

MCAW 2021 @ Purdue University, West Lafayette - Program schedule

Campus Location: Class of 1950 Lecture Hall (CL50)

Saturday, November 13<sup>th</sup> (Check-in and poster setup from 8:50am)

9:20-9:30am Opening remarks (Chris Greene, Purdue)

**Invited talks:**

**New Faculty Session** (Chair: Chris Greene, Purdue)

9:30-9:50am Qiyu Liang (Purdue)

*Strongly-interacting photons mediated by Rydberg blockade and exchange interactions*

9:50-10:10am Jacob Covey (UIUC)

*Programmable quantum circuits with an array of nuclear spins*

10:10-10:30am Jonathan Hood (Purdue)

*Assembling ultracold LiCs molecules with optical tweezers*

Additional Q&A + Break

**Rydberg Atoms** (Chair: Hannes Bernien, UChicago)

10:50-11:10am Aaron Reinhardt (Kenyon College)

*Towards Control of State Mixing Interactions in Rydberg Excitation Near Forster Resonance*

11:10-11:30am Lavanya Taneja (Simon group, UChicago)

*Interfacing single mm-wave and optical photons using Rydberg atoms*

11:30-11:50am Yin Li (Kuzmich group, UMichigan)

*Collective Rydberg qubits for quantum networks*

12:00-1:40pm Lunch break + Poster + Lab tour I\*

**Trapped Ions and Atom Array** (Chair: Brian DeMarco, UIUC)

1:40-2:00pm Sruthi Venkataramanababu (Odom group, Northwestern)

*Reaction kinetics of  $\text{SiO}^+$  and  $\text{H}_2$  in an ion trap at low rotational states and at super-rotor energies*

2:00-2:20pm Yuanheng Xie (Richerme group, IU-Bloomington)

*An open-endcap blade trap for radial-2D ion crystals*

2:20-2:40pm Kevin Singh (Bernien group, UChicago)

*A dual-element, two-dimensional atom array with continuous-mode operation*

Additional Q&A + Break

**Quantum Gas and Quantum Optics** (Chair: Bryce Gadway, UIUC)

3:00-3:20pm Krutik Patel (Chin group, UChicago)

*Sound Propagation in a Quantum Degenerate Bose-Fermi Mixture*

3:20-3:40pm David gold (Yavuz group, UW-Madison)

*Spatial Coherence of Light in Collective Spontaneous Emission*

3:40-4:00pm Imran Mirza (Miami U)

*Many-body waveguide quantum electrodynamics: From entanglement manipulation to photon routing*

Additional Q&A + Break

**Precision Measurements and Sensing** (Chair: Tongcang Li, Purdue)

4:20-4:40pm Tejas Deshpande (Kovachy group, Northwestern)

*Gravitational wave and dark matter detection using atom interferometry (MAGIS-100)*

4:40-5:00pm Xin Zheng (Kolkowitz group, UW-Madison)

*High Precision Differential Clock Comparisons with a Multiplexed Optical lattice Clock*

5:00-5:20pm Eduardo Alejandro (Gareci group, Northwestern)

*3-D force sensing at sub-micron-distances from a surface using optically trapped nanospheres*

