ITAMP, 60 Garden St., Cambridge, MA 02138 Tel. 617 495-9524

B2, 32540 S. Biosphere Road, Oracle Arizona 85623 Tel. 520 838-6200

Winter Graduate School on Atomic, Molecular and Optical Physics:

Quantum Thermodynamics: quantum many-body meets thermodynamics

February 18 - 24, 2024

Hosted at Biosphere 2

*ITAMP is funded by the National Science Foundation

Notes

Welcome

Welcome to the 12th ITAMP Winter Graduate School on Atomic, Molecular and Optical Physics. This year's program focuses on Quantum Thermodynamics: many-body quantum meets thermodynamics. We are delighted to have researchers who are undisputed world leaders in this field and outstanding teachers. We are grateful for their willingness to invest the considerable amount of time required to prepare and present their lectures.Our primary goal for this school is to enable and encourage informal interactions as well as formal discussions during the school. We hope that you will take advantage of the unique setting of the Biosphere 2 campus and its relaxed and informal environment to interact extensively with the lecturers. Most of them will be able to spend several days with us. So, don't miss this opportunity!

We also have extracurricular activities planned. So, it's not just all work and no play. The schedule of lectures includes free afternoons for the faculty and students to enjoy the outdoors, or just relax in the beautiful surroundings of the B2 Campus.

Enjoy!

Hossein Sadeghpour

Events

We have planned excursions and events during the week and a sign up sheet will be available.

- Hike/Outing
- Poster Session
- Possibly private car riding to Saguaro National Park

Notes

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Notes

Program

		SUN	MON	TUE	WED	THUR	FRI	SAT
		2/18/2024	2/19/2024	2/20/2024	2/21/2024	2/22/2024	2/23/2024	2/24/2024
Start	End							
7:30	9:00		BREAKFAST	BREAKFAST	BREAKFAST	BREAKFAST	BREAKFAST	BREAKFAST
9:00	10:10	Arrival	Yunger Halpern	Schmidt-Kaler	Schmidt-Kaler	Kosloff	Dag	Departure
10:10	11:20	Pickup Registration Packets and Keys	Kosloff	Sinha	Landi	Sinha	Ng	
11:20	12:30		Ng	Yunger Halpern	Kosloff	Schmidt-Kaler	Landi	
12:30	1:30		LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	
1:30	5:30		Free Afternoon	Free Afternoon	OUTING Catalina Mountain HIKE	Free Afternoon	Free Afternoon	
5:30	6:30	DINNER - SELF SERVE (Available from 5pm to 10pm)	Landi	Dag	DINNER	Yunger Halpern	Sinha	
6:30	7:30		DINNER	DINNER	DINNER	DINNER	DINNER	
7:30	8:30		Poster Session	Ng		Movie at the Biosphere		

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Lecturers

Ceren Dag

ITAMP

Email: ceren.dag@cfa.harvard.edu

Ceren B. Dag is an ITAMP Fellow at Harvard University. She earned her PhD in Physics at University of Michigan in 2021 collaborating with Kai Sun and Luming Duan as her thesis advisors. She studies quantum matter in and out of equilibrium, and looks for fundamental principles underlying physical phenomena.

Lecturers

Nicole Yunger Halpern

NIST/UMD

Email: nicoleyh@umd.edu

Nicole Yunger Halpern is a physicist at the National Institute of Standards and Technology (NIST), a Fellow of the Joint Center for Quantum Information and Computer Science (QuICS), and an adjunct assistant professor at the University of Maryland. Nicole re-envisions 19th-century thermodynamics for the 21st century, using quantum information theory. She has dubbed this research "quantum steampunk," after the steampunk genre of art and literature that juxtaposes Victorian settings with futuristic technologies. Nicole completed her PhD at Caltech, winning the international Ilya Prigogine Prize for a thermodynamics thesis. While an ITAMP Postdoctoral Fellow at Harvard University, she won the International Quantum Technology Emerging Researcher Award. Other accolades include the US ASPIRE Prize and the Mary Somerville Medal. Nicole is also the author of the book for the general public Quantum Steampunk: The Physics of Yesterday's Tomorrow.

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Contacts

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Jaclyn Donahue - Administrative Coordinator
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Email: Jaclyn.donahue@cfa.harvard.edu

Biosphere Contact:
Kimberly Land - Events Operations Coordinator
Phone: 520-621-0436
Email: kland@arizona.edu

Lecturers

Ronnie Kosloff
Hebrew University
E-mail: glandi@ur.rochester.edu

Ronnie Kosloff is a Professor of Chemistry at Hebrew University. Prof. Kosloff expertise and inter-ests range from efficient numerical techniques for molecular dynamics and coherent control of molecular reactions, to thermodynamics of open quantum systems, finite time quantum thermodynamics, and quantum approaches to equilibration and thermalization.

Lecturers

Gabriel Landi
University of Rochester
E-mail: glandi@ur.rochester.edu

Gabriel Landi received his PhD from the University of São Paulo, Brazil, in 2012. He was an assistant professor at UFABC (2013-2016), and at the University of São Paulo (2016-2022). He joined the University of Rochester in 2022 as an associate professor in the Department of Physics and Astronomy. He is also an associate editor at PRX Quantum, and a member of the Brazilian Physical Society. Professor Landi's research is in the field of theoretical quantum information sciences and technologies. He is a specialist in the field of open quantum systems, with applications to quantum thermodynamics, quantum transport and quantum metrology. In particular, his research focuses on reformulating the laws of thermodynamics, and concepts such as resource expenditure and irreversibility, within a quantum-coherent context. The research aims to address fundamental questions, as well as propose novel applications in quantum sensing, energy harvesting devices and quantum computing.

