

Monday Morning January 9 2023

7:00 **Continental breakfast** [Ballroom 1+2]

Plenary Session [Ballroom 1+2] Olga Kocharovskaya, Chair

7:30 **Marlan Scully**, *Texas A&M University*, “Photon Entanglement in Unruh and Hawking Radiation”

8:00 **Mikhail Lukin**, *Harvard University*, “Exploring new scientific frontiers using programmable atom arrays”

8:30 **Naomi Halas**, *Rice University*, “Nanoparticles and Light for Sustainability and Societal Impact”

Entangling quantum optics with gravity
Ballroom 1
Marlan Scully, Chair

New horizons in optical tweezers arrays
Magpie A
Mikhail Lukin, Chair

Frontiers of Nanophotonics I
Magpie B
Naomi Halas, Chair

Nanoscale Quantum Optics
Wasatch A
Maria Chekhova, Chair

9:10 **Wolfgang Schleich**, *University of Ulm, Germany*, “Atoms falling into Black Holes and Beyond”

Hannes Pichler, *University of Innsbruck*, “Quantum Optimization with Rydberg Atom Array beyond Unit Disk Graphs”

Jennifer Dionne, *Stanford University*, “High-Q Nanophotonic Platforms for Environmental Monitoring and Wastewater-Based Epidemiology”

Maria Chekova, *Max-Planck Institute for the Science of Light, Erlangen, Germany*, “Nanoscale generation of photon pairs: freedom from phase matching”

9:30 **Jonathan Ben Benjamin**, *Texas A&M University*, “The Unruh Energy Paradox”

Manuel Endres, *Caltech*, “Fidelity Benchmarking of Analog Quantum Simulators in High Entanglement-Entropy”

Steve Cronin, *University of Southern California*, “In Situ Spectroscopy of Hot Electron Phenomena in Plasmonic and Plasma-based Processes”

Jose Tomás Santiago-Cruz, *Max-Planck Institute for the Science of Light, Germany*, “Quantum state generation in resonant metasurfaces”

9:50 **Arash Azizi**, *Texas A&M University*, “Unruh and Hawking from Negative Frequency Perspectives”

Hannes Bernien, *University of Chicago*, “Error Mitigation and Interactions in a Dual-Species Atom Array”

Alessandro Alabastri, *Rice University*, “Hot Electron Relaxation Dynamics in Optical Metasurfaces: From Ultrafast Switching to Light Rectifications”

Jihua Zhang, *Australian National University, Australia*, “Entangled two-photon state generation from nonlocal nonlinear metasurfaces”

10:10 **Anatoly Svidzinsky**, *Texas A&M University*, “Manifestations of Minkowski vacuum entanglement”

Adam M. Kaufman, *University of Colorado/JILA*, “Quantum science with microscopically-controlled arrays of alkaline-earth atoms”

Emiliano Cortes, *LMU, Germany*, “Bimetallic Plasmonic Catalysts: From Single Particles to Metasurfaces”

Adrien Borne, *Université Paris Cité*, “Quantum state engineering of photon pairs in nonlinear nanoresonators”

10:30

— Break —

Plenary Session [Ballroom 1+2] Yuri Shvyd’ko, Chair

10:50 **Jun Ye**, *JILA, NIST, University of Colorado*, “Quantum coherence, entanglement, and clock: from emergent phenomena to fundamental physics”

11:20 **Olga Kocharovskaya**, *Texas A&M University*, “Quantum Optics with x-ray photons and ultra-narrow nuclear transitions”

Interface of Gravity and Quantum Optics
Ballroom 1

Igor Pikovsky and Jun Ye, Chair

12:00 **Andrew Geraci**, *Northwestern University*, “Testing gravity with optically levitated sensors”

Quantum Nucleonics
Magpie A

Olga Kocharovskaya, Chair

Yuri Shvyd’ko, *ANL*, “Resonant Excitation of the long-lived 12.4-keV nuclear transition in ^{45}Sc by x-ray free-electron laser pulses”

Peter Thirolf, *University of Munich*, “Unveiling the Thorium Isomer $^{229\text{m}}\text{Th}$: On the Way Towards a Nuclear Clock as Novel Quantum Sensor”

Wen-Te Liao, *National Central University*, “Coherent Control of Nuclei: From X-Ray Spectral Enhancement to the Transient Nuclear Inversion”

New Frontiers with atomic clocks and Rydberg atoms
Magpie B

Mikhail Lukin, Chair

Shimon Kolkowitz, *University of Wisconsin, Madison*, “Testing relativity in the laboratory with optical lattice atomic clocks”

Alex Kuzmich, *University of Michigan*, “Light-matter interfaces with Rydberg atomic ensembles and arrays”

Robert Jones, *University of Virginia*, “Active Suppression of Dephasing to Reveal Dipole-Dipole Driven Rabi Oscillations in a Random Many-Atom Rydberg Gas”

Matter-Wave Bubbles/BEC
Wasatch A

Barry Garraway, Chair

Barry Garraway, *University of Sussex, UK*, “Bubbles and Rings of Cold Quantum Gas: Dressed-Atom Approach”

Smitha Vishveshwara, *University of Illinois, Urbana-Champaign*, “Quantum Bubbles in Land-Based Optical Lattices and in Space”

Naceur Gaaloul, *Leibniz University of Hanover, Germany*, “Quantum Bubbles with Degenerate Mixtures”

12:40 **Igor Pikovski**, *Stevens Institute of Technology & Stockholm University*, “Eddington’s Enigma: Composite quantum systems on curved space-time and tests with quantum networks”

Monday Evening January 9 2023

Plenary Session [Ballroom 1+2] Eric Van Stryland, Chair

- 19:00 **Kerry Vahala**, *Caltech*, “Next Generation Frequency Microcombs for Miniature Clocks, Signal Sources and Frequency Synthesizers”
19:30 **Gerd Leuchs**, *Max Planck Institute for the Science of Light*, “The Distinguishing Role of the Quantum Measurement Process”
20:00 **Alexei V Sokolov**, *Texas A&M University*, “Quantum Sensing — near and far”