5:20-6:30pm Poster + Lab tour II\*

\*Join optional lab tour according to assigned session on name tag

Departure

## Midwest Cold Atom Workshop 2021

Saturday, November 13<sup>th</sup>, 2021

Class of 1950 Lecture Hall, Purdue University

### Poster Session

#### First floor lobby

#	Authors	Poster title	Institution
1	Mohit Verma, Shaozhen Yang, and David DeMille	A new experiment to search for the FrAg Schiff moment using ultracold assembled molecules	University of Chicago
2	Ujaan Purakayastha, Colin Lualdi, and Paul Kwiat	Fast optical switching for quantum information	University of Illinois - Urbana-Champaign
3	Tejas Deshpande, Natasha Sachdeva, Garrett Louie, Jay Jachinowski, Jayampathi Kangara, Jonah Glick, Kefeng Jiang, Kenneth DeRose, Sharika Saraf, Yiping Wang, Zilin Chen, and Timothy Kovachy	Tests of gravity using a Strontium atom interferometer over 10 cm to 1 m length scales	Northwestern University
4	Scott Wenner, Reese Tyra, Jianqiao Li, Kefeng Jiang, Samir Bali	Topological stability of stored Bessel beams via EIT in atomic vapor	Miami University
5	David Peana, Karl Blodgett, Maria Paula Montes Bejarano, Saumitra Phatak, Jonathan Hood	Assembling Ultracold LiCs Molecules from Single Atoms	Purdue University
6	Xinchao Zhou, Hikaru Tamura, Tzu-Han Chang, Chen-Lung Hung	Atom trapping and demonstration of atom-light interaction on a nanophotonic microring resonator	Purdue University
7	Jonah Glick, Tejas Deshpande, Natasha Sachdeva, Zilin Chen, Ken DeRose, Yiping Wang, Timothy Kovachy	A High Power, Stable, and Tunable Interferometer Beam with Suppressed Wavefront Aberrations for 100 Meter Baseline Atom Interferometry (MAGIS-100)	Northwestern University
8	Kenneth DeRose, Tejas Deshpande, Timothy Kovachy	High-power and Frequency-Agile Laser System for Gravitational Wave and Dark Matter Detection Using Atom Interferometry (MAGIS-100)	Northwestern University
9	Deepak Aditya Suresh, Francis Robicheaux	Photon induced atom recoil in collectively interacting planar arrays	Purdue University
10	Hyunwoo Lee, Chris Greene	Variational Adiabatic Hyperspherical Potentials of More than Few Bosons	Purdue University
11	Marissa D'Onofrio, Yuanheng Xie, A.J. Rasmuson, Jiafeng Cui, Evangeline Wolanski, Stephen Howell, and Phil Richerme	Radial Two-Dimensional Ion Crystals in a Linear Paul Trap	Indiana University
12	Peng Ju, Jonghoon Ahn, Zhujing Xu, Jaehoon Bang, Xingyu Gao, Tongcang Li	Ultrasensitive torque detection with an optically levitated nanoparticle	Purdue University
13	Jonathan Trisnadi, Mingjiamei Zhang, Lauren Weiss, Lucas Baralt, Huiting Liu, Samir Rajani, Cheng Chin	Quantum Matter Synthesizer: Seeing and Controlling Individual Atoms	University of Chicago

14	AJ Rasmusson, Marissa D'Onofrio, Yuanheng Xie, Jiafeng Cui, Philip Richerme	Optimized pulsed sideband cooling and enhanced thermometry of trapped ions	Indiana University
15	Natasha Sachdeva, Yiping Wang, Joseph Jachinowski, Jonah Glick, Timothy Kovachy	Study of laser aberrations for the MAGIS-100 beam delivery system	Northwestern University
16	Dongmin Pak, Arindam Nandi, Michael Titze, Edward Bielejec, Hadiseh Alaeian, Mahdi Hosseini	Optical Properties of Rare-Earth Ion Arrays Embedded into Lithium Niobate Micro-ring Resonators	Purdue University
17	Tomohisa Yoda, Emily Hirsch, Jason Montgomery, Lucy Shamel, Aaron Reinhard	Modeling state mixing in Rydberg excitation near Forster resonance	Kenyon College
18	Noah Glachman, Shankar Menon, Yuzhou Chai, Kevin Singh, Haley Nguyen, Cody Googin, Johannes Borregaard, Hannes Bernien	Telecom Quantum Network Node via Atom-Nanophotonic Interface	University of Chicago
19	Shraddha Agrawal, Sai Naga Manoj Paladugu, Simon Hu & Bryce Gadway	Towards two-dimensional synthetic lattice of momentum states	University of Illinois - Urbana-Champaign
20	Chenxi Huang, Ivan Velkovsky, Cheeranjeev Purmessur, Jackson Ang'ong'a, Tao Chen, and Bryce Gadway	Towards synthetic Rydberg lattice for Quantum simulation	University of Illinois - Urbana-Champaign
21	Callum Welsh, Huiting Liu, Kelsey Gilchrist, Michelle Chong, Cheng Chin	Phenomena in Thermophoretic Levitation: Photophoresis and Many-Body Dynamics	University of Chicago
22	Jeremy Cadiente, Botao Du, Ramya Suresh	Quantum Simulations with Superconducting Quantum Circuits	Purdue University
23	Donny R. Pearson Jr., Zachary W. Riedel, Elizabeth A. Goldschmidt, Daniel P. Shoemaker	Rare earths in solids are cryogenic temperatures as a platform for quantum memory devices	University of Illinois - Urbana-Champaign
24	Eric Reinhardt, Ming Zhu, Cheng-An Chen, Chen-Lung Hung	Analyzing in situ imaging system for a quantum gas experiment through machine learning	Purdue University
25	Casey Scoggins, Danny Wingert, Jordan Churi, Grant Brown, Samir Bali	Bidirectional/Unidirectional ratcheting and stochastic resonance in a dissipative 3D optical lattice	Miami University
26	Akbar Safari, Preston Huft, Chris Young, Jin Zhang, Eunji Oh, Ravikumar Chinnarasu, Cecilia Vollbrecht, Brandon Mehlenbacher, April Yu, Hongyan Mei, Sanket Deshpande, Yuzhe Xiao, Randall Goldsmith, Mikhail Kats, Mark Saffman	Towards A Neutral Atom Quantum Network Testbed	University of Wisconsin - Madison
27	Zhujing Xu, Xingyu Gao, Jaehoon Bang, Zubin Jacob, Tongcang Li	Non-reciprocal energy transfer through quantum vacuum fluctuations	Purdue University
28	Will Huie, Lintao Li, Neville Chen, Brett Merriman, Mingkun Zhou, Jacob Covey	Programmable quantum circuits with an array of nuclear spins	University of Illinois - Urbana-Champaign
29	Danielle Woods, Safura Sharifi, Josephine Melia, Gaurav Bahl, and Elizabeth Goldschmidt	Rare-Earth Doped Silica Microsphere Resonators	University of Illinois - Urbana-Champaign