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Lecturers

Nelly Ng
Nanyang Technological Univ -Singapore
E-mail: nelly.hy.ng@gmail.com

Nelly Ng was appointed as Nanyang Assistant Professor in 2020 in the physics department of the School of Physical and Mathematical Sciences (SPMS) at Nanyang Technological University. She is also co-PI of the National Quantum-Safe Network (NQSN), an initiative to build quantum-safe communication technologies across Singapore. Nelly received her B.Sc. (Hons) from SPMS NTU in 2012. In 2017, she received her PhD on the study of quantum information and thermodynamics from Delft University of Technology, the Netherlands. Nelly was hosted between 2017-2020 at the Free University of Berlin as an Alexander von Humboldt Research Fellow, applying the theoretical toolkits of quantum information to probe complex many-body systems and thermodynamics for nanoscale quantum systems. The current research directions in her group at NTU revolve around the theme of developing new analytical methods in quantum information theory, and using them to gain a fresh perspective in various problems, ranging from quantum many-body physics to quantum communication tasks.

Lecturers

Ferdinand Schmidt-Kaler
University of Mainz
E-mail: fsk@uni-mainz.de

Full Professor of Experimental Quantum Optics and Atomic Physics at Mainz Univ. 2005-2010, Full Professor of Experimental Physics at the University of Ulm, 2001 Habilitation and Univ. Lecturer, Innsbruck, Austria and 1995-1996 Research Assistant with R. Blatt. 1992-1995 Postdoctoral Research Assistant with S.Haroche, Lab. Kastler Brossel at École Normale Supérieure in Paris. 1992 - 1989 Research Assistant at MPQ Garching / PhD student with T. Hänsch. 1989 Diploma in Physics at the TUM / MPQ with G. Rempe, H. Walther. 1986 - 1983, Study of Physics, TUM, Univ. Bonn and Univ. Bochum.

Research interests: Laser cooling and trapping of atoms and ions, high resolution spectroscopy, quantum information technologies with atoms, ions, electrons and solids, more than 200 publications - www.quantenbit.de

Helpful local information

*** Please obey the speed zones on Oracle Road.**

Pharmacy:
CVS - 25 minutes
10650 N Oracle Rd, Oro Valley, AZ 85737

Hospitals:
Oro Valley hospital - 22 minutes
1551 E Tangerine Rd, Oro Valley, AZ 85755

Grocery store:
Bashas - 17 minutes
15310 N Oracle Rd Tucson Az 85739

Gas Station:
Circle K - 8 minutes
2000 W American Ave, Oracle, AZ 85623

Circle K - 14 minutes
15935 N Oracle Rd, Tucson, AZ 85739

Coffee:
The Oracle Patio Cafe and Market - 11 minutes
270 W American Ave, Oracle, AZ 85623

Restaurants:
Sammy's Mexican Grill - 15 minutes
16502 N Oracle Rd, Catalina AZ 85739

Sunny Side up Cafe - 16 minutes
15800 N Oracle Rd Tucson AZ 85739

Lupe's Restaurant - 10 minutes
35480 AZ - 77, Saddlebrooke, AZ 85739

Shopping:
Oracle Crossings - 32 minutes
7881 N Oracle Rd, Oro Valley, AZ 85704

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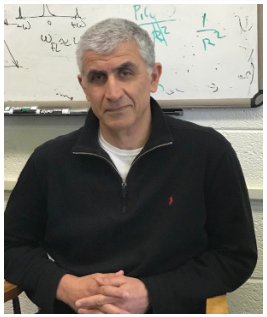
Organizers



Hossein Sadeghpour

Director

Center for Astrophysics| Harvard&Smithsonian

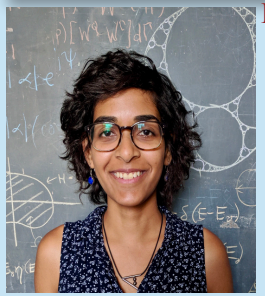
Research Interests:

Theoretical AMO physics, ultralong range Rydberg molecules, Rydberg mediated few- and many-body physics, precision sensing with Rydberg atoms, cavity assisted molecular formation, and photometry and radiometery for cosmological surveys.

ITAMP began life in 1989 at the Center for Astrophysics | Harvard & Smithsonian. It is the only theoretical AMO "user facility" in the United States. It hosts workshops and visiting scholars, sponsors a speaker series, maintains a prestigious postdoctoral fellowship program, organizes a winter school on AMO physics, and hosts an endowed lecture series. ITAMP workshops and winter schools are archived on the institute YouTube channel. A Call for Pro posal to organize workshops are available at http://itamp.harvard.edu.

ITAMP thrives in the larger Cambridge-area AMO physics ecosys-tem.The mission of ITAMP is to further the cause of theoretical AMO physics by providing resources, scientific and administrative expertise, enhancing collaborative efforts between theory and experiment, and advocating for theoretical AMO physics.

Lecturers



Kanu Sinha

Arizona State

E-mail: kanu@arizona.edu

Kanu Sinha is an Assistant Professor at the Wyant College of Optical Sciences at University of Arizona. She earned her Ph.D. in Physics at University of Maryland (UMD), College Park, and has held postdoctoral appointments at the Institute of Quantum Optics and Quantum Information (IQOQI) in Innsbruck and the US Army Research Laboratory (ARL). She was subsequently an Associate Research Scholar at Princeton University and then an Assistant Professor at Arizona State University before starting her current faculty position at UArizona.

Her research is at the intersection of quantum optics and open quantum systems – with a focus on fluctuation phenomena, collective atom-field interactions and non-Markovian open quantum systems. While primarily a theorist, she collaborates closely with ongoing experiments with cold atoms

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Winter school group Photo 2022

Winter school group Photo 2023