Advanced Semiconductor Lasers

Ballroom 1

Kerry Vahala, Chair

- 20:50 **John Bowers**, *University of California, Santa Barbara*, “Microcomb Generation Using AlGaAsOI Resonators”
21:10 **Kent Choquette**, *University of Illinois*, “Supermode Dynamics of Microcavity Laser Arrays”
21:30 **Jesper Mork**, *Technical University of Denmark*, “Semiconductor nanolasers with deep sub-wavelength confinement of light”
21:50 **Johann Peter Reithmaier**, *University of Kassel*, “InP-Based 1.3 μ meter Quantum Dot Material: Prospects and Status”
22:10 **Gadi Eisenstein**, *Technion*, “On the Relationship between Electro-Optics and Electric Characteristics of Tunneling Injection Quantum Dot Lasers”

Quantum Versus Classical: Entanglement and Criteria for Quantumness

Magpie A

Gerd Leuchs, Chair

- Natalia V Korolkova**, *University of St. Andrews*, “Separable Quantum and Non-Separable Classical Modes: controversies and Operational Value”
Antonio Zelaquett Khoury, *Universidade Federal Fluminense, Niteroi*, “Quantum-Like Inequalities for Spin-Orbit Laser Modes”
Luis Sánchez-Soto, *Universidad Complutense de Madrid*, “Quantumness beyond entanglement: The case of symmetric states”
Alexei Ourjountsey, *CNRS & College de France*, “Deterministic Free-Propagating Photonic Qubits with Negative Wigner Functions”
Ebrahim Karimi, *University of Ottawa*, “Structured Photons: Quantum or Classical?”

Nonlinear Optics

Magpie B

Eric Van Stryland and Alexei Sokolov, Chair

- Eric Van Stryland**, *CREOL*, “5 Decades of Measuring Nonlinear Material Properties”
Jeffrey Moses, *Cornell University*, “Altering the Normal Behaviors of Parametric Frequency Conversion for Practical Gains”
Ksenia Dolgaleva, *University of Ottawa, Canada*, “Predicting and Measuring Gain Nonlinearity in Crystal Quartz at the THz Frequency Range”
Demetrios Christodoulides, *University of Southern California*, “Optical Thermodynamics of Nonlinear Highly-Multimode Systems”
David Novoa, *Max Planck Institute for the Science of Light, Germany, University of the Basque Country (UPV/EHU), Spain and Basque Foundation for Science, Spain*, “Quantum Frequency Conversion using Hollow Anti-Resonant Fibers”

Photonic Quantum Technologies

Wasatch A

John Howell, Chair

- Norbert M. Linke**, *Duke University*, “Realizing quantum applications on a noisy trapped-ion machine”
Andrei Faraon, *Caltech*, “Controlling nuclear spins with a single rare-earth ion”
Kyungwon An, *Seoul National University*, “Coherent Superradiance and Its Applications”
Diana Serrano, *Paris Tech, PSL University, CNRS, Instiut de Recherche de Chimie Paris*, “Europium Complexes with Ultra-Narrow Optical Linewidth: A New Material Platform for Photonic Quantum Technologies”
Natalia Litchinitser, *Duke University*, “Topological states of light and darkness”

Tuesday Morning January 10 2023

7:00 **Continental breakfast** [Ballroom 1+2]

Plenary Session [Ballroom 1+2] Mark Saffman, Chair

7:30 **Christopher Monroe**, *Duke University and IonQ*, “Quantum Computer Components, Systems and Applications”

8:00 **Peter Nordlander**, *Rice University*, “Plasmon-induced hot carrier generation, relaxation, and applications”

8:30 **Mikhail Ivanov**, *Max Born Institute, Germany*, “Lasing without inversion during laser filamentation in the air”

<i>Qubits and Quantum Computing Systems</i> Ballroom 1 Christopher Monroe, Chair	<i>Frontiers of Nanophotonics II</i> Magpie A Peter Nordlander, Chair	<i>Airlasing</i> Magpie B Mikhail Ivanov, Chair	<i>Control of Many-Body Spin Systems</i> Wasatch A Svetlana Malinovskaya, Chair
9:10 Jungsang Kim , <i>Duke University and IonQ</i> , “High Performance Quantum Logic Gates in Trapped Ion Systems”	Nicolas Large , <i>University of Texas, San Antonio</i> , “Photonic Band Structure Calculation of 3D Finite Nanostructured Supercrystals”	Arthur Dogariu , <i>Princeton University and Texas A&M University</i> , “Backward, Forward, and Around the Corner Atomic Lasing in Air”	Svetlana Malinovskaya , <i>Stevens Institute of Technology</i> , “Imprinting the entanglement of the atomic state on a photonic state”
9:30 Sasha Anderov , <i>University of Chicago</i> , “Millimeter-Wave Superconducting Qubits and Optical Transduction”	Jiming Bao , <i>University of Houston</i> , “Microfluidic Pumps with Laser Streaming from Tips of Optical Fibers and Sewing Needles”	Chandrashekhar Joshi , <i>University of California Los Angeles</i> , “What do High-Field Ionization of Nobel Gases and Lasing in Air Have in Common”	Reinhold Walser , <i>Darmstadt University</i> , “Designing optics for coherent and quantum matter-waves”
9:50 Mark Saffman , <i>University of Wisconsin and ColdQuanta</i> , “Mid-Circuit Qubit Measurements on a Neutral Atom Processor”	Jason Valentine , <i>Vanderbilt University</i> , “Meta-Optic Accelerators for Image Processing”	Pavel Polynkin , <i>Arizona State University</i> , “Low-order harmonic generation and interference in short- and mid-wave infrared laser filaments in gases”	Chunlei Qu , <i>Stevens Institute of Technology</i> , “Bose-Einstein condensate gyroscope via a synthetic magnetic field”
10:10 Lei Feng , <i>Duke University</i> , “Quantum Simulation of Entangled Matter with an Ion Trap Quantum Computer”	Tigran Shahbazyan , <i>Jackson State University</i> , “Purcell Factor for Plasmon-Enhanced Metal Photoluminescence”	Alexey Zheltikov , <i>Texas A&M University</i> , “Cross-range nonlinear optics with laser filaments”	Robin Côté , <i>University of Connecticut</i> , “Resonant processes and their impact in many-body dynamics”

— Break —

Plenary Session [Ballroom 1+2] Václav Špička, Chair

10:50 **Susanne Yelin**, *Harvard University*, “Brain-Inspired Quantum Machine Learning for NISQ Machines”

11:20 **Surjeet Rajendran**, *John Hopkins University*, “A Causal Framework for Non-Linear Quantum Mechanics”

<i>Quantum Machine Learning</i> Ballroom 1 Susanne Yelin, Chair	<i>New Tests of Quantum Mechanics</i> Magpie A Surjeet Rajendran, Chair	<i>Ultrafast Spectroscopy</i> Magpie B Thomas Pfeifer, Chair	<i>Optics of Solids</i> Wasatch A Weng Chow, Chair
12:00 Xun Gao , <i>Harvard University</i> , “Interpretable Quantum Advantage in Neural Sequence Learning”	Alex Sushkov , <i>Boston University</i> , “Experimental Limit on Non-Linear State-Dependent Terms in Quantum Theory”	Zhenhuan Yi , <i>Texas A&M University</i> , “Toward Tip-enhanced Low Frequency Raman”	Peter Keefe , <i>University of Detroit Mercy</i> , “Bardeen Hysteresis Explained”
12:20 Hakan Türeci , <i>Princeton University</i> , “Fundamental Limits to Learning with Finitely Sampled Qubit-Based Systems”	Andrew Jayich , <i>University California, Santa Barbara</i> , “Towards Measuring Atomic Aging with a Radioactive Optical Clock”	Steven Cundiff , <i>University of Michigan</i> , “Multidimensional Coherent Imaging Spectroscopy of Transition Metal Dichalcogenides Monolayers and Heterostructures”	Václav Špička , <i>Institute of Physics of the Czech Academy of Sciences</i> , “Physics of biological neural networks”
12:40 Jacob Biamonte , <i>Beijing Institute of Mathematics and Applications</i> , “Towards experimental demonstration of parameterisation effects when training variational quantum algorithms”	Gerhard Klimeck , <i>Network for Computational Nanotechnology, Purdue University</i> , “Atomistic, multi-scale, multi-physics quantum transport models for quantitative, predictive nanoscale device designs”	Thomas Pfeifer , <i>Max Planck Institute for Nuclear Physics</i> , “Understanding Intense-Laser Control from Two Electrons in Atoms to Many Electrons in Molecules”	Alexander W. Cerjan , <i>Sandia Lab</i> , “Creating Controllable Sets of Bound States in the Continuum”

Tuesday Evening January 10 2023

Plenary Session [Ballroom 1+2] David A Reis, Chair

- 19:00 **Dana Anderson**, *University of Colorado/JILA*, “Peculiar and Useful Aspects of Matter-Wave Field Theory”
 19:30 **Nikolay Zheludev**, *University of Southampton*, “Photonic Analogue of a Continuous Time-Crystal”
 20:00 **Ralf Röhlsberger**, *HI Jena and DESY, Hamburg, Germany*, “New Regimes in Nuclear Cooperative Emission”

	<i>The Marriage of Quantum Sensing and Information Processing with Atoms</i> Ballroom 1 Dana Anderson, Chair	<i>Pico-nano-opto Mechanics and Floquet Matter</i> Magpie A Nikolay Zheludev, Chair	<i>X-Ray Quantum Optics</i> Magpie B Ralf Röhlsberger, Chair	<i>Diamond Quantum Technology</i> Wasatch A Philip Hemmer, Chair
20:50	Shengwang Du , <i>University of Texas, Dallas</i> , “Non-Hermitian Quantum Optics in Cold Atoms”	Mark Brongersma , <i>Stanford University</i> , “Nanomechanical Control of Gap Plasmon resonators”	Leon Lohse , <i>Universität Göttingen, and DESY, Germany</i> , “Collective single-photon emission in x-ray waveguides: “The Super of Superradiance” revisited”	Philip Hemmer , <i>Texas A&M University</i> , “New opportunities for biosensing with fluorescent diamond and phosphor nanoparticles”
21:10	James K Thompson , <i>University of Colorado, Boulder/JILA Institute</i> , “Entanglement-Enhanced Matter-Wave Interferometry in a High-Finesse Cavity”	Javier Aizpurua , <i>Materials Physics Center CSIC-UPV/EHU, Spain</i> , “Atomically-Resolved Mapping of the Purcell Factor, Lamb Shift and Stark Effect from a Single Molecular Emitter in a Picocavity”	Xiwen Zhang , <i>Texas A&M University</i> , “Hard X-ray quantum memory by Doppler frequency comb”	Nir Bar-Gill , <i>Hebrew University</i> , “Diamond Quantum Technologies — From Noise Characterization to Radical Sensing”
21:30	Ceren Uzun , <i>Los Alamos National Laboratory</i> , “Machine Learning Optimization of a Guided Atom Interferometer”	Jakob Khurgin , <i>John Hopkins University</i> , “What does it take to modulate refractive index by any conceivable means?”	Sven Velten , <i>University Hamburg</i> , “Nuclear Frequency Comb for Quantum Memory: Experiment”	Peter Pauzauski , <i>University of Washington</i> , “Synthesis and Characterization of Optically-Levitated Quantum Electronic Sensors”
21:50	Murray K Holland , <i>University of Colorado, Boulder/JILA Institute</i> , “Quantum Design of a Matter-Wave Interferometer”	Ewold Verhagen , <i>AMOLF, The Netherlands</i> , “Optomechanical meta-matter: Nonreciprocity and topology in synthetic nanomechanical networks”	Joachim von Zanthier , <i>Universität Erlangen-Nürnberg, Germany</i> , “Quantum Imaging via correlations of X-ray fluorescence photons”	Peter Maurer , <i>University of Chicago</i> , “Engineering spin coherence in core-shell diamond nanocrystal”
22:10	Malcolm Geoffrey Boshier , <i>Los Alamos National Laboratory</i> , “Sensing and Signal Processing with Trapped BECs”	Andrea Alú , <i>CUNY</i> , “Floquet Metamaterials”	Jörg Evers , <i>MPI Heidelberg</i> , “Inverse Design in Nuclear Cavity QED”	Pankaj Jha , <i>Syracuse University</i> , “Spectroscopy of Atomic Defects in 2D Materials”

Wednesday Morning January 11 2023

7:00 **Continental breakfast** [Ballroom 1+2]

Plenary Session [Ballroom 1+2] Philip Hemmer, Chair

7:30 **Wolfgang Schleich**, *University of Ulm*, “The Kostin Equation, the Deceleration of a Quantum Particle and Coherent Control”

8:00 **Vlad Shalaev**, *Purdue University*, “Quantum Meta-Photonics”

8:30 **Ren-Bao Liu**, *Chinese University of Hong Kong*, “Quantum Nonlinear Spectroscopy via Quantum Sensing”

Quantum Dynamics I

Ballroom 1
Wolfgang Schleich, Chair

9:10 **Georgi Gary Rozenman**, *Tel Aviv University*, “Surface Gravity Waves as a Universal Platform to Emulate Physical Phenomena”

9:30 **Denys Bondar**, *Tulane University*, “Chiral current of Bose-Einstein Condensates via asymmetric tunneling”

9:50 **Hansjörg Dittus**, *University of Bremen*, “Quantum Sensing: The Ultimate Tool for Space Research and Exploration”

10:10 **Hartmut Abele**, *TU Wien*, “Quantum Gravitation and Gravity Resonance Spectroscopy”

10:30

10:50 **Marlan Scully**, *TAMU, Baylor, Princeton*, “Presentation of the 2023 Willis E. Lamb Award for Laser Science and Quantum Optics”

11:20 **Franco Nori**, *RIKEN and University of Michigan*, “Quantum Optics with Giant Atoms: Decoherence-Free Interaction Between Giant Atoms in Waveguide Quantum Electrodynamics”

New Frontiers in Optics: From Nonlinear Resonator Networks to Quantum Optics with Neural Networks and

Machine Learning

Ballroom 1
Franco Nori, Chair

12:00 **Sahin Ozdemir**, *Pen State University*, “Non-Hermitian Spectral Degeneracies in Light-Matter Interactions”

12:20 **Anton Frisk-Kockum**, *Chalmers University of Science and Technology, Sweden*, “Quantum State and Process Tomography with Machine Learning and Gradient Descent”

12:40 **Alireza Marandi**, *Caltech*, “Nonlinear Resonator Networks: From Complex Optics to Advanced Computing and Sensing”

Meta-Quantum

Magpie A
Vlad Shalaev, Chair

David A B Miller, *Stanford University*, “Shrinking Optics—Why Optics Needs Thickness and How Much It Needs”

Dirk Englund, *MIT*, “Metasurfaces Controlled by Single or Few Electrons per Optical Degree of Freedom”

Marin Soljagic, *MIT*, “A general framework for scintillation in nanophotonics”

Eran Lustig, *Stanford University*, “Time-Refractive of Light in the Single-Cycle Regime”

Plenary Session [Ballroom 1+2] Virgil Sanders, Chair

Biophotonics

Magpie A
Pu-Ting Dong, Chair

Pu-Ting Dong, *Harvard*, “Differentiation of Microbial Interaction at the Single-Cell Level Through Unconventional Utilization of Expansion Microscopy”

Jie Hui, *Massachusetts General Hospital and Harvard Medical School*, “Endogenous Chromophore-Targeted Antimicrobial Phototherapy: For Fundamental Concept Towards Clinical Application”

Jizhou Wang, *Texas A&M University*, “Infrared Label-free Wide-Field Imaging with Sub-Micron Spatial Resolution Enabled by Infrared-Resonant Third-Order Sum-Frequency Technique”

Quantum Science and Technology using Spins in Diamond

Magpie B
Ren-Bao Liu, Chair

Chunhui Du, *University of California, San Diego*, “Harnessing Nitrogen Vacancy Centers in Diamond for Next-Generation Quantum Science and Technology”

Milos Nesladek, *Interuniversity Microelectronics Center and Hasselt University, Belgium*, “Diamond Spin Qubits Performance: Electrical vs Optical Readout”

Guido van de Stolpe, *Delft University of Technology, Netherlands*, “Sensing and control of a 50-nuclear-spin network surrounding a single NV center”

Chong Zu, *Washington University, St Louis*, “Quasi-Floquet Prethermalization in a Disordered Dipolar Spin Ensemble in Diamond”

— Break —

Metamaterials and Topology

Magpie B
Hakan Türeci, Chair

Ji-Xin Cheng, *Boston University*, “Ultrasensitive Chemical Imaging by Optical Photothermal Infrared Microscopy”

Siddharth Ramachandran, *Boston University*, “Topological Confinement: An Alternative to Total-Internal Reflection for Light Transport”

Evgenii Narimanov, *Purdue University*, “The Fundamental Limit to the Resolution of Far-Field Optical Imaging”

Quantum Simulation and Sensing

Wasatch A
TBA, Chair

Shi-Yao Zhu, *Zhejiang University*, “Quantum Simulation in Superradiance Lattices”

Sarah Zubairy, *Texas A&M University*, “Economic Impact of Quantum Technologies”

John Howell, *Chapman Univ.*, “Doppler Gyroscopes: Frequency vs Phase Estimation”

Sharon Shwartz, *Bar Ilan University*, “High-resolution imaging with ghost Compton imaging”

Quantum Dynamics II

Wasatch A
Wolfgang Schleich, Chair

Martina Barnas, *Office of Naval Research Global, London*, “Partners in Science: The U.S. Office of Naval Research Global Programmatic Overview”

Igor Jex, *Czech Technical University Prague*, “Quantum Walks on Graphs”

Peter Hommelhoff, *University Erlangen-Nurnberg*, “Femtosecond laser-emitted electrons from needle tips: from two-particle correlations to coherent light-electron coupling”

Wednesday Evening January 11 2023

Plenary Session [Ballroom 1+2] Dawei Wang, Chair

- 19:00 **Moti Segev**, *Technion - Israel Institute of Technology*, “Topological Photonics: Where do we go from here?”
19:30 **Alexandra Boltasseva**, *Purdue University*, “Advancing Photonics with Machine Learning”
20:00 **Olga Smirnova**, *Max Born Institute, Germany*, “Ultrafast Chirality: twisting light to twist electrons”

<i>Topological Quantum Optics</i>	<i>Photonics, Quantum and Machine Learning</i>	<i>Attosecond Science with Structured and Quantum Light</i>	<i>Nonlinear Optics and Quantum Sensing</i>
Ballroom 1	Magpie A	Magpie B	Wasatch A
Moti Segev and Dawei Wang, Chair	Alexandra Boltasseva, Chair	Olga Smirnova, Chair	Eric Van Stryland and Alexei Sokolov, Chair
<u>20:50</u> Marius Jürgensen , <i>The Pennsylvania State University</i> , “Quantized Fractional Thouless Pumping of Solitons”	Hadiseh Alaeian , <i>Purdue</i> , “From Dipolar to Rydberg Photonics”	David A Reis , <i>Stanford University and SLAC National Accelerator Laboratory</i> , “X-Ray and Optical Mixing as a Means of Imaging Attosecond Electron Motion in Solids”	Richard Miles , <i>Princeton University</i> , “Atomic Resonance Enabled Atmospheric LIDAR”
<u>21:10</u> Mohammad Hafezi , <i>University of Maryland</i> , “Light-matter interaction in itinerant and correlated electron systems”	Marina Radulaski , <i>University of California, Davis</i> , “Modeling Lossy Quantum Photonics on NISQ hardware”	Carlos Hernández-García , <i>Universidad de Salamanca</i> , “Light topology interplay in high harmonic generation driven by structured laser pulses”	Deniz Yavuz , <i>University of Wisconsin, Madison</i> , “Generation and Detection of Axions using Nonlinear Wave Mixing and Optical Fibers”
<u>21:30</u> Andrea Blanco-Redondo , <i>Nokia Bell Labs</i> , “Topological quantum photonics”	Simeon Bogdanov , <i>UIUC</i> , “Machine-assisted quantum photonic device assembly with nanodiamond-based color centers”	Emilio Pisanty , <i>King’s College, London</i> , “Novel symmetries, topologies and conservation laws revealed by high-harmonic generation in polychromatic optical vortices”	Masayuki Katsuragawa , <i>University of Electro-Communications, Japan</i> , “Proof-of-principle experiment of engineering in nonlinear optical process by arbitrarily manipulating phase relationships of the relevant optical fields”
<u>21:50</u> Zhigang Chen , <i>Nankai University</i> , “Nonlinear topological photonics: focusing on the SSH lattice”	Yong Chen , <i>Purdue University</i> , “Optical characterizations of twisted 2D materials”	Ido Kaminer , <i>Technion – Israel Institute of Technology</i> , “Light emission from strongly driven many-body systems”	Fetah Benabid , <i>Xlim, Limoges, France</i> , “Engineering Stokes Spatial-Temporal Mode in Stimulated Raman Scattering for Waveform Synthesis”
<u>22:10</u> Dawei Wang , <i>Zhejiang University</i> , “Observing the quantum topology of light”	Mikhail Kats , <i>University of Wisconsin-Madison</i> , “Photonic design and optimization for quantum technologies”	Matthias Kling , <i>Stanford University</i> , “Strong light-field controlled valleytronics”	Dzmitry Kurouski , <i>Texas A&M University</i> , “Raman Spectroscopy in Biophotonics: From Pathogen Diagnostics to Digital Farming”

Thursday Morning January 12 2023

Plenary Session [Ballroom 1+2] Richard Miles, Chair

7:00 **Continental breakfast** [Ballroom 1+2]

7:30 **Christoph Keitel**, *Max Planck Institute for Nuclear Physics*, “Extreme field quantum physics with ultra-strong laser pulses”

8:00 **Leonid Butov**, *University of California, San Diego*, “Indirect Excitons in Hetrostructures”

8:30 **Miles Padgett**, *University Glasgow, UK*, “An Endoscope the Width of the Human Hair: Beam Shaping, Photon Timing and Machine Learning”

Extreme Laser Pulses

Ballroom 1

Christoph Keitel, Chair

Excitons in Heterostructures

Magpie A

Leonid Butov, Chair

Quantum Imaging

Magpie B

Miles Padgett, Chair

Quantum Sensing

Wasatch A

Eugeniy Mikhailov, Chair

9:10 **Paul Corkum**, *University of Ottawa*, “Measuring Attosecond Photo-Recombination Time Delay by Perturbing Recollision Trajectories”

9:30 **Stepan Bulanov**, *Lawrence Berkeley National Laboratory*, “Strong Field QED Studies at PW-Class Laser Facilities and Beyond”

9:50 **Martin Formanek**, *ELI-Beamlines Prague, Czechia*, “Flying Focus Regime and Advances in High Intensity Laser-Particle Experiments”

10:10 **Kensuke Homma**, *Hiroshima University*, “Step-by-Step Approach to Search for Dark Matter with Stimulated Resonant Laser Colliders”

10:30

10:50 **Yoshihisa Yamamoto**, *NTT Research Inc.*, “Coherent Ising Machine with One Average Photon”

11:20 **Val Zwiller**, *KTH*, “Generation, manipulation and detection of single photons”

Physics of Light-Matter Interactions

Ballroom 1

Yashihisa Yamamoto and Matthew Pelton, Chair

12:00 **Kai-Mei Fu**, *University of Washington*, “Fabrication and isolation of In donors in ZnO”

12:20 **Matthew Pelton**, *UMBC*, “Plasmon-Exciton Strong Coupling at Room Temperature”

12:40 **Michael Fraser**, *NTT Research, USA and RIKEN, Japan*, “Optically Driven Rotation of Exciton-Polariton Condensates”

Massimo Rontain, *Instituto Nanoscienze, Modena*, “Evidence for Equilibrium Exciton Condensation in Monolayer WTe@”

Parag Deotare, *University of Michigan*, “Manipulating Exciton Energy Transport in Low Dimensional Materials”

Mo Li, *University of Washington*, “Electromechanics of excitons in 2D materials”

Qiuyang Li, *University of Michigan*, “Strong Coupling and Interaction of Exciton-Polariton in 2D Semiconductor-Photonic Crystals”

— Break —

Plenary Session [Ballroom 1+2] Matthew Pelton, Chair

Semiconductor Quantum Optics

Magpie A

Stephan Reitzenstein, Chair

Stephan Reitzenstein, *Technische Universität, Berlin*, “Development and deterministic nanofabrication of single quantum dot devices for applications in photonic quantum technologies”

Frank Jahnke, *University of Bremen*, “Many-body Effects of Excited Carriers in TMDC Semiconductors”

Weng Chow, *Sandia National Laboratory*, “Laser Physics of Sub-Hz Linewidth in Integrated III-V/SiN Laser”

Daniele Faccio, *University of Glasgow*, “Hong-Ou-Mandel Microscopy and Fluorescence Lifetime Imaging”

Sergey Polyakov, *NIST/Physics UMD*, “Quantum-Measurements Verification of Single-Biomarker Sensitivity of a Flow Cytometer”

Jonathan Leach, *Heriot-Watt University, UK*, “Fundamental limits to depth imaging with single-photon detector array sensors”

Mehul Malik, *Heriot-Watt University, UK*, “Transport and Manipulation of High-Dimensional Entanglement through a Complex Medium”

Quantum Sensing

Magpie B

Irina Novikova, Chair

Eugeniy Mikhailov, *College of William and Mary*, “Vector magnetometer: Rb atoms, EIT, and machine learning”

Denis Seletskiy, *Polytechnique, Montreal*, “Time-domain quantum optics: fundamentals and applications”

Alexander Mikhaylov, *MPI, Erlangen*, “Quantum Sensing with Quantum States of Light”

Irina Novikova, *College of William and Mary*, “Rydberg Raman Ramsey EIT”

Vladimir Malinovsky, *ARL*, “Generation of Extreme Spin Squeezing by Rapid Adiabatic Passage between Dicke States”

Chris O’Brien, *Naval Air Warfare Center*, “Optimal Atomic Quantum Sensing using EIT Readout”

John Howell, *Chapman Univ.*, “Doppler Gyroscopes: Frequency vs Phase Estimation”

Nano to Pico Photonics

Wasatch A

Sathwik Bharadwaj, Chair

Hong Tang, *Yale University*, “Unveiling photon statistics with an integrated 100-pixel photon-number-resolving detector”

Zubin Jacob, *Purdue University*, “Picophotonics: Anomalous Atomistic Waves in Silicon”

Zongfu Yu, *University of Wisconsin-Madison*, “Modeling quantum elements in complex nanostructures by integrating two level systems in full-wave FDTD simulations”

Thursday Evening January 12 2023

Plenary Session [Ballroom 1+2] Peter Keefe, Chair

- 19:00 **Gershon Kurizki**, *Weizmann Institute of Science*, “Noise as Resource for Quantum Sensing and Work”
19:30 **Warwick Bowen**, *University of Queensland*, “Hydrodynamics at nanoscale: laser control of superfluid helium solitons”
20:00 **Harry Atwater**, *California Institute of Technology*, “Active Metastructures and Imaging”

	<i>Quantum Noise for Sensing and Work</i>	<i>Laser Control & Observation of Superfluid Dynamics</i>	<i>Active Metastructures and Imaging</i>	<i>Physics of Qubits</i>
	Ballroom 1 Gershon Kurizki, Chair	Magpie A Warwick Bowen, Chair	Magpie B Harry Atwater, Chair	Wasatch A Yoshihisa Yamamoto and Matthew Pelton, Chair
<u>20:50</u>	Tomas Opatrny , <i>University of Olomouc</i> , “Work and Heat Exchange in Quantum Nonlinear Interferometers”	John Davis , <i>University of Alberta</i> , “Gravitational Wave and Dark Matter Sensors using Superfluid Electromechanics”	Arseniy Kuznetsov , <i>A Star, Singapore</i> , “Tunable metasurfaces for LiDAR and 3D holographic display applications”	William Oliver , <i>MIT</i> , “Giant Artificial Atoms and Waveguide QED”
<u>21:10</u>	Joachim Ankerhold , <i>University of Ulm</i> , “Quantum Noise beyond Markovianity: Heat and work exchange in spectrally structured environments”	Valery Milner , <i>University of British Columbia</i> , “Quasiparticles in an optical centrifuge: Ultrafast laser control of rotons in superfluid helium”	Arka Majumdar , <i>University of Washington</i> , “TBA”	Thaddeus Ladd , <i>HRL Labs</i> , “Universal Encoded Quantum Logic and Dynamical Decoupling in Si/SiGe 6-Dot Arrays”
<u>21:30</u>	David Petrosyan , <i>FROTH, Crete</i> , “Transport and quantum noise sensing in disordered spin systems with long-range interactions”	Xavier Rojas , <i>Royal Holloway</i> , “Superfluid Optomechanics with Photonic Nanostructures”	Jonathan Fan , <i>Stanford University</i> , “Active and passive wavefront engineering with freeform metasurfaces”	Shruti Puri , <i>Yale University</i> , “Tailoring Fusion-Based Error Correction for High-Thresholds to Biased Fusion-Failures”
<u>21:50</u>	Fabrizio Piacentini , <i>INRIM, Turin</i> , “Experiments in Quantum Noise Sensing via Single-Photon Quantum Zeno and Anti-Zeno Effects”	Yogesh Patil , <i>Yale University</i> , “Quantum Optomechanics with Superfluid Helium”	Maiken Mikkelsen , <i>Duke University</i> , “Control of Nanoscale Heat Generation and Applications for Ultrafast Detectors”	Markus Raschke , <i>University of Colorado, Boulder</i> , “Ultrafast nano-imaging: Probing quantum dynamics in time and space”
<u>22:10</u>	Barnabas Kim , <i>Texas A&M University</i> , “Trends in Photonic Quantum Heat Engine”	Svetlana Lukishova , <i>University of Rochester</i> , “Liquid Crystals under Two Extremes: (1) High-Power Laser Irradiation and (2) Single-Photon Level”	Xingjie Ni , <i>Penn State University</i> , “TBA”	Alexey Belyanin , <i>Texas A&M University</i> , “Entangled Many-Qubit Dark and Bright States in Nanocavity QED”

Friday Morning January 13 2023

7:00 **Continental breakfast** [Ballroom 1+2]

Plenary Session [Ballroom 1+2] Anatoly Svidzinsky, Chair

7:30 **Saikat Guha**, *University of Arizona*, “Using distributed entanglement to achieve quantum limits of long-baseline imaging”

8:00 **Reinhard Kienberger**, *Technische Universität München*, “Chasing Contributions to Delay in Photoemissions”

8:30 **Vlad Yakovlev**, *Texas A&M University*, “Seeing Life in a New Light: From Simple Physics to Quantum Enhanced Imaging”

Quantum-enhanced and quantum-inspired sensing and imaging

Ballroom 1

Saikat Guha, Chair

Current Topics of Interest in Attosecond Science

Magpie A

Reinhard Kienberger, Chair

Biomedical Spoof Quantum Electronics

Magpie B

Vlad Yakovlev, Chair

Ultra-intense light and X-ray optics

Wasatch A

Donald Umstadter, Chair

9:10 **Alexey Gorshkov**, *University of Maryland*, “Quantum Sensor Networks”

Willem Boutu, *Paris Saclay University, CEA, CNRS, LIDYL Laboratory, France*, “Shaping High Order Harmonic Emission from Crystals”

Roozbeh Jafari, *Texas A&M University*, “Physical Foundations of Wearable Medical Devices”

Donald Umstadter, *University of Nebraska, Lincoln*, “Optical interference of ultra-intense light in plasma”

9:30 **Quntao Zhuang**, *University of Southern California*, “Continuous-variable distributed quantum sensing and error correction”

Zdenek Masin, *Charles University, Czech Republic*, “Electronic Coupling Delay and the Laser-Induced Dipole Delay in RABBITT”

Marcus Cicerone, *Georgia Institute of Technology*, “Towards Simple, Real-Time Spectroscopic Coherent Raman Imaging of Biology”

Phay J. Ho, *Argonne National Lab*, “Controlling Ultrafast X-ray Scattering”

9:50 **Dalziel Wilson**, *University of Arizona*, “Entanglement-Enhanced Optomechanical Sensing”

Abraham Camacho Garibay, *Ohio State University*, “Building a Quantum Trajectory Simulator for Studying Strong Field Physics”

Giuliano Scarcelli, *University of Maryland*, “Recent Progress of Brillouin Microscopy in Biology”

Justin Peatross, *Brigham Young University*, “Inherent Asymmetry of Electron Figure-8 Motion in Nonlinear Thomson Scattering”

10:10 **Amit Ashok**, *University of Arizona*, “on quantum-inspired super-resolution imaging using predetection mode sorters”

Margarita Khokhlova, *Max Born Institute*, “Enantiosensitive steering of free-induction decay”

Yaron Bromberg, *Hebrew University of Jerusalem*, “Coherent Backscattering of Entangled Photon Pairs”

Zhehui (Zeph) Wang, *LANL*, “Neutron Interferometry and Entanglement”

10:30

— Break —

Plenary Session [Ballroom 1+2] Shaul Mukamel, Chair

10:50 **Hui Cao**, *Yale University*, “Customizing Laser Speckle Statistics”

11:20 **Shaul Mukamel**, *University of California, Irving*, “Probing Elementary Molecular Events by Attosecond”

Controlling Light Transport

Ballroom 1

Hui Cao, Chair

Atto-Second and High Intensity Physics

Magpie A

Paul Corkum, Chair

Laser Spectroscopy

Magpie B

TBA, Chair

TBA

Wasatch A

TBA, Chair

12:00 **Douglas Stone**, *Yale University*, “Suppressing instabilities in high-power fiber lasers via wavefront shaping”

Julia Mikhailova, *Princeton University*, “Plasma optics for ultrafast high-field science”

Dmitri Voronine, *University of South Florida*, “Nanoscale imaging of migrating cancer cells”

Zhedong Zhang, *City University of Hong Kong*, “Quantum-Light Multidimensional Spectroscopy of Molecules”

12:20 **Rémi Carminati**, *ESPCI Paris-PSL, CNRS and Université Paris-Saclay, France*, “Out-of-the-box speckle statistics in non-linear or time-varying random media”

Arvinder Sandhu, *University of Arizona*, “Advances in measurement and control of electron dynamics in the continuum”

Zhenrong Zhang, *Baylor University*, “Operando Raman Spectroscopy Study of Photoreaction of Single TiO₂ Microcrystals”

Reed Nessler, *Texas A&M University*, “Quantum laser theory as a classical analysis problem”

12:40 **Alexey Yamilov**, *Missouri University of Science & Technology*, “Coherent enhancement of optical remission in diffusive media”

Barry Walker, *University of Delaware*, “Polarizability, Stark Shifts and Field Ionization of Highly Charged Ions in Ultra-Intense Lasers”

TBA, TBA, “TBA”

Eugene Tsao, *University of Colorado Boulder and NIST*, “Quantum Measurement Limits of Frequency Comb Heterodyne”

Friday Evening January 13 2023

Plenary Session [Ballroom 1+2] Marlan Scully, Chair

- 19:00 **Alexander Lvovsky**, *University of Oxford*, “How to Train an Optical Neural Network”
19:30 **Gennady Shvets**, *Cornell University*, “Nanostructures Meets Microplates: Metasurface-Enhanced Infrared Spectroscopy in Cell-Friendly Environment”
20:00 **Jack Harris**, *Yale University*, “Measuring the knots and braids of non-Hermitian oscillators”

<i>Optical Neural Network</i>	<i>Applications of Photonic and Spectroscopy to Life Sciences and Translational Medicine</i>	<i>Topology and control in non-Hermitian systems</i>	<i>Physics of Qubits</i>
Ballroom 1 Alexander Lvovsky, Chair	Magpie A Gennady Shvets, Chair	Magpie B Jack Harris, Chair	Wasatch A TBA, Chair
<u>20:50</u> Ryan Hamerly , <i>MIT</i> , “Wavelength-Multiplexed Edge Computing and Photonic Error Corrections”	Lisa Poulikakos , <i>University California, San Diego</i> , “Colorimetric Metasurfaces for Next-Generation, On-Chip Imaging of Tissue Microstructures”	Aashish Clerk , <i>University of Chicago</i> , “Anomalous relaxation and localization in non-Hermitian quantum lattice models”	TBA, TBA , “TBA”
<u>21:10</u> Volker Sorger , <i>Queen’s University, Canada</i> , “Neuromorphic Silicon Photonics: Inference and Training, Classical and Quantum”	Stanislav Emelianov , <i>Georgia Tech and Emory University</i> , “Biomedical Photoacoustic Imaging using Plasmonic Nanoconstructs”	Shanhui Fan , <i>Stanford University</i> , “Topology of Separable Non-Hermitian Bands in Two and Three Dimensions”	TBA, TBA , “TBA”
<u>21:30</u> Firooz Aflatouni , <i>University of Pennsylvania</i> , “Integrated Photonic Deep Networks for Image Classification”	Lan Yang , <i>Washington University, St. Louis</i> , “Resonance-Enhanced Sensing and Spectroscopy”	Mercedeh Khajavikhan , <i>University Southern California</i> , “TBA”	TBA, TBA , “TBA”
<u>21:50</u> Aydogan Ozcan , <i>University California Los Angeles</i> , “Diffractive Optical Networks & Computational Imaging Without a Computer”	Lev Perelman , <i>Harvard University</i> , “Label-Free Light Scattering Spectroscopy Techniques for Tissue and Cell Analysis”	Hugo Ribeiro , <i>University of Massachusetts, Lowell</i> , “Harnessing Perturbation Theory to Control Non-Hermitian Systems”	TBA, TBA , “TBA”
<u>22:10</u> Alex Sluuds , <i>MIT</i> , “Delocalized Photonic Deep Learning on the Internet’s Edge”	TBA, TBA , “TBA”	Philippe Lewalle , <i>University of California, Berkeley</i> , “Pontryagin-Optimal Control of a non-Hermitian Qubit”	TBA, TBA , “TBA”

Poster session in PQE-2023

Joseph Adebisi, *University of Ilorin, Kwara State*
“TBA”

Alexander (Sasha) Anferov, *University of Chicago*
“Millimeter-wave Superconducting Qubits and Optical Transduction”

Sathwik Bharadwaj, *Purdue University*
“Picoelectrodynamics in Silicon”

Ivan Burenkov, *University of Maryland/NIST*
“Phenomenological study of *in situ* flow cytometer calibration and single-molecule resolution via quantum measurement”

“Coexistence limit for quantum and classical synchronization channels in quantum network links”

Chong Chen, *The Chinese University of Hong Kong, Hong Kong, China*
“Quantum network structures in spin baths”

Mo Chen, *California Institute of Technology*
“Acoustically shielded TLS exceeding 100us T1 time”

Sahar Delfan, *Texas A&M University*
“Biosensor Design and fabrication”

Sanket Deshpande, *Univ. Wisconsin-Madison*
“Modeling and fabrication of diffractive chips for magneto-optical trapping of atoms”

Shahriar Esmaeili, *Texas A&M University*
“Detection of SARS-CoV-2 cDNA using Förster Resonance Energy Transfer between Upconversion and Gold nanoparticles”

Chengyu Fang, *Univ. Wisconsin-Madison*
“Scalable passive optical masks that enable one- and two-species atom-trap arrays”

Vasileios Fragkos, *Stockholm University*
“Quantum effects in axion dark matter”

“Gravity Induced Entanglement and the Quantization of Gravity”

Zhenfei Jiang, *Texas A&M University*
“Raman Scattering and Photoluminescence on 2D Ruddlesden–Popper Perovskite Flakes”

Catie LeDesma and Kendall Mahling, *JILA, University of Colorado*
“Building a Matter-Wave Interferometer using Reinforcement Learning”

Yiyun Li, *Texas A&M University*
“Optical multiband polarimetric modulation sensing for the identification of gender and species of native pollinators in flight”

Evgenii E. Narimanov, *Purdue University*
“The Fundamental Limit to the Resolution of Far-Field Optical Imaging”

Christian M. Pluchar, *University of Arizona*
“Quantum optomechanics with an optical lever”

Vesna Radisic, *Northrop Grumman Corporation*
“Electrically Small Antennas Using Chirped Time Modulation”

Navid Rajil, *Texas A&M University*
“Quantum Optical Immunoassay: Upconversion Nanoparticle-Based Neutralizing Assay For COVID-19”

Hassan Shapourian, *Cisco Quantum Lab*
“All-photonic one-way quantum repeaters”

Eugene Tsao, *University of Colorado Boulder and NIST*
“Quantum Measurement Limits of Frequency Comb Heterodyne”

Jizhou Wang, *Texas A&M University*
“Widefield Single-shot IR Imaging with High Spatial Resolution”

Michael Ware, *Brigham Young University*
“Laser Pulse Duration and Spot Size Effects in Nonlinear Thomson Scattering”

Wenzhuo Zhang, *Texas A&M University*
“An optimization mechanism of speckle patterns in sub-Nyquist CGI”

Ver. 2.2.1