30	Andrea Londono, Huy Nguyen, Carola Jansohn, Carlos Owens, Paul Berman, Alex Kuzmich	Quantum Information using holographic optical microtraps	University of Michigan
31	Michael D Higgins, Chris H Greene	A Hyperspherical Study of Three- and Four-Fermionic Systems Near Unitarity	Purdue University
32	Zilin Chen, Garrett Louie	Enhancing Large Momentum Transfer Atom Interferometry with Optimal Quantum Control	Northwestern University
33	Jonathan Dolde, Xin Zheng, Hong Ming Lim, Nico Ranabhat, Shimon Kolkowitz	A multiplexed optical lattice clock for differential clock comparisons	University of Wisconsin - Madison

## Second floor lobby

#	Authors	Poster title	Institution
34	Shu Nagata, Zhendong Zhang, Kevin Yao, Cheng Chin	Transition from an atomic to a molecular Bose-Einstein condensate and ultracold chemistry	University of Chicago
35	Foster Thompson, Alex Kamenev, Mark Dykman	Qubit Decoherence and Symmetry Restoration through Real-Time Instantons	University of Minnesota
36	Utku Saglam, Deniz Yavuz	Neutral Atom Phase Gate with Nano-scale Resolution using EIT	University of Wisconsin - Madison
37	Lohmeyer, Chloe. Aggarwal, Nancy. Zhang, Huan. Geraci, Andrew.	Magnetic characterization of the rotational stage for the ARIADNE Axion Experiment	Northwestern University
38	Cheng-An Chen, Chen-Lung Hung	Universal quench dynamics in attractive two-dimensional Bose gases	Purdue University
39	D. M. Girotti-Hernandez, D. C. Gold, A. Bhadkamkar, S. Carpenter, R. Goldsmith, D. van der Weide, and D. D. Yavuz	Molecular Modulation in Glass Disks	University of Wisconsin - Madison
40	Ansh Shah, Alisher Duspayev, Georg Raithel	Non Adiabatic decay in spin coupled dependent potentials	University of Michigan
41	Kevin Singh, Shraddha Anand, Andrew Pocklington, Hannes Bernien	A dual-element, two-dimensional atom array with continuous-mode operation	University of Chicago
42	Lukas Palm, Matt Jaffe, Claire Baum, Lavanya Taneja, and Jonathan Simon	Topological Quantum Matter Made of Light	University of Chicago
43	Matthew Cambria, Ariel Norambuena, Hossein Dinani, Aedan Gardill, Ishita Kemeny, Yanfei Li, Adam Gali, Jeronimo Maze, Shimon Kolkowitz	Temperature dependence of phonon-limited spin relaxation rates of nitrogen-vacancy centers	University of Wisconsin - Madison
44	Yimeng Wang and Chris Greene	Phase lag in the coherent control of photoelectron angular distributions on atomic barium	Purdue University
45	Chenxi Huang, Ivan Velkovsky, Cheeranjeev Purmessur, Jackson Ang'ong'a, Tao Chen, and Bryce Gadway	Towards synthetic Rydberg lattice for Quantum simulation	University of Illinois - Urbana-Champaign

46	Geyue Cai, Krutik Patel, Cheng Chin	Fermion-Mediated Interactions and Sound Excitations in Quantum Degenerate $^{133}\text{Cs}$ - $^6\text{Li}$ Bose-Fermi Mixtures	University of Chicago
47	Sanket Deshpande, Zhaoning Yu, Jin Zhang, Eunji Oh, Preston Huft, Mark Saffman, Mikhail Kats	Diffraction Chips for Simultaneous Magneto-Optical Trapping of Two Atomic Species	University of Wisconsin - Madison
48	Y. Mei, Y. Li, H. Nguyen, P. R. Berman, A. Kuzmich	Dynamics of interaction-induced dephasing for collective atomic qubits	University of Michigan
49	Claire Baum, Lukas Palm, Matt Jaffe, Jonathan Simon	AMO OAM AOM	University of Chicago
50	Bineet Dash, Alisher Duspayev, Georg Raithel	Tractor Atom Interferometry for inertial sensing	University of Michigan
51	Kai-Xuan Yao, Zhendong Zhang, Shu Nagata, Cheng Chin	Dynamics of domain walls in a Bose-Einstein condensate driven by density-dependent gauge field	University of Chicago
52	Shay Inbar	Squeezing in a refractive index-enhanced system	University of Wisconsin - Madison
53	Alisher Duspayev, Xiaoxuan Han, Michael Viray, Lu Ma, Jianming Zhao, Georg Raithel	Rydberg-atom-ion molecule: Formation mechanism, properties and experimental perspectives	University of Michigan
54	Sai Naga Manoj Paladugu, An Fanzhao Alex, Chen Tao, Yan Bo, Bryce Gadway	Injection Spectroscopy for Momentum-Space Lattices	University of Illinois - Urbana-Champaign
55	Sambit Banerjee, Ming Zhu, Chen-Lung Hung	Cold molecule synthesis on a nanophotonic microring circuit	Purdue University
56	Ashwin Boddeti, Jun Guan, Tyler Sentz, Xitlali Juarez, Ward Newman, Cristian Cortes, Teri W. Odom, Zubin Jacob	Long-range dipole-dipole interactions in plasmonic lattice	Purdue University
57	Chetan Galla, Evan Weisman, Nia Burrell, Andrew Laeuger, Andrew A. Geraci	Precision Measurements with Optically-levitating Nanospheres	Northwestern University
58	Jonah Quirk, Amy Damitz, Carol E. Tanner, and D. S. Elliott	Absolute frequency and hyperfine coupling constant measurement of the $nS_{1/2}$ states for $n=12,13$ in atomic cesium-133	Purdue University
59	Ryan Cardman and Georg Raithel	Towards Atomic Internal-State Interferometry of $A_p$ and $A$ -square Interactions in a Driven Optical Lattice	University of Michigan
60	Dongmin Pak, Arindam Nandi, Michael Titze, Edward S Bielejec, Hadiseh Alaeian and Mahdi Hosseini	Cooperative Resonances in an Array of Rare-Earth Ions in Solid-State Photonic Resonators	Purdue University
61	Jianlong Lin, Elizabeth Goldschmidt	Multimode Quantum Interference in Spontaneous Parametric Down Conversion	University of Illinois - Urbana-Champaign
62	Amy Damitz, Jonah Quirk, Carol E. Tanner, D. S. Elliott	Progress towards a measurement of the nuclear anapole moment in cesium	Purdue University
63	Jiafeng Cui, Yuanheng Xie, AJ Rasmusson, Marissa D'Onofrio, Philip Richerme	Susceptibility of Trapped-Ion Qubits to Radiation Sources	Indianan University