Attachment in Ultracold Quantum Gases*
10. Guy Zisling (Ben Gurion): *t.b.a.*
11. Hannes Busche (University of Southern Denmark): *Rydberg superatoms as effective two-level systems coupled to a single optical mode in free space.*
12. Iliya Esin (Technion): *Promoting spontaneous symmetry breaking through Floquet band engineering.*
13. Inbar Shani (Bar-Ilan): *t.b.a.*
14. Jan-Niklas Schmidt (Stuttgart): *Supersolidity in a trapped dipolar quantum gas*
15. Jeccy Sun (Technion): *t.b.a.*

Session 2 (Wednesday)

1. Krzysztof Jachymski (Forschungszentrum Jülich): *Quantum simulation of extended polaron models using hybrid ion-atom platform.*
2. Leon Bello (Bar-Ilan): *Persistent Coherent Beating in Coupled Parametric Oscillators.*
3. Meny Menashes (Technion): *Towards the generation of a 2D Skyrmion in a degenerate Fermi gas*
4. Mor M. Roses (Bar-Ilan): *Signatures of a counter-lasing transition in a cavity QED experiment.*
5. Oriana Diessel (MPQ): *Exploring Fermi polarons and molecules in ultracold atoms.*
6. Quancheng Liu (Bar-Ilan)*: The first detected transition time in quantum walks.*
7. Ralf Klemt (Heidelberg): *Correlation measurements of mesoscopic two-dimensional Fermi systems.*
8. Ran Finkelstein (Weizmann): *Continuous protection of a quantum state from inhomogeneous dephasing.*
9. Ravikumar Chinnarasu (Tsing Hua University): *Demonstration of sub-MHz-linewidth biphotons by controlled quantum interference.*
10. Roy Elbaz (Bar-Ilan): *t.b.a.*
11. Ruoyu Yin (Bar-Ilan): *Large fluctuations of the first detected quantum return time.*
12. Talía Lezama Mergold Love (Ben Gurion University): *Dynamics in time-dependent disordered systems.*
13. Yaakov Yudkin (Bar-Ilan): *The Feshbach Dimer - Efimov Trimer Interferometer: Concept, Results and Analysis*
14. Yiming Pan (Weizmann): *Observation of the weak-to-strong transition of quantum measurement in trapped ions.*
15. Zhenbo Ni (Bar-Ilan): *t.b.a.*

Sponsors

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- Batsheva de Rothschild fund of the Israeli Academy of Science.

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Batsheva de Rothschild 1914-1999

Batsheva de Rothschild was a biologist, trained at the Sorbonne, Paris and at Columbia University, New York. She worked for a while at the Pasteur Institute, Paris. During World War II, Bethsabée joined the Free French Movement at its office in New York and volunteered for its armed forces. Assigned to London, she landed in Normandy during the Allied invasion, eventually reaching Paris, where she served as liaison between the French and the United States military forces. As a frequent visitor to the young State of Israel in the 1950s, she met with Prof. Ephraim Katzir (Weizmann Institute) and Prof. Alex Keynan (Hebrew University), who convinced her of the acute need to support basic research in Israel. In 1958, she established the fund bearing her name, which she personally headed with great devotion until her last days.

The Batsheva Fund was established as a private endowment fund, first in New York City and afterwards, in 1965, in Israel. In 1993 she generously transferred the fund to the Israel Academy of Sciences and Humanities. In 1958 she became the only one ever, from her legendary family, to settle in Israel and became active in public life. Science and the arts were the two loves of this exceptional woman. In 1989 she was awarded the prestigious Israel Prize for her many contributions to Israeli society, among them the founding of Israel's Batsheva and Bat Dor Dance Companies. The Batsheva Fund's purpose is to further Science in Israel for the people of Israel. It operates through a five-member Directorate. A Panel of Advisors, comprised of Israeli scientists of several disciplines, is

appointed to guide its scientific activity. The President of the Academy serves as its President.