TUE 1o: Opening remarks and plenary talk

Chair: Harald Giessen, University of Stuttgart, Germany

Time: Tuesday, 8:45–9:50 Location: Olympia

Opening Remarks

Plenary TUE 1o.1 Tuesday, 9:00 Olympia

Quantum Simulation with Atoms, Molecules and Light — •Immanuel Bloch — Max Planck Institute of Quantum Optics, Munich, Germany

Forty years after Feynman's proposal, quantum simulation is now a thriving reality. Focusing on ultracold atoms in optical lattices, I will discuss how probing and engineering many-body phases with single-particle resolution offers new possibilities for exploring complex questions in correlated quantum matter.

9:50–10:05: Coffee break

TUE 2o: Nanophotonic applications

Chair: Nahid Talebi, University of Kiel, Germany

Time: Tuesday, 10:05–12:30 Location: Olympia

Invited TUE 2o.1 Tuesday, 10:05 Olympia

Sustainable Manufacturing of Optical Metasurfaces with Engineered Optical Materials — •Junsuk Rho — Pohang University of Science and Technology (POSTECH), Pohang, South Korea

Metasurfaces, composed of nanostructure arrays, enable high-resolution imaging across various wavelengths from UV to acoustic waves, with applications in displays, sensors, and bio-imaging. While design and manufacturing challenges exist, emerging fabrication methods like nanoimprint lithography and photolithography are advancing their commercialization potentials.

Invited TUE 2o.2 Tuesday, 10:30 Olympia

Environmetal Nanophotonics — •Mario Hentschel — 4th Physics Institute and Research Center SCoPE, University of Stuttgart, Stuttgart, Germany

We demonstrate an optical sieve consisting of resonant Mie voids which delivers statistical information on nanoplastic samples via the observation of distinct colour changes. The method can also accommodate elliptical particles and can discriminate PMMA, PET, and PS. The proposed method offers a straightforward, highly accessible and mobile solution for environmental and biological research.

Oral TUE 2o.3 Tuesday, 10:55 Olympia

Nanoplasmonic Infrared Microarray Sensor for High-Throughput Drug Screening Based on Protein Biomarkers of Neurodegenerative Diseases — Deepthy Kavungal[1,2], Enzo Morro[2], Senthil T Kumar[2], •Berkay Dagli[1], Hilal A Lashuel[2], and Hatice Altug[1] — [1]Bionanophotonic Systems Laboratory, Institute of Bioengineering, École Polytechnique Fédérale de Lausanne, Lausanne 1015, Switzerland — [2]Laboratory of Molecular Neurobiology and Neuroproteomics, Institute of Bioengineering, École Polytechnique Fédérale de Lausanne, Lausanne 1015, Switzerland

This work introduces a nanoplasmonic infrared microarray sensor for label-free and high-throughput drug screening based on structural protein biomarkers in neurodegenerative diseases. It employs biocompatible 2D microarrays hosting plasmonic sensing units with 100 pg/mL sensitivity in under a minute of in situ measurement. Several prominent drugs are assessed.

Oral TUE 2o.4 Tuesday, 11:10 Olympia

Self-illuminated Plasmonic Biosensor Enabled by Inelastic Tunneling Luminescence — Jihye Lee[1], Yina Wu[2], Ivan Sinev[1], •Mikhail Masharin[1], Sotirios Papadopoulos[3], Eduardo Dias[2], Lujun Wang[3], Ming Lun Tseng[4], Seunghwan Moon[5], Jong-Souk Yeo[5], Lukas Novotny[3], F. Javier García de Abajo[3], and Hatice Altug[1] — [1]Institute of Bioengineering, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland — [2]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Barcelona, Spain — [3]Photonics Laboratory, ETH Zürich, Zurich, Switzerland — [4]Institute of Electronics, National Yang Ming Chiao Tung University, Hsinchu, Taiwan — [5]School of Integrated Technology, Yonsei University, Incheon, South Korea

We present a self-illuminating plasmonic biosensor for label-free detection of biological analytes. Light generated via inelastic electron tunneling in a metal–insulator–metal junction excites plasmonic resonances highly sensitive to refractive index variations, enabling compact, stable, and high-performance biosensing without external illumination or bulky optics.

Oral TUE 2o.5 Tuesday, 11:25 Olympia

Magnetic Field Rectification Using Time-Reflection of Guided Light in Optically Switched Dielectric Metasurfaces — Shivaksh Rawat , Samyobrata Samyobrata, and •Gennady Shvets — Cornell University, Ithaca, USA

Generation of ultra-high dc magnetic fields on a nanoscale has many applications in materials science. We propose a mechanism for converting the optical energy of metasurface-guided surface waves into quasi-static magnetic energy using a time interface produced by rapid free-carrier generation. The magnetic field persists over multiple electron scattering times.

Invited TUE 2o.6 Tuesday, 11:40 Olympia

Metasurface-Enabled Astronomical Polarimetry — •Noah A. Rubin[1], Lisa W. Li[1], Phillip H.H. Oakley[2], Rebecca N. Schindhelm[2], Sean G. Sellers[3], and Roberto Casini[4] — [1]University of California San Diego, La Jolla, USA — [2]BAE Systems Space & Mission Systems, Boulder, USA — [3]New Mexico State University, Las Cruces, USA — [4]High Altitude Observatory, Boulder, USA

Polarization control is cited as a primary advantage of metasurface optics. Here, we develop (and deploy to a major observatory facility) a telescope containing a metasurface polarization grating for full-Stokes polarization observations of solar magnetism. This is among the first demonstrations of an advantage provided by metasurfaces in observational astronomy.

Invited TUE 2o.7 Tuesday, 12:05 Olympia

Understanding and insights into nonlinear waveguide dynamics using machine learning — •John Dudley[1], Andrei Ermolaev[1], Mathilde Hary[1], Lev Leybov[2], Piotr Ryczkowski[2], Anas Skalli[1], Daniel Brunner[1], Fanchao Meng[3], Christophe Finot[4], and Goery Genty[3] — [1]Université Marie et Louis Pasteur, Institut FEMTO-ST, Besançon, France — [2]Tampere University, Tampere, Finland — [3]Jilin University, Changchung, China — [4]Université Bourgogne Europe, Dijon, France

We review the remarkable progress using the methods of machine learning to control ultrafast nonlinear processes in optical fibre based sources, and to yield new physical insights into the underlying dynamics.

TUE 1s: Quantum nanophotonics I

Chair: Steven Anlage, Université du Maryland, College Park, USA

Time: Tuesday, 10:30–12:30 Location: Seefeld/Tirol

Invited TUE 1s.1 Tuesday, 10:30 Seefeld/Tirol

Black hole bombs and how to build one — Marion Cromb[1,2], Maria Chiara Braidotti[1], Andrea Vinante[4], •Daniele Faccio[3], and Hendrick Ulbricht[1] — [1]School of Physics & Astronomy, University of Southampton, Southampton, United Kingdom — [2]School of Mathematical Sciences, University of Nottingham, Nottingham, United Kingdom — [3]School of Physics & Astronomy, University of Glasgow, Glasgow, United Kingdom — [4]Istituto di Fotonica e Nanotecnologie, CNR and Fondazione Bruno Kessler, Trento, Italy

We will overview work from the past few years that has led to a recent result demonstrating the black hole bomb explosion effect as the result of runaway amplification of electromagnetic waves from a time-varying (rotating), non-reciprocal (the effect depends on rotation direction), absorbing cylinder.

Oral TUE 1s.2 Tuesday, 10:55 Seefeld/Tirol

Probing coherence in quantum systems using electron beams — •Hebrew Benhur Crispin and Nahid Talebi — Institute for Experimental and Applied physics, Kiel University, kiel, Germany

We develop a time-dependent quantum theory of a free electron wave-packet interacting with a two-level quantum emitter. An exact semi-analytic expression for the coupling strength is derived. We predict transient coherent oscillations in the emitter populations and the electron's zero-loss energy peak, revealing novel dynamical coherence effects.

Oral TUE 1s.3 Tuesday, 11:10 Seefeld/Tirol

Octopus-States: new type of hyperentanglement — •Alexander Palatnik[1], Liat Nemirovsky-Levy[1], Guy Bartal[2], and Mordechai Segev[1,2] — [1]Physics Faculty and Solid-State Institute, Technion, Haifa, Israel — [2]Andrew and Erna Viterbi department of Electrical & Computer Engineering, Technion , Haifa, Israel

Hyperentanglement is typically limited to symmetric configurations, where all photons are entangled using the same set of DoFs. Here, we present, experimentally and theoretically, a new class of hyperentangled states: Octopus States. In the new architecture a single central photon is entangled with multiple photons, each via a different DoFs

Oral TUE 1s.4 Tuesday, 11:25 Seefeld/Tirol

Quantum state tomography of entangled multidimensional spatial qudits using random metasurfaces — •Yuming Niu and Kai Wang — McGill University, Montreal, Canada

We demonstrate that spatially random metasurfaces can perform high-dimensional quantum state tomography of entangled-photon spatial qudits. Large-scale simulations of over 12000 amorphous-silicon metasurfaces reveal well-conditioned measurement operators enabling accurate density-matrix reconstruction with sufficient detector redundancy, achieving a 0.91 fidelity for reconstructing a 49-dimensional entangled two-photon state under high noise.

Invited TUE 1s.5 Tuesday, 11:40 Seefeld/Tirol

Entanglement of Near-Field Photons in Their Total Angular Momentum — •Amit Kam[1,2], Shai Tsesses[3,4], Yigal Ilin[2,4], Kobi Cohen[2,4], Lior Fridman[2,4], Yaakov Lumer[1,2], Anatoly Patsyk[1,2], Stav Lotan[2,4], Liat Nemirovsky-Levy[1,2], Meir Orenstein[2,4], Mordechai Segev[1,2,4], and Guy Bartal[2,4] — [1]Physics department, Technion – Israel Institute of Technology, Haifa 32000, Israel — [2]The Helen Diller Quantum Center, Technion – Israel Institute of Technology, Haifa 32000, Israel — [3]Research Laboratory of Electronics, Massachusetts Institute of Technology,, Cambridge, MA 02139, USA — [4]Electrical & Computer Engineering, Technion – Israel Institute of Technology, Haifa 32000, Israel

We demonstrate the first observation of non-classical correlations between near-field photons producing N00N states entangled in total angular momentum. By coupling photon-pairs to plasmonic modes and utilizing quantum imaging, we uncover distinct mode-dependent quantum correlations, presenting a major step toward integrated on-chip quantum entanglement in nanophotonic platforms.

Invited TUE 1s.6 Tuesday, 12:05 Seefeld/Tirol

Silicon carbide metalens and AR diffractive waveguides — •Min Qiu — Westlake University, School of Engineering , Hangzhou, China

Silicon Carbide (SiC), as a third-generation semiconductor material, emerges as an ideal platform for advancing nanophotonic technologies due to its high refractive index, low optical loss, compatibility with integrated circuit processes, and high thermal conductivity. This talk presents key innovations in SiC photonics.

TUE 3o: Time crystals and Floquet Matter

Chair: Jacob Khurgin

Time: Tuesday, 17:00–18:45 Location: Olympia

Invited TUE 3o.1 Tuesday, 17:00 Olympia

Light-Matter Interactions in Single-Cycle and Sub-Cycle Regime — •Mordechai (Moti) Segev — Technion, Haifa, Israel

The theoretical and experimental progress on light-matter interactions in time-varying media will be described, with recent results in the sub-cycle regime.

Invited TUE 3o.2 Tuesday, 17:25 Olympia

The Case for Timetronics – a Low Energy Data Processing Technology — Venugopal Raskatla and •Nikolay Zheludev — Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom

Nano-opto-mechanical time crystals provide a platform for timetronics - an emerging data storage and processing technology that can surpass silicon transistors in terms of energy efficiency. We experimentally demonstrate a fundamental timetronics memory device and investigate the limits of its power consumption that could reach the picowatt range.

Oral TUE 3o.3 Tuesday, 17:50 Olympia

Experimental Observation of Time-Domain Bound States in The Continuum — Zahra Manzoor[1], Oded Schiller[2], Yonatan Plotnik[2], Mordechai Segev[2], and •Dimitrios Peroulis[1] — [1]Purdue University, Lafayette, USA — [2]Technion – Israel Institute of Technology, Haifa, Israel

Bound states in the continuum (BICs) enable perfect wave confinement within radiative continua. Here, we experimentally realize the first time-domain BICs using a compact, time-modulated transmission-line network. By mapping a temporally varying permittivity $\epsilon(t)$ to a modulated capacitance C(t), we demonstrate waves confined in time, revealing a fundamentally new class of wave phenomena.

Oral TUE 3o.4 Tuesday, 18:05 Olympia

Single-cycle optical nonlinearity of transparent conducting oxides explained — Ieng Wai Un[1], Subhajit Sarkar[2], and •Yonatan Sivan[3] — [1]South China Normal University, Guangzhou, China — [2]Shiv Nadar University , Delhi, India — [3]Ben-Gurion University, Be'er sheva, Israel

We provide a quantitative model for the electro-optic response of transparent conducting oxides to single cycle intense pulses. We show that the interplay between spatio-temporal aspects of absorption, stimulated emission and multi-photon absorption can explain the weaker-than-before nonlinear response observed in experiments, as well as on the unexplained relaxation dynamics.

Invited TUE 3o.5 Tuesday, 18:20 Olympia

Directional Transport in a Plasmonic Ratchet Induced by Tailored Dissipation — •Anna Sidorenko[1], Jan Mathis Giesen[2], Sebastian Eggert[2], and Stefan Linden[1] — [1]Physikalisches Institut, Universität Bonn, Bonn, Germany — [2]Physics Department and Research Center OPTIMAS, University of Kaiserslautern-Landau, Kaiserslautern, Germany

The ratchet effect refers to the capability of transforming a periodic drive into directed motion without the need for a net force by breaking both space- and time-reversal symmetry. We propose and demonstrate a new design of a plasmonic ratchet, where the directional transport is implemented purely by dissipation.

TUE 2s: Quantum nanophotonics II

Chair: Sergey Bozhevolnyi, University of Southern Denmark, Copenhagen, Denmark

Time: Tuesday, 17:00–18:45 Location: Seefeld/Tirol

Invited TUE 2s.1 Tuesday, 17:00 Seefeld/Tirol

On-chip quantum nanophotonics with superconducting detectors — Pierre Brosseau[1,2], Filippo Martinelli[1,2], Shuyu Dong[2,3], Jiawei Wang[1,2], Ruixiang Guo[1,2], Anton N. Vetlugin[1,2], Giorgio Adamo[1], and •Cesare Soci[1,2,3] — [1]Centre for Disruptive Photonic Technologies, The Photonics Institute, Nanyang Technological University, Singapore, Singapore — [2]Division of Physics and Applied Physics, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, Singapore — [3]School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore

We present two on-chip quantum photonic architectures employing superconducting nanowire single-photon detectors (SNSPDs): a plasmonic metal-superconductor platform enabling polarization quantum state tomography, and polymer waveguide-integrated SNSPDs for inline photon-number resolving and temporal correlation measurements, offering compact and scalable solutions for

quantum information processing and optical metrology.

Invited TUE 2s.2 Tuesday, 17:25 Seefeld/Tirol
Birefringent Spherulite Optomechanics for Dual Quantum pH and Magnetic Bio-Sensing — •Hani Barhum[1], Tamara Amro[1,2], Vjaceslavs Bobrovs[3], Pavel Ginzburg[4], Nir Bar Gil[2], and Mohammad Attrash[1] — [1]Triangle Research and Development Center, Kfar Qara, Israel — [2]Hebrew University , Jerusalem, Israel — [3]Riga Technical University, Riga, Latvia — [4]Tel Aviv University, Tel Aviv, Israel
A birefringent vaterite–nanodiamond hybrid enables orientation-locked optical trapping and robust quantum sensing in liquids. Stable ODMR (2–8%), single-exponential $T_1 \approx 60\,\mu s$, and threefold T_1 shortening for $\Delta pH \approx 0.3$ reveal proton-driven dielectric-gate coupling, establishing a compact, biocompatible platform for optomechanical and chemical quantum sensing in physiological media.

Invited TUE 2s.3 Tuesday, 17:50 Seefeld/Tirol
On-chip Entanglement in Synthetic Dimensions of a single Waveguide — •Stav Lotan[1,2], Amir Sivan[1,2], Amit Kam[1,2,3], Leroy Dokhanian[1], Lior Gal[1], Meir Orenstein [1,2], and Guy Bartal [1,2] — [1]Andrew and Erna Viterbi department of Electrical & Computer Engineering, Technion-Israel Institute of Technology, Haifa, Israel — [2]Helen Diller Quantum Center, Haifa, Israel — [3]Physics Department, Technion-Israel Institute of Technology, Haifa, Israel
We demonstrate on-chip generation of entangled photonic states using the guided-mode ladder of a single silicon-nitride waveguide as a synthetic dimension and exploiting intricate intermodal interactions. Our novel concept enables the realization of entire photonic integrated quantum circuits in small-footprint and readily fabricable single WG structures.

Oral TUE 2s.4 Tuesday, 18:15 Seefeld/Tirol
Orbital-Angular-Momentum Entangled Photon Emission from Superconducting Qubits — •Ankit Kumar[1], Avi Koriat[1], Nitzan Wiesenfeld[2], Shlomi Bouscher[1], Sima Buchbinder[1], Sarit Feldman[1], and Alex Hayat[1] — [1]Department of Electrical Engineering, Technion Israel Institute of Technology, Haifa, Israel — [2]Department of Physics, Technion Israel Institute of Technology, Haifa, Israel
We theoretically demonstrate orbital-angular-momentum (OAM) entangled photon-pair emission from a superconducting light-emitting diode (SLED) with a circular supercurrent, where radiative recombination inherits the superconducting phase, enabling coherent transfer of qubit information into photonic quantum channels.

Oral TUE 2s.5 Tuesday, 18:30 Seefeld/Tirol
Scalable quantum metasurfaces of Silicon-Vacancy centers on a single chip — Uri Israeli, Ada Krasnosky, Daniel Silvian, Shahar Levi, Itai David, and •Rivka Bekenstein — Hebrew University, Jerusalem, Israel
We realize quantum metasurfaces of silicon-vacancy centers array with 50 nm resolution, demonstrating enhanced optical response capable of atom-photon entanglement generation that is scalable in the number of spins and photons on a single chip

18:45–19:00: Coffee break

TUE 4o: Breakthrough talks I

Chair: John Dudley, Université de Franche-Comté, Besançon, France

Time: Tuesday, 19:00–19:50 Location: Olympia

Breakthrough TUE 4o.1 Tuesday, 19:00 Olympia
Electro-optically Tunable Active Metasurfaces — Martin Thomaschewski, Julie Belleville, Prachi Thureja, and •Harry Atwater — California Institute of Technology , Pasadena, USA
Electro-optically tunable active metasurfaces that enable dynamic modulation of reflection and transmission amplitude, phase, and polarization using resonantly excited materials and phenomena are powerful design elements for meta-imaging and computation. . In this talk, I will discuss active metasurface designs with high quality factor, local, resonant elements, tunable via electrooptic and thermo-optic control.

Breakthrough TUE 4o.2 Tuesday, 19:25 Olympia
Narwhal wavefunction and the quest for ultimate light confinement. — •Renmin Ma — Peking University, Beijing, China
We introduce a narwhal-shaped wavefunction that establishes a lossless dielectric pathway beyond the optical diffraction limit. Rooted in the singular dispersion equation, it unifies exponential decay with power-law enhancement, enabling extreme, dissipation-free light confinement.

TUE 3s: Breakthrough talks II

Chair: Uriel Levy, Hebrew University of Jerusalem, Israel

Time: Tuesday, 19:00–19:50 Location: Seefeld/Tirol

Breakthrough TUE 3s.1 Tuesday, 19:00 Seefeld/Tirol
Rydberg atom-polariton interaction: exceptional points, nonlinear networks and remote readout — •Shai Tsesses — Massachusetts Institute of TEchnology, Cambridge, USA
Rydberg polaritons are collective optical excitations in atomic clouds, strongly interacting with nearby Rydberg atoms. We demonstrate, for the first time, all three regimes of Rydberg atom-polariton interaction, identifying exceptional points in the interaction, and exploring its potential to support nonlinear quantum optical networks or fast, remote atomic state detection.

Breakthrough TUE 3s.2 Tuesday, 19:25 Seefeld/Tirol
Observation of Cavity-Mediated Nonlinear Landau Fan in Graphene Quantum Transport — Hongxia Xue[1], Hsun-Chi Chan[1], Zuzhang Lin[1], Dalin Boriçi[2], Shaobo Zhou[1], Yanan Wang[1], Kenji Watanabe[3], Takashi Taniguchi[3], Cristiano Ciuti[2], Wang Yao[1], Dong-Keun Ki[1], and •Shuang Zhang[1] — [1]Department of Physics, The University of Hong Kong, Hong Kong, China — [2]Université Paris Cité, CNRS, Matériaux et Phénomènes Quantiques, Paris, France — [3]National Institute for Materials Science, Ibaraki, Japan
Recent studies on cavity-coupled two-dimensional electron gas have shown that vacuum-field engineering can tailor electronic transport properties of materials. By achieving ultra-strong coupling between a terahertz resonator and mesoscopic graphene, we demonstrate that cavity vacuum fields can alter the effective degeneracies of Landau levels, resulting in a nonlinear Landau fan diagram for massless Dirac fermions while preserving quantum-Hall quantization.

WED 1o: Plenary talk

Chair: Douglas Stone, Yale University, New Haven, USA

Time: Wednesday, 9:00–9:50 Location: Olympia

Plenary WED 1o.1 Wednesday, 9:00 Olympia
Weaving topologies into light — •Andrew Forbes — University of the Witwatersrand, Johannesburg, South Africa
A recent trend in structured light is to imbue optical fields with a topology, promising a topological alphabet that is robust to noise. Using examples from classical and quantum optics, I will highlight the recent progress made in this field and the exciting future prospects.

9:50–10:05: Coffee break

WED 2o: Topological light (Sir Michael Berry Session)

Chair: Moti Segev, TECHNION, Israel Institute of Technology, Haifa, Israel

Time: Wednesday, 10:05–11:45 Location: Olympia

Invited WED 2o.1 Wednesday, 10:05 Olympia
Coherent Control of Wave Scattering via Coincidences of Complex Spectra — •A. Douglas Stone[1], Ali Alhulaymi[1], Nazar Pyvovar[1], Philipp del Hougne[2], and Owen Miller[1] — [1]Yale University, Dept of Applied Physics, New Haven, USA — [2]University of Rennes, CNRS, Rennes, France
Harnessing interference to control wave propagation in multiple scattering geometries is a fundamental challenge in both classical and quantum physics. We present a new framework for implementing coherent control based on tunable scattering elements within a chaotic cavity. Desired solutions correspond to coincidences of complex eigenfrequencies on the real axis.

Invited WED 2o.2 Wednesday, 10:30 Olympia
Fragile topologies in optical fields: knotted vortices, skyrmionic origami and nonabelian dark points — •Mark Dennis — School of Physics and Astronomy, University of Birmingham, Birmingham, United Kingdom
Topological design of structured light extends the half-century Berry–Nye tradition of singular optics. Algebraic, differential and gauge-theoretic structures reveal new taxonomies of optical singularities and field geometries. This connects with other areas of topological physics, offering rich possibilities in modern topological optics.

Invited WED 2o.3 Wednesday, 10:55 Olympia
New Photonic Topological Singularities Identified Through Generalized Speckle Patterns — •Steven Anlage, Thomas Antonsen, Jared Erb, Isabella Giovannelli, and Nadav Shaibe — University of Maryland, College Park, USA
We explore the properties of non-Hermitian scattering systems through speckle patterns of parametrically-varied scattering matrices, and the use of complex time delay, to uncover new topological photonic scattering singularities. The approach is driven by data from reciprocal and non-reciprocal microwave graphs, as well as billiards having a range of values of loss.

Invited WED 2o.4 Wednesday, 11:20 Olympia
Skyrmions in Nanophotonics – from classical to quantum — •Guy Bartal — Technion, Haifa, Israel
We observe quantum skyrmions mediated by coupling heralded single photons to a nanophotonic platform and demonstrate a robust transfer of near-field skyrmions into Stokes skyrmions in free-space. This paves the way to topological invariants as quantum degree of freedom, for robust and scalable high-dimensional quantum information processing and transfer architectures.

WED 1s: 2D Nanophotonics

Chair: Mohammad Hafezi, University of Maryland, College Park, USA

Time: Wednesday, 10:05–12:20 Location: Seefeld/Tirol

Invited WED 1s.1 Wednesday, 10:05 Seefeld/Tirol
From Ultrafast Exciton–Polariton Dynamics to Device Applications in Scalable 2D TMDC Platforms — •Yu-Jung Lu — Academia Sinica, Taipei, Taiwan — National Taiwan University, Taipei, Taiwan
We demonstrate wafer-scale integration of monolayer MoS_2 photodetectors with nitride-based plasmonic metasurfaces, achieving high detectivity (2.6×10^{12} Jones), ultralow dark current (8 pA), and long-term stability. The enhanced performance arises from plasmonic photogating and exciton–polariton coupling, offering scalable, CMOS-compatible platforms for next-generation optoelectronic and quantum photonic devices.

Oral WED 1s.2 Wednesday, 10:30 Seefeld/Tirol
Exciton-Plasmon Coupling Leads to Second-Harmonic Generation — •Maximilian Black[1], Yaser Abdi[1,2], Prabhdeep Singh[1], and Nahid Talebi[1,3] — [1]Institute of Experimental and Applied Physics, Kiel University, Kiel, Germany — [2]Department of Physics, University of Tehran, Tehran, Iran — [3]Kiel Nano, Surface, and Interface Science KiNSIS, Kiel University, Kiel, Germany
We report strong plasmon-exciton interactions and enhanced interfacial fields in Borophene/ZnO hybrid nanostructures. Borophene, a 2D metal in the visible range, exhibits an anisotropic in-plane plasmonic response coupling to the excitons of nanoscale ZnO rods. The resulting nonlinear polarization and second harmonic generation is probed optically.

Oral WED 1s.3 Wednesday, 10:45 Seefeld/Tirol
Intrinsic plasmon canalization in the natural biaxial van-der-Waals material $MoOCl_2$ — •Farid Aghashirinov[1], Andrea Manchini[2], Lin Nan[2], Giacomo Venturi[2], Nicola Melchioni[2], Florian Mangold[1], Bettina Frank[1], Antonio Ambrosio[2], and Harald Giessen[1] — [1] 4th Physics Institute, Research Center SCoPE, and Integrated Quantum Science and Technology Center, University of Stuttgart, Stuttgart, Germany — [2] Vectorial Nano-Imaging, Istituto Italiano di Tecnologia, Milano, Italy
We investigate directional, natural near-infrared plasmon polaritons in mechanically exfoliated bulk molybdenum oxide dichloride ($MoOCl_2$) flakes on SiO_2 using SNOM across a 2.3–7 μm wavelength range, excited via gold launchers. We report, for the first time, the transition from hyperbolic plasmon-polaritons to canalisation and elliptical modes.

Oral WED 1s.4 Wednesday, 11:00 Seefeld/Tirol
Angular Emission Properties of Strained Transition-Metal Dichalcogenides — Lee Grimberg, Svyatoslav Kostyukovets, and •Moshe G. Harats — Department of Materials Engineering, Ben-Gurion University of the Negev, Be'er Sheva, Israel
We observe the erratic strain dependency of the photoluminescence intensity of strained transition-metal dichalcogenides at low strain values. We find that this is the result of the optical-dipole emission dependent on the curvature of the substrate. These findings are supported by Finite-Difference Time-Domain simulations, in agreement with the experimental data.

Oral WED 1s.5 Wednesday, 11:15 Seefeld/Tirol
Coherent Interaction of Exciton States in TMDC Monolayers — •Max Wegerhoff, Moritz Scharfstädt, Andrea Bergschneider, and Stefan Linden — Physikalisches Institut, University of Bonn, 53115 Bonn, Germany

We use femtosecond pump-probe spectroscopy to study the interaction of exciton states in TMDC monolayers. Within the same valley, we measure the repulsive interaction between 2s and 1s excitons. Furthermore, we demonstrate the existence of a 2s-1s biexciton. Recently, we started investigating the influence of screening on the interaction strength.

Invited WED 1s.6 Wednesday, 11:30 Seefeld/Tirol
Near-field probe and control of excitons in 2D materials with plasmonic nanostructures — •You Zhou — University of Maryland, College Park, USA
We present a platform using plasmonic metasurfaces to control excitons in 2D materials via a nonlocal pump-probe scheme. Surface plasmon polaritons induce sub-diffraction AC Stark effects in MoSe2 with power two orders of magnitude lower than free-space illumination, enabling power-efficient, chip-compatible light-induced exciton modulation below the diffraction limit.

Invited WED 1s.7 Wednesday, 11:55 Seefeld/Tirol
Ultrafast and quantum photonics with free electrons — •Javier Garcia de Abajo — ICFO-Institute de Ciencies Fotoniques, Barcelona, Spain
Ultrafast electron microscopy combines electron imaging and ultrafast optics to probe material excitations with extreme precision. We explore how free electrons interact with light and nanostructures, enabling novel quantum protocols, sensing, and photon generation through decoherence and quantum correlations, paving the way for advanced quantum sensing and metrology.

WED 3o: Industrial talk - Introducing IRa-SCOPE: vibrational analysis of materials at multiple length scales

Chair: attocube systems GmbH, Eglfingerweg 2, 85540 Haar, Germany

Time: Wednesday, 15:00–16:00 Location: Olympia

Technology WED 3o.1 Wednesday, 15:00 Olympia
Introducing IRa-SCOPE: vibrational analysis of materials at multiple length scales — •Sergiu Amarie, Andreas Huber, Bogdan Sava, Claas Reckmeier, and Alexander Govyadinov — attocube systems GmbH, Haar, Germany
attocube's Nanoscale Analytics unit (formerly neaspec) pioneers breakthrough technologies for nanoscale imaging and spectroscopy. With decades of expertise across semiconductor research, chemistry, photonics, polymers and life sciences, we develop advanced correlative AFM-based optical instruments offering sub-10 nm resolution from visible to THz, empowering cutting-edge materials research worldwide.

WED 4o: In honour of Sir Michael Berry

Chair: Nikolay Zheludev, University of Southampton, UK

Time: Wednesday, 16:30–17:50 Location: Olympia

Plenary WED 4o.1 Wednesday, 16:30 Olympia
The mathematics of Michael Berry — •Daniele Struppa — Chapman University, Orange, USA
Sir Michael Berry has an uncanny ability to demonstrate the intimate connections between mathematics and physics through his work in optics. In my talk I will attempt to give the audience a sense of the impact he has had not only on the physical community, but on the mathematical one as well.

Plenary WED 4o.2 Wednesday, 17:00 Olympia
Rainbow history: hidden connections — •Michael Berry — H H Wills Physics Laboratory, Bristol , United Kingdom
Rainbows, and the history leading to their understanding, illustrate a variety of scientific concepts.

WED PIANO: Postcards for Piano

Chair: Orit Wolf - International Pianist, Professor of Creative Arts, Humanities & Arts Department, Technion, Israel

Time: Wednesday, 18:00–18:50 Location: Olympia

A collection of intimate piano miniatures—musical postcards and whispered moments—featuring Chopin, Debussy, Albéniz, and beyond.

WED 5o: Awards Ceremony. John Dudley and Peter Dombi

Time: Wednesday, 18:50–19:30 Location: Olympia

EPS Awards Ceremony. Presented by John Dudley and Peter Dombi

THU 1o: Plenary talk

Chair: Hui Gao, Institute of Physics, Chinese Academy of Sciences, Beijing, China

Time: Thursday, 9:00–9:50 Location: Olympia

Plenary THU 1o.1 Thursday, 9:00 Olympia
Light a quantum path for clock and fundamental physics — •Jun Ye — JILA, NIST and University of Colorado, Boulder, USA
Scaling up quantum systems promises to revolutionize the performance of atomic clocks. The combination of ultrafast optics and precision metrology also provides new tools for nuclear physics, leading to recent development of thorium-229 nuclear clock. The permeation of quantum metrology to all areas of physics opens new discovery potentials.

THU 2o: Topological light and matter 1

Chair: Natalia Lichinitser, Duke University, Durham, USA

Time: Thursday, 10:05–12:05 Location: Olympia

Invited THU 2o.1 Thursday, 10:05 Olympia

Axion Electrodynamics and Topological Photonic Crystals — •Baile Zhang — Nanyang Technological University, Singapore, Singapore

The possible existence of axions can modify Maxwell's equations, giving rise to axion electrodynamics. In photonic crystals, certain symmetries can quantize the axion field, rendering it a topological invariant. Here, we discuss approaches to realizing axion photonic crystals and explore their distinctive physical properties.

Invited THU 2o.2 Thursday, 10:30 Olympia

Tuning of topological properties enabled by surface phonon polaritonics: phonon polariton skyrmions, merons, and skyrmion bags — •Julian Schwab[1], Florian Mangold[1], Bettina Frank[1], Timothy J. Davis[1,2], and Harald Giessen[1] — [1]4th Physics Institute, Research Center SCoPE, and Integrated Quantum Science and Technology Center, University of Stuttgart, Germany — [2]School of Physics, University of Melbourne, Australia

We present surface phonon polariton skyrmions, merons, and skyrmion bags and study the influence on their topology when tuning the excitation wavelength. We present simulation results on the bubble-to-Néel-type transition of topological textures appearing in the electric field and spin angular momentum, and study singularity-type electric field spin merons and the conservation of their topological charges in moiré lattices.

Oral THU 2o.3 Thursday, 10:55 Olympia

2D Topological Edge States in Periodic Space-Time Interfaces — •Ohad Segal[1], Yonatan Plotnik[1], Eran Lustig[1], Yonatan Sharabi[1], Moshe-Ishay Cohen[1], Alexander Dikopoltsev[2], and Mordechai Segev[1] — [1]Technion, Haifa, Israel — [2]ETH Zürich, Zurich, Switzerland

We investigate topological phases in photonic space-time crystals, materials with refractive index that is modulated in both space and time. The resulting space-time topology enables propagating and exponentially amplified edge states along space-time interfaces. These systems exhibit novel edge states combining scattering-free unidirectional transport and non-resonant amplification without population inversion.

Oral THU 2o.4 Thursday, 11:10 Olympia

Birefringence-enabled topological effects in laser-written quantum photonics — •Max Ehrhardt[1], Matthias Heinrich[2], Kai Wang[1], and Alexander Szameit[2] — [1]McGill University, Montreal, Canada — [2]University of Rostock, Rostock, Germany

This work demonstrates how engineered birefringence in femtosecond laser-written waveguides enables topological control in quantum photonics. By tailoring waveguide orientations, synthetic magnetic fluxes produce robust quantum interference and polarization-to-vortex coupling. These birefringence-induced topological effects enhance stability and scalability, advancing resilient architectures for next-generation photonic quantum information technologies.

Oral THU 2o.5 Thursday, 11:25 Olympia

Generation of Self-Dual Lorentz-Invariant Axionic Toroidal Light Pulses — •Luka Vignjevic[1], Yijie Shen[2], Nikitas Papasimakis[1], and Nikolay I Zheludev[1] — [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom — [2]Centre for Disruptive Photonic Technologies and The Photonics Institute, Nanyang Technological University, Singapore, Singapore

We report on the generation and characterization of self-dual Lorentz-invariant optical pulses of toroidal topology exhibiting spin-orbit coupling and $\vec{E} \cdot \vec{B} \neq 0$, that are of interest to axion electrodynamics, telecommunications, spectroscopy, and particle acceleration.

Invited THU 2o.6 Thursday, 11:40 Olympia

Topology with Spatiotemporally Sculptured Light — •Qiwen Zhan — University of Shanghai for Science and Technology, Shanghai, China

In this talk I will review recently developed techniques that allows us to directly sculpt optical fields in the spatial and spatiotemporal domains. These spatiotemporal sculpturing techniques are employed to produce optical fields with various topological features, which may find important applications when interact with matters, opening tremendous potential opportunities for sculptured complex spatiotemporal wavepackets.

THU 1s: e-Photon interaction & other

Chair: Guy Bartal, Technion, Haifa, Israel

Time: Thursday, 10:05–12:05 Location: Seefeld/Tirol

Invited THU 1s.1 Thursday, 10:05 Seefeld/Tirol

Active integrated photonics for information processing, computing, and quantum networking — •Liang Feng — University of Pennsylvania, Philadelphia, USA

We present a unified photonic computing platform that combines lithography-free linear programmability with field-programmable nonlinear activation, enabling fully reconfigurable optical information processing on a semiconductor chip with applications on AI, computing, and quantum networking.

Invited THU 1s.2 Thursday, 10:30 Seefeld/Tirol

Phonon-mediated processes in hexagonal boron nitride: decoherence, exciton-defect coupling, and frequency down-conversion — •Nahid Talebi — Kiel University, Kiel, Germany

We report on phonon-mediated photophysics of hexagonal boron nitride, including decoherence of defect electronic excitations, frequency down-conversion, and exciton-defect couplings in heterostructures of hexagonal boron nitride and perovskites, explored using photoluminescence and cathodoluminescence spectroscopy.

Oral THU 1s.3 Thursday, 10:55 Seefeld/Tirol

4D Near-Field Electron Tomography — •Tamir Shpiro, Ron Ruimy, Kaizad Rustomji, and Ido Kaminer — Technion – Israel Institute of Technology, Haifa, Israel

Sensing of ultrafast electromagnetic pulses is limited by detectors' spatio-temporal resolution. Utilizing electrons' spatial resolution and their coherent interaction with fields, we develop a novel technique for reconstructing 3+1D vectorial near-fields in ultrafast electron microscopy.

Oral THU 1s.4 Thursday, 11:10 Seefeld/Tirol

Ultrafast all-optical nanoplasmonic switching based on hot electrons — •Béla Lovász[1], Zsuzsanna Pápa[1,2], Péter Sándor[1], Judit Budai[2], Lázár Tóth[2], Péter Rácz[1], and Péter Dombi[1,2] — [1]Wigner Research Centre for Physics, Budapest, Hungary — [2]Extreme Light Infrastructure Attosecond Laser Pulse Source, The Extreme Light Infrastructure European Research Infrastructure Consortium, Szeged, Hungary

We demonstrate all-optical ultrafast nanoplasmonic switching of a femtosecond SPP wavepacket propagating in a plasmonic waveguide. This we achieve by exploiting hot electron generation with a femtosecond laser pulse. Simulation results correspond to experimental findings.

Oral THU 1s.5 Thursday, 11:25 Seefeld/Tirol

Interaction of Preshaped Electron Wavepackets with Plasmonic Near-Fields Visited from First Principles — •Mitja Funk[1] and Nahid Talebi[1,2] — [1]Institute of Experimental and Applied Physics, Kiel University, Kiel, Germany — [2]Kiel Nano, Surface and Interface Science KiNSIS, Kiel University, Kiel, Germany

We present first-principles simulations of sequential light–electron interactions showing that the interaction strength between optical near-fields and free-electron wavepackets depends on their initial shape. Pre-shaped electron wavepackets exhibit enhanced interaction with plasmonic dipole fields, enabling controlled frequency bunching and offering a route toward ultrafast, high-resolution electron metrology.

Invited THU 1s.6 Thursday, 11:40 Seefeld/Tirol

Magnetic Metamaterials for Drug Delivery — •Pavel Ginzburg[1] and Hani Barhom[2] — [1]Tel Aviv University, Tel Aviv, Israel — [2]Triangle Regional Research and Development Center, Kfar Qara, Israel

Nanoparticles integrating multiple biomedical modalities are promising candidates for electromagnetically responsive theranostic carriers. We introduce a

metamaterial drug delivery capsule based on gold and magnetized vaterite, outlining advantages for light-activated theranostics, including controllable release and imaging compatibility. Feasibility is supported by large animal experiments demonstrating targeted activation and performance.

THU 3o: Industral talk-Supercontinuum White Light Lasers – a Powerful Tool for Nano-Photonics and Novel Materials Research

Time: Thursday, 15:00–16:00 Location: Olympia

Technology THU 3o.1 Thursday, 15:00 Olympia

Supercontinuum White Light Lasers – a Powerful Tool for Nano-Photonics and Novel Materials Research — •Nicolai Granzow — NKT Photonics A/S, Bregnerødvej 144, Denmark

NKT Photonics introduces supercontinuum white light lasers, explaining the physics of supercontinuum generation in photonic crystal fibers and their integration into commercial SuperK lasers. The talk also highlights diverse applications, featuring cutting-edge research from Nano-Photonics and Meta-Materials groups worldwide.

THU 4f: Poster session

Time: Thursday, 16:00–17:00 Location: Foyer

THU 4f.1 Thursday, 16:00 Foyer

Time refraction optics with sub-cycle modulation — •Ohad Segal[1], Noa Konforty[1], Oded Schiller[1], Maxwell J. Tolchin[2], Jon-Paul Maria[2], and Mordechai Segev[1] — [1]Technion, Haifa, Israel — [2]Pennsylvania State University, State College, Pennsylvania , USA

We experimentally realize order-unity change in the refractive index occurring within a sub-cycle of optical frequencies. By varying the duration of the index change from extending over many cycles to sub-cycle, we measure enhanced time-refractions. This work enables experiments on time-interfaces, time-reflections and photonic time-crystals at optical frequencies.

THU 4f.2 Thursday, 16:00 Foyer

Engineering Optical Forces for Time Crystal Transitions — •Steffen Seligmann and Nikitas Papasimakis — University of Southampton, Southampton, United Kingdom

We show continuous tuning of interactions in ensembles of plasmonic resonator arrays, from reciprocal to fully nonreciprocal. Our results provide a framework for investigating and engineering synchronization phenomena in many-body systems, including topological states and time crystals.

THU 4f.3 Thursday, 16:00 Foyer

Utilizing Kink States in Topological Photonic Waveguides for on-chip Slow Light Transport — •Yves Köppeler[1], Emmanuel Narváez Castañeda[1,3], Michael Brauckmann[1,3], Dustin Siebert[2,3], Benjamin Brecht[1,3], Jens Förstner[2,3], and Thomas Zentgraf[1,3] — [1]Department of Physics, Paderborn University, Paderborn, Germany — [2]Department of Electrical Engineering, Paderborn University, Paderborn, Germany — [3]Institute for Photonic Quantum Systems (PhoQS), Paderborn, Germany

We design and fabricate valley photonic crystal waveguides in silicon on insulator based on the quantum valley-Hall effect. We exploit their specific topological properties to realize on-chip slow light transport.

THU 4f.4 Thursday, 16:00 Foyer

Multi-timescale Frequency–Phase Matching for High-Yield Nonlinear Photonics — Mahmoud Jalali Mehrabad[1], Lida Xu[1], Gregory Moille[1], Christopher Flower[1], •Supratik Sarkar[1], Apurva Padhye[1], Shao-Chien Ou[1], Daniel G. Suarez-Forero[1], Mahdi Ghafariasl[1], Yanne Chembo[2], Kartik Srinivasan[1], and Mohammad Hafezi[1] — [1]Joint Quantum Institute, University of Maryland, College Park, USA — [2]Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, USA

We introduce a topologically protected passive on-chip silicon nitride platform based on a two-timescale ring-resonator lattice that generates ultra-wide broadband nested frequency combs. Our architecture fundamentally relaxes frequency-phase matching and demonstrates simultaneous generation of fundamental, second, third, and fourth harmonic combs from blue to telecom wavelengths with 100% device yield.

THU 4f.5 Thursday, 16:00 Foyer

Towards a Bloch Surface Wave Based Platform for Coupled Waveguide Arrays — •Tore Homeyer and Stefan Linden — Physikalisches Institut, Universität Bonn, Bonn, Germany

We fabricate and characterize dielectric loaded Bloch surface wave guides (DLBSWGs) on SiO_2/Ta_2O_5 multilayers. DLBSWGs exhibit low intrinsic losses and high propagation lengths which make them a compelling platform for the study of tight binding systems in arrays of coupled waveguides.

THU 4f.6 Thursday, 16:00 Foyer

withdrawn

THU 4f.7 Thursday, 16:00 Foyer

Broadband Emission Enhancement of NV Center using Disordered Silicon Pyramids surface — •Mohd Aleem and Rajesh V. Nair — Indian Institute of Technology, Ropar, Rupnagar, Punjab, India

Herein, we present a robust platform for broadband emission enhancement of NV centres using spatially distributed structured silicon surfaces acting as open photonic cavities. These enable broadband Purcell enhancement, yielding a 2-fold lifetime reduction, 10-fold PL intensity increase, and 8-fold magnetic sensitivity improvement with high coupling efficiency and fabrication-tolerant performance.

THU 4f.8 Thursday, 16:00 Foyer

Mechanism of High-Temperature Superfluorescence in Hybrid Perovskite Thin Films — •Boris Fainberg[1] and Vladimir Osipov[2,3] — [1]Holon Institute of Technology, Holon, Israel — [2]Harbin Institute of Technology, Harbin, China — [3]Suzhou Research Institute of Harbin Institute of Technology, Suzhou, China

In relation to discovery of high-temperature superfluorescence in hybrid perovskites, we elucidate the mechanism that enables high-temperature superfluorescence in these systems. We show that a prerequisite for the high-temperature superfluorescence in hybrid perovskite thin films is the formation of Wannier excitons interacting with longitudinal optical phonons via Fröhlich interaction.

THU 4f.9 Thursday, 16:00 Foyer

Stability of the Quantum Coherent Superradiant States in Relation to Exciton-Phonon Interactions and the Fundamental Soliton in Hybrid Perovskites — •Boris Fainberg[1], Andrey Gladkij[2], Nikolay Veretenov[2], Nikolay Rosanov[2], and Boris Malomed[3] — [1]Holon Institute of Technology, Holon, Israel — [2]Ioffe Physical-Technical Institute, St. Petersburg, Russia — [3]Tel Aviv University, Tel Aviv, Israel

We investigate the stability of the superradiant state with respect to exciton–phonon interactions in hybrid perovskites, in which the room-temperature superfluorescence was discovered. We derive nonlinear equations for the complex-valued polarization and obtain their stable fundamental soliton solution. The soliton regime enhances the amplitude of a stable exciton state.

THU 4f.10 Thursday, 16:00 Foyer

An open source toolbox GRANAD: GRAphene Nanoantennas with Adatoms — David Dams[1], Miriam Kosik[2], Marvin M. Müller[1], Abhishek Ghosh[2], Antton Babaze[3,4], Garnett W. Bryant[5], Andres Ayuela[3], Carsten Rockstuhl[1,6], Marta Pelc[2], and •Karolina Słowik[2] — [1] Karlsruhe Institute of Technology, Institute of Theoretical Solid State Physics, Karlsruhe, Germany — [2] Institute of Physics, Nicolaus Copernicus University in Toruń, Toruń, Poland — [3]Centro de Física de Materiales/ Donostia International Physics Center, Donostia-San Sebastián, Spain — [4]Department of Applied Physics, School of Architecture, Donostia-San Sebastián, Spain — [5]University of Maryland and National Institute of Standards and Technology, College Park, MD, USA — [6]Karlsruhe Institute of Technology, Institute of Nanotechnology, Karlsruhe, Germany

We introduce and discuss applications of GRANAD:an open-source toolbox for simulating optoelectronic and quantum-optical properties of 2D material nanostructures. Combining tight-binding modeling with semiclassical light treatment and JAX-based auto-differentiation, GRANAD captures quantum effects, nonlinear interactions, and dissipation, enabling GPU-accelerated analysis and optimization of graphene-based and other 2D material nanoantennas.

THU 4f.11 Thursday, 16:00 Foyer

withdrawn

THU 4f.12 Thursday, 16:00 Foyer

Role of pseudospectra scaling in exponential sensitive lattices — Ioannis Kiorpelidis[1,2] and •Konstantinos Makris[1,2] — [1]Institute of Electronic Structure and Laser-FORTH, Heraklion, Greece — [2]Department of Physics, University of Crete, Heraklion, Greece

In the framework of non-Hermitian photonics we present recent results regarding the effect of non-normality in the ultra-sensitivity and power amplification of open optical waveguide lattices with asymmetric couplings. Based on pseudospectra-scaling theory we suggest a route for designing ultrasensitive systems without relying on exceptional points.

THU 4f.13 Thursday, 16:00 Foyer

Multiorder exceptional points in optical lattices — Athanasios Athanasopoulos[1,2], Demetrios Kaltsas[1,2], and •Konstantinos Makris[1,2] — [1]Institute of Electronic Structure and Laser-FORTH, Heraklion, Greece — [2]Department of Physics, University of Crete, Heraklion, Greece

We introduce a new type of non-Hermitian degeneracies, namely the multi-order exceptional Points (MoEPs) in photonic lattices with gain and loss. The response and the symmetry-based sensitivity of these quantum inspired classical systems is examined by using pseudospectra. Their potential applications in precision sensing for optical systems, are also discussed.

THU 4f.14 Thursday, 16:00 Foyer

Localisation Transitions by Temporal Disorder in Liquid Light — •Diego Piciocchi[1], Ina Heckelmann[1], Alexander Dikopoltsev[1], Michael Schreiber[2], Mathieu Bertrand[1], Mattias Beck[1], Christian Jirauschek[2], Oded Zilberberg[3], and Jérôme Faist[1] — [1]Institute for Quantum Electronics and Quantum Center, ETH Zürich, Zürich, Switzerland — [2]TUM School of Computation, Information and Technology, Technical University of Munich (TUM), Munich, Germany — [3]Department of Physics, University of Konstanz, Konstanz, Germany

We investigate noise-induced localisation in the synthetic lattice of cavity modes of a ring laser. The fast gain enforces a coherent liquid state of light, suppressing intensity fluctuations. Temporal disorder introduced through noisy current modulation drives transitions from extended to Gaussian and exponentially localised spectra, observed via time-resolved measurements.

THU 4f.15 Thursday, 16:00 Foyer

Strain-Tuned Phonon-Polariton in Hexagonal Boron Nitride — Sukanta Nandi[1,2], •Eyal Shoham[1], Aviv Biton[3], Ayelet Teitelboim[4], Jeny Jose[1], Gil Atar[4], Ashwin Ramasubramaniam[5], Assaf Hamo[3], Hanan Herzig Sheinfux[3], Doron Naveh[1], and Tomer Lewi[1] — [1]Faculty of Engineering and Institute of Nanotechnology and Advanced Materials, Bar-Ilan University, Ramat Gan 5290002, Israel — [2]Department of Electronics and Communications Engineering, Indraprastha Institute of Information Technology Delhi (IIIT-Delhi), New Delhi 110020, India — [3]Physics Department, Bar-Ilan University, Ramat Gan 5290002, Israel — [4]Applied Physics Division, Soreq NRC, Yavne 81800, Israel — [5]Department of Mechanical and Industrial Engineering & Materials Science and Engineering Graduate Program, University of Massachusetts Amherst, Amherst, Massachusetts 01003, USA

This work demonstrates strain-tuned phonon-polaritons in hexagonal boron nitride within the mid-infrared regime. Thermally induced strain creates nanobubbles acting as efficient single-photon emitters through a strain-phonon "cooling" mechanism, while external strain modulates the reststrahlen band and polariton dispersion, enabling active control of light-matter interactions and quantum emission.

THU 4f.16 Thursday, 16:00 Foyer

Observation of the AC Stark shift in the photoluminescence of an exciton-polariton condensate — •Sarit Feldman[1], Dmitry Panna[1], Nadav Landau[1], Sebastian Brodbeck[2], Sebastian Klembt[2], Christian Schneider[2], Sven Hoefling[2], and Alex Hayat[1] — [1]Department of Electrical and Computer Engineering, Technion , Haifa, Israel — [2]Technische Physik, Physikalisches Institut and Wilhelm Conrad Röntgen Research Center for Complex Material Systems, Universität Würzburg, Würzburg, Germany

We report the first observation of a Stark-induced spectral shift in the photoluminescence of an exciton-polariton condensate. Our results shed light on the ultrafast, noninvasive manipulation of the condensate, key to the investigation of solid-state condensate dynamics and implementations in quantum polariton-based information technologies.

THU 4f.17 Thursday, 16:00 Foyer

Polytype-Dependent Upconversion Photoluminescence in 3R-MoS2 — •Idan Kizel[1,2], Omri Meron[1,2], Dror Hershkovitz[1,2], Youngki Yeo[1], Nirmal Roy[1], Wei Cao[3], Moshe Ben-Shalom[1], and Haim Suchowski[1,2] — [1]Condensed Matter Physics Department, School of Physics and Astronomy, Tel Aviv University, Tel Aviv, Israel — [2]Center for Light-Matter Interaction, Tel Aviv University, Tel Aviv, Israel — [3]State Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemical Engineering, Nanjing Tech University, Nanjing, China

We report exciton-exciton annihilation upconversion in ferroelectric 3R-MoS2 - a first for ferroelectric TMDs. Upconversion photoluminescence emerges across 3–10 layers, with trilayer ABA and BAB polytypes showing robust contrast despite identical polarization. Ab initio calculations reveal competing processes underlying this stacking-dependent contrast in ferroelectric van der Waals materials

THU 4f.18 Thursday, 16:00 Foyer

withdrawn

THU 4f.19 Thursday, 16:00 Foyer

A fiber-based cathodoluminescence detection system for investigating exciton-defect interactions in hBN/Perovskite heterostructures — •Paul H. Bittorf[1], Filip Majstorovic[1], Pavel Ruchka[2], Harald Giessen[2], Sara Darbari[1], and Nahid Talebi[1,3] — [1]Institute for Experimental and Applied Physics, Kiel University, Kiel, Germany — [2]4th Physics Institute and Research Center SCoPE, University of Stuttgart, Stuttgart, Germany — [3]Kiel Nano, Surface and Interface Science KiNSIS, Kiel University, Kiel, Germany

Here, we investigate the spatial far-field distribution of local photonic modes, e.g., exciton polaritons, by performing fiber-based cathodoluminescence spectroscopy. Moreover, the heterostructure of Ruddleson-Popper perovskites (RPP) and hexagonal boron nitride (hBN) shows a long-range energy transfer mechanism, where the excitons of the RPP couple to localized defects inside the hBN.

THU 4f.20 Thursday, 16:00 Foyer

Tailoring Phonon Polaritons in hBN with the Plasmonic Phase-Change Material In_3SbTe_2 — •Lina Jäckering, Aaron Moos, Lukas Conrads, and Thomas Taubner — 1st Institute of Physics (IA), RWTH Aachen University, Aachen, Germany

By optical programming resonators into the phase-change material In_3SbTe_2 we show fast prototyping of reconfigurable resonators for polaritons in hexagonal boron nitride (hBN) that we investigate with near-field optical microscopy.

THU 4f.21 Thursday, 16:00 Foyer

Optical resonance tuning of single polystyrene microspheres using the phase-change material In_3SbTe_2 as a switchable mirror — •Rebecca Rahmel, Hristiyana Kyoseva, Lukas Conrads, Thomas Taubner, and Gero von Plessen — I. Institute of Physics (IA), RWTH Aachen University, Aachen, Germany

Dielectric particles exhibit optical scattering resonances, which are highly sensitive to the dielectric properties of the surrounding medium. Here, we tune the infrared resonances of single polystyrene microspheres deposited on the phase-change material In_3SbTe_2 by switching it between its dielectric and metallic phase, making it a switchable mirror.

THU 4f.22 Thursday, 16:00 Foyer

withdrawn

THU 4f.23 Thursday, 16:00 Foyer

Population-Dependent Crossover of Excitonic Strong-Field Effects in Non-collinear High-Harmonic Spectra — Jicai Zhang[1], •Stanislav Kruchinin[2], and Tran Trung Luu[1] — [1]Department of Physics, The University of Hong Kong, Hong Kong, China — [2]Microsoft Austria, Vienna, Austria

We investigate strong-field exciton dynamics in thin films of SiO_2 using non-collinear high harmonic spectroscopy. Delay-dependent energy shifts of the third harmonic centroid have revealed a population-dependent crossover between the excitonic Stark, dynamic Franz-Keldysh, and ponderomotive effects.

THU 4f.24 Thursday, 16:00 Foyer

Single Molecule Detection in hBN metasurfaces — •Saeid Izadshenas and Karolina Słowik — Nicolaus Copernicus University , Torun, Poland

We report complementary hBN metasurface hosting embedded nanocavities. Comprehensive optical characterization reveals visible-regime high-Q resonances due to the quasi-bound states in the continuum, which produce a spatially uniform electric fields. The cavity field enables single-molecule detection, which we here consider for ATTO 610-doped ethanol. Results demonstrate strong absorption–emission enhancement.

THU 4f.25 Thursday, 16:00 Foyer

On the intrinsic optical bistability of artificial atoms — •Andrey Malyshev — Universidad Complutense de Madrid, Madrid, Spain

We predict an intrinsic optical bistability in a single semiconductor quantum dot

or a similar system under a close to resonant excitation and propose experiments to observe it.

THU 4f.26 Thursday, 16:00 Foyer

Optical Eigenpulses for Temporal Metamaterials — •Joseph Stones, Stefano Vezzoli, Riccardo Sapienza, and Anthony Harwood — Imperial College London, London, United Kingdom

I present the recent progression towards creating and measuring optical Eigenpulses. Eigenpulses are non-trivially predefined waveforms that retain temporal and spectral distribution after interacting with time varying media. I will present simulation and experimental results.

THU 4f.27 Thursday, 16:00 Foyer

Tunable Second Harmonic Generation in Metaslab Waveguides — •Mai Tal[1,2,3], Hyunseung Jung[4,5], Uriel Levy[6], Igal Brener[4,5], and Tal Ellenbogen[2,3] — [1]School of Physics and Astronomy, Tel-Aviv University, Tel-Aviv, Israel — [2]Department of Physical Electronics, Faculty of Engineering, Tel-Aviv University, Tel-Aviv, Israel — [3]Center for Light-Matter Interaction, Tel-Aviv University, Tel-Aviv, Israel — [4]Sandia National Laboratories, Albuquerque, New Mexico, USA — [5]Center for Integrated Nanotechnologies, Sandia National Laboratories, Albuquerque, New Mexico, USA — [6]Institute of Applied Physics, Center for Nanoscience and Nanotechnology, The Hebrew University of Jerusalem, Jerusalem, Israel

We implement subwavelength-grating structures to create nonlinear metaslab waveguides for angle-tunable, phase-matched optical frequency conversion. We measure continuously tunable on-chip second harmonic generation of infrared light. We elucidate how form-birefringence and structural dispersion interplay within these metaslabs to enable precisely controlled nonlinear interactions for advanced optical applications.

THU 4f.28 Thursday, 16:00 Foyer

withdrawn

THU 4f.29 Thursday, 16:00 Foyer

Stark-Induced Coherent Control of Plexcitonic Modes in Resonant and Off-Resonant Quantum Systems — •Hira Asif[1] and Ramazan Sahin[1,2] — [1]Department of Physics, Akdeniz University , Antalya, Turkey — [2]Turkish National Observatories (TUG), Antalya, Turkey

We demonstrate Stark-induced coherent control of plexcitonic modes in resonant and off-resonant plasmon–emitter systems. Voltage-controlled Stark fields enable tunable Rabi splitting, transparency effects, and on/off photoluminescence modulation, offering a versatile platform for reconfigurable quantum photonic devices.

THU 4f.30 Thursday, 16:00 Foyer

Electric-field-induced Second Harmonic Generation using Silicon-rich Nitride Guided-mode Resonance Metasurface — •Zetian Chen, Oren Goldberg, Noa Mazurski, and Uriel Levy — Hebrew University of Jerusalem, Jerusalem, Israel

We demonstrate a tunable nonlinear metasurface device based on a CMOS-compatible process. It leverages guided-mode resonance using silicon-rich nitride, together with low-loss compact electrodes design, holding great promise for electric-field-induced second harmonic generation. Initial experimental results show prominent resonance at the fundamental wavelength.

THU 4f.31 Thursday, 16:00 Foyer

Infrared beam-shaping on-demand employing optically programmed metasurfaces with the phase-change material In_3SbTe_2 — •Lukas Conrads and Thomas Taubner — RWTH Aachen University, Aachen, Germany

We exploit the non-volatile insulator-to-metal transition of the plasmonic phase-change material In_3SbTe_2 for optical programming infrared beam-shaping metasurfaces. We tailor the geometric phase of metasurfaces to achieve beam steering, lensing, optical vortex beams and holography.

THU 4f.32 Thursday, 16:00 Foyer

Metasurfaces for Thermal Encoding and Thermal Camouflage in both MWIR and LWIR Bands Simultaneously and Independently — •Roy Maman, Noa Mazurski, and Uriel Levy — The Hebrew University of Jerusalem, Jerusalem, Israel

This paper demonstrates a metasurface platform that enables independent, high-resolution spatial control of emissivity in both the MWIR and LWIR bands simultaneously. The design provides a broad emissivity palette allowing the encoding of arbitrary thermal patterns. It operates across a wide temperature range, under varying incidence angles, and is polarization-agnostic.

THU 4f.33 Thursday, 16:00 Foyer

Foundation Models for Large-Scale Inverse Design in Metaphotonics — •Sergei Rodionov, Arturo Burguete-Lopez, Maxim Makarenko, Qizhou Wang, and Andrea Fratalocchi — King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

Modern metaphotonics demands inverse design tools that are generalizable, accurate, and computationally efficient. We introduce a foundation model for metasurface inverse design trained on a large-scale experimental dataset. Using contrastive learning to align geometry and spectral embeddings, it transforms inverse design into a matrix–vector multiplication, generating over 10^5 accurate metasurface designs per second with high accuracy.

THU 4f.34 Thursday, 16:00 Foyer

observation of bound state in the continuum in the deep ultraviolet regime — •Minsu Jeong[1], Jihae Lee[2], and Junsuk Rho[1,2,3,4,5] — [1]Department of Mechanical Engineering, Pohang University of Science and Technology (POSTECH), Pohang 37673, South Korea — [2]Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Pohang 37673, South Korea — [3]Department of Electrical Engineering, Pohang University of Science and Technology (POSTECH), Pohang 37673, South Korea — [4]POSCO-POSTECH-RIST Convergence Research Centre for Flat Optics and Metaphotonics, Pohang 37673, South Korea — [5]National Institute of Nanomaterials Technology (NINT), Pohang 37673, South Korea

We experimentally demonstrate symmetry-protected bound states in the continuum (BICs) in the deep-ultraviolet (DUV) regime using Zirconium oxide-coated resist nanostructures fabricated via hybrid lithography. The high-index, low-loss design enables robust DUV resonances, expanding BIC applications to biosensing and imaging through strong DUV photon–matter interactions.

THU 4f.35 Thursday, 16:00 Foyer

Mie Voids in Silicon Rich Nitride Operating in Transmission — •oren goldberg and uriel levy — Institute of Applied Physics, The Faculty of Science, The Center for Nanoscience and Nanotechnology, The Hebrew University of Jerusalem, Jerusalem, Israel

We theoretically and experimentally demonstrate Mie voids in silicon rich nitride (SRN) operating in transmission.

THU 4f.36 Thursday, 16:00 Foyer

CMOS-compatible Ge Metasurfaces on 200 mm Si Wafers for Applications in Wavelength-Selective Photodetection — Paul Oleynik[1], Wei-Han Chen[2], Jon Schlipf[2], Katarzyna Hnida-Gut[2], Yuji Yamamoto[2], Wei-Chen Wen[2], Christian Wenger[2], and •Inga Anita Fischer[2] — [1]Experimental Physics and Functional Materials, BTU Cottbus-Senftenberg, Cottbus, Germany — [2]IHP - Leibniz Institute for High Performance Microelectronics, Frankfurt (Oder), Germany

We present first results on the fabrication of Ge metasurfaces in an industrial 8“ processing line for the realization of metasurface-based photodetectors on the Si platform. Our spectroscopic characterization results highlight the influence of geometry parameters on optical properties as well as the high quality of the fabricated metasurfaces.

THU 4f.37 Thursday, 16:00 Foyer

Spatial and spectral engineering of thermal radiation through collective resonances — •Komron Shayegan[1], Lior Michaeli[2], Yae-Chan Lim[3], George R. Rossman[3], and Harry A. Atwater[3] — [1]ETH Zurich, Zurich, Switzerland — [2]Tel-Aviv University, Tel-Aviv, Israel — [3]California Institute of Technology, Pasadena, USA

We experimentally measure thermal radiation patterns in the infrared using a nanophotonic structure that supports a collective, or nonlocal, resonance. We design optimized structures using the coupled dipole approximation, which captures both the local and collective response of the structure, combined with an optimization algorithm.

THU 4f.38 Thursday, 16:00 Foyer

Photoluminescence from metals – (all) arguments resolved — Imon Kalyan[1], Ieng Wai Un[2], Kaiqiang Lin[3], John Lupton[4], Sebastian Bange[4], and •Yonatan Sivan[1] — [1]Ben-Gurion University, Beer Sheva, Israel — [2]South China Normal University, Guangzhou, China — [3]Xiamen University, Xiamen, China — [4]Regensburg University, Regensburg, Germany

We provide a single line analytic theory for (nonlinear) photoluminescence from illuminated metal nanostructures under CW and pulsed illumination which allows us to explain a long series of seemingly contradicting experimental reports. We then describe a new set of measurements which provide detailed experimental evidence supporting our subtle novel predictions.

THU 4f.39 Thursday, 16:00 Foyer

Time-domain photonic convolutional accelerator — •Anna Fischer[1], Aymeric Frerejean[1], Matthew J. Filipovich[1,2], Folkert Horst[1], and Bert Offrein[1] — [1]IBM Research Europe, Rüschlikon, Switzerland — [2]Clarendon Laboratory, University of Oxford, Oxford, United Kingdom

We demonstrate an integrated photonic convolution accelerator built from cascaded tunable couplers and delay lines, incorporating BaTiO3 electro-optic phase shifters. The platform enables time-domain processing of optical signals, and we will present examples of convolutional operations on complex-valued data and kernels, highlighting its scalability for advanced computing tasks.

THU 4f.40 Thursday, 16:00 Foyer

Mode locking in plasmonic lattice lasers — Janne I. Heikkinen, Roman Calpe, Laura Yrjänheikki, Atri Halder, Antti J. Moilanen, Matias Koivurova, and •Tommi K. Hakala — University of Eastern Finland, FI-80101, Joensuu, Finland

We present a mechanism for mode locking in lasers composed of nanoscale plasmonic components.

THU 4f.41 Thursday, 16:00 Foyer

UV-Compatible Reflective Mie Void Metasurfaces — •Serkan Arslan, Julian Schwab, Harald Giessen, and Mario Hentschel — 4th Physics Institute University of Stuttgart, Stuttgart, Germany

Extending nanophotonics into the UV remains challenging. Mie voids, which confine light in air, offer strong resonances in the UV spectral range. We demonstrate reflective Mie void metasurfaces achieving off-axis focusing in the visible. Owing to their linear resonant dispersion, these results can be readily adapted to the UV regime.

THU 4f.42 Thursday, 16:00 Foyer

optically-gated hybrid nanodevice for neuromorphic and multi-valued photonic computation — •richard harris — department of physics, university of the free state, bloemfontein, south africa

We report a nanoscale photonic-neuromorphic device integrating ZnO, Al_2O_3, and Au layers to achieve light-driven memory, adaptive forgetting, and reset operations. The system exhibits persistent photoresponse, multi-level optical logic, and spectral tunability across UV–visible ranges, emulating synaptic behavior. This architecture advances low-power, room-temperature, light-based neuromorphic computing.

THU 4f.43 Thursday, 16:00 Foyer

Methods for characterization of hybrid optically traceable mesoporous silica–lipid nanocarriers for SiRNA delivery — •Diana Tzankova — Faculty of Pharmacy, Medical University of Sofia, Sofia, Bulgaria

Optically traceable hybrid nanosized drug delivery systems based on lipid-coated inorganic carriers for siRNA delivery require specific characterisation based on different techniques such as TEM, DLS, FTIR, TGA, DSC and XRD. In addition, fluorescence tracking methods could confirm siRNA localisation and protection, which is one more benefit for these systems.

THU 4f.44 Thursday, 16:00 Foyer

Light-Responsive siRNA-Loaded Amino-Functionalized Mesoporous Silica Nanoparticles for Nanoscale Intracellular Delivery — •Borislav Tzankov — Faculty of Pharmacy, Medical University of Sofia, Sofia, Bulgaria

Newly synthesised hybrid drug delivery system based on amino-functionalized mesoporous silica loaded with fluorescent siRNA is a potential platform for gene silencing and optical tracking. The properties of the particles possess targeted delivery and possible intracellular monitoring. High loading efficiency was achieved. Possible surface interactions and fluorescence properties gave them a potential for photonic-assisted teranostic systems.

THU 4f.45 Thursday, 16:00 Foyer

Resonant surface-enhanced infrared absorption spectroscopy of environmentally harmful PFAS substances — •Johanna Rose, Sandra Mennle, Philipp Karl, Mario Hentschel, and Harald Giessen — 4th Physics Institute and Research Center SCoPE, University of Stuttgart, Stuttgart, Germany

Perfluorated alkyl substances (PFAS) are known as "forever chemicals", as they persist in drinking water, soil. As regulatory agencies will soon impose limits on the concentration of PFAS in drinking water, we present resonant plasmonic SEIRA with gold nanoantennas as a quick nanophotonics method to detect these substances and their concentrations.

THU 4f.46 Thursday, 16:00 Foyer

Metasurfaces for the Generation and Control of Structured Light — Andrea Vogliardi [1,3,4], Gianluca Ruffarto[1,3,4], Daniele Bonaldo[1,3,4], Vittorio Apolloni[1,3,4], Simone Dal Zilio[2,4], and •Filippo Romanato[1,3,4] — [1]Univ of Padova, Dept of Physics , Padova, Italy — [2]Istituto Officina dei Materiali CNR , Trieste, Italy — [3]Quantum Technologies Research Center, Padova , Italy — [4]MetaPhoX s.r.l., Padova, Italy

Multifunctional metasurfaces enable compact generation and control of structured light for devices such as ultra-compact metalenses, OAM multipliers, and self-accelerating beams. Applications span optical communications (including high-dimensional modulation), quantum key distribution, and on-chip photonic processors, uniting phase, amplitude and polarization control in a planar platform

THU 4f.47 Thursday, 16:00 Foyer

symmetry breaking in the honeycomb lattice for the chiral resonance — •Minsu Jeong[1], Jihae Lee[2], and Junsuk Rho[1,2,3,4,5] — [1]Department of Mechanical Engineering, Pohang University of Science and Technology (POSTECH), Pohang 37673, South Korea — [2]Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Pohang 37673, South Korea — [3]Department of Electrical Engineering, Pohang University of Science and Technology (POSTECH), Pohang 37673, South Korea — [4]POSCO-POSTECH-RIST Convergence Research Centre for Flat Optics and Metaphotonics, Pohang 37673, South Korea — [5]National Institute of Nanomaterials Technology (NINT), Pohang 37673, South Korea

We experimentally demonstrate quality factor tunable chiral resonances in a honeycomb photonic crystal lattice by breaking inversion and planar symmetries. The resulting radiative chiral modes show large divergence angles exceeding 50° and quality factors tunable from 500 to 1500, representing symmetry-controlled chiral mode generation in photonic crystals.

THU 4f.48 Thursday, 16:00 Foyer

Plane Wave Scattering by a Planar Junction of PEC-Backed Chiral Layers — •Giovanni Riccio[1], Flaminio Ferrara[2], Gianluca Gennarelli[3], Rocco Guerriero[2], and Francesco Chiadini[2] — [1]D.I.E.M. - University of Salerno, Fisciano, Italy — [2]D.I.In. - University of Salerno, Fisciano, Italy — [3]I.R.E.A. - C.N.R., Naples, Italy

The plane wave scattering involving a planar junction formed by two uniaxial anisotropic chiral half-sheets located on a perfect electrical conductor is addressed when the incidence direction is perpendicular to the junction. Reflected and diffracted contributions are evaluated and added to the incident field to obtain the total field.

THU 4f.49 Thursday, 16:00 Foyer

Chiral light-matter interaction for controlling nanoplasmonic fields — •Lázár Tóth[1], Judit Budai[1], Zsuzsanna Márton[1], Péter Rácz[2], Péter Dombi[1,2], and Zsuzsanna Pápa[1] — [1]ELI ALPS, ELI-HU Non-Profit Ltd., Szeged, Hungary — [2]HUN-REN Wigner Research Center for Physics, Budapest, Hungary

We designed nanostructure dimers exhibiting ultrahigh plasmonic circular dichroism. Our simulations and SNOM experiments verified the almost 20-fold (~95%) field enhancement contrast in the gap by using left- and right-circularly polarized illuminations. The size of the gap region where the hot-to-cold spot switching is best fulfilled is also identified.

THU 4f.50 Thursday, 16:00 Foyer

Chiral Time Crystal - Modelling the Matter-to-Life Transition — •Baurzhan Salimzhanov, Eric Plum, and Nikolay Zheludev — University of Southampton, Southampton, United Kingdom

Nonreciprocal molecular interactions are now widely discussed as a mechanism of the matter-to-life transition that is accompanied by emergence of structural chirality. Here we demonstrate an achiral photonic nano-mechanical metamaterial that transitions to a chiral oscillating time crystal state, under illumination with circularly polarized light.

THU 4f.51 Thursday, 16:00 Foyer

Chirality encoding in resonant metasurfaces governed by lattice symmetries — Ivan Sinev[1], Felix Ulrich Brikh[1], Ivan Toftul[2], •Nikita Glebov[1], Kirill Koshelev[2], Yongsop Hwang[3], David G. Lancaster[3], Yuri Kivshar[2], and Hatice Altug[1] — [1]Institute of Bioengineering, École Polytechnique Fédérale de Lausanne, Lausanne 1015, Switzerland — [2]Nonlinear Physics Center, Research School of Physics, Australian National University, Canberra ACT 2601, Australia — [3]Laser Physics and Photonics Devices Lab, STEM, University of South Australia, Mawson Lakes, SA 5095, Australia

We present a universal strategy for engineering chiral metasurfaces via meta-atom geometry and lattice symmetries across all planar Bravais types. Chiral gradient metasurfaces enable predictable, tunable responses, offering an additional degree of freedom in optical signal processing, demonstrated via simultaneous mid-IR image encoding in transmission and circular dichroism.

THU 4f.52 Thursday, 16:00 Foyer

A Comparative Analysis of Plasmonic and Dielectric Metasurface Sensing Platforms Powered by Bound States in the Continuum — •Tao Jiang[1], Angana Bhattacharya[1], Martin Barkey[1], Andreas Aigner[1], Lina Rohrer[1], Thomas Weber[1], Juan Wang[1], Stefan A. Maier[2,3], and Andreas Tittl[1] — [1]Ludwig-Maximilians-University, , Faculty of Physics,Chair in Hybrid Nanosystems, Nano-Institute, , Munich, Germany — [2]Monash University, School of Physics and Astronomy, , Clayton, Australia — [3]Imperial College, Department of Physics, , London, United Kingdom

We reveal a fundamental trade-off between plasmonic and dielectric metasurfaces for molecular sensing. A clear performance crossover is identified: dielectric metasurfaces excel in air, while plasmonic metasurfaces dominate in lossy solvents. These results establish design rules for infrared metasurface sensors

and enable optimized performance in realistic, solvent-rich environments.

THU 4f.53 Thursday, 16:00 Foyer

Tunable Polaritonic Skyrmion Lattices Generated by Nonlocal Photonic Modes — •Enrico Baù[1], Connor Heimig[1], Jonas Biechteler[1], Florian Mangold[2], Julian Schwab[2], Manobina Karmakar[1], Leonardo Menezes[1,3], Haoran Ren[4], Stefan A. Maier[4,5], Harald Giessen[2], and Andreas Tittl[1] — [1]LMU, Nano-Institute Munich, Department of Physics, 1Chair in Hybrid Nanosystems, Munich, Germany — [2]University of Stuttgart, 24th Physics Institute, Research Center SCoPE, and Integrated Quantum Science and Technology Center,, Stuttgart, Germany — [3]Universidade Federal de Pernambuco, Departamento de Física, Recife-PE, Brazil — [4]Monash University, School of Physics and Astronomy, , Clayton, Australia — [5]Imperial College, Department of Physics, , London, United Kingdom

We demonstrate the generation and dynamic control of polaritonic skyrmion lattices through nonlocal photonic modes within resonant metasurfaces, producing deep subwavelength optical topologies. Our approach overcomes a limitation of previous platforms by optically tuning individual skyrmions through small changes in excitation frequency within the same structure.

THU 4f.54 Thursday, 16:00 Foyer

Accessible, All-Polymer Metasurfaces: Low Effort, High Q — •Michael Hirler, Alexander A. Antonov, Enrico Baù, Andreas Aigner, Connor Heimig, Haiyang Hu, and Andreas Tittl — Ludwig-Maximilians-Universität, Faculty of Physics, Chair in Hybrid Nanosystems, Nanoinstitute, , Munich, Germany

Optical high-Q metasurfaces provide a powerful platform for many applications, yet rely on costly, time- and labor-intensive fabrication methods. Here, we simplify this fabrication by repurposing PMMA resist as the resonator material, only relying on spin-coating, exposure, and development, demonstrating Q factors up to 523 at visible and near-infrared wavelengths.

THU 4f.55 Thursday, 16:00 Foyer

Reconfigurable Genetically Designed Metasurfaces for Drone Radar Tagging — •Pavel Ginzburg[1], Dmytro Vovchuk[1], Anna Mikhailovskaya[1], Mikhail Tsukerman[1], Konstantin Grotov[1], Anton Kharchevskii[1], Toms Salgals[2], and Vjaceslavs Bobrovs[2] — [1]Tel Aviv University, Tel Aviv, Israel — [2]Institute of Telecommunications Riga Technical University, Riga, Latvia

Detecting and monitoring small drones is a worldwide problem. We demonstrate tailor-made genetically designed metasurfaces that maximize radar visibility. We formulated an AI-driven optimization problem and built superscattering arrays validated in GHz experiments, demonstrating broadband backscatter and the identification of airborne targets, thereby translating fundamental electromagnetic concepts into practical applications.

THU 5o : Topological light and matter 2

Chair: Mark Dennis

Time: Thursday, 17:00–18:30 Location: Olympia

Invited THU 5o .1 Thursday, 17:00 Olympia

Nonlinear topological photonics: frequency combs and novel phase-matching schemes — •Mohammad Hafezi — University of Maryland, College Park, USA

We report recent exciting developments in the field of nonlinear topological photonics.

Invited THU 5o .2 Thursday, 17:25 Olympia

Axion Sources in 3D Topological Light Waves — •Yijie Shen — Nanyang Technological University, Singapore, Singapore

I will talk about recent advances of higher-dimensional topological structures of light, and their emerging applications on particle manipulation and robust information transfer. Finally I will talk about the new physics of detecting axions by topological light waves.

Invited THU 5o .3 Thursday, 17:50 Olympia

Dynamic and Geometric Shifts in Wave Scattering — Konstantin Bliokh[1,2,3], •Zeyu Kuang[4], and Stefan Rotter[4] — [1]Donostia International Physics Center , Donostia-San Sebastian, Spain — [2]IKERBASQUE, Basque Foundation for Science, Bilbao, Spain — [3]Centre of Excellence ENSEMBLE3 Sp. z o.o., Warsaw, Poland — [4]Institute for Theoretical Physics, TU Wien, Wien, Austria

We extend the geometric–dynamic decomposition from wave evolution to scattering, using the generalized Wigner–Smith operator, where the shifts in frequency, momentum, and position are splitted into dynamic and geometric parts. Examples include time-varying waveplates, metasurfaces, optical forces, beam shifts, and Wigner delays, offering a unifying framework across wave physics.

Oral THU 5o .4 Thursday, 18:15 Olympia

Discovery of phonon-polaritonic skyrmions: Transition from bubble- to Néel-type — •Florian Mangold[1], Enrico Baù[2], Lin Nan[2], Julian Schwab[1], Thorsten Gölz[2], Andrea Mancini[2], Bettina Frank[1], Andreas Tittl[2], and Harald Giessen[1] — [1]4th Physics Institute, Research Center SCoPE, and Integrated Quantum Science and Technology Center, University of Stuttgart, Stuttgart, Germany — [2]Chair in Hybrid Nanosystems, Nano-Institute Munich, Department of Physics, Ludwig-Maximilians Universität München, München, Germany

We observe for the first time phonon-polariton skyrmions in ultrathin silicon carbide membranes, demonstrating a tunable transition from bubble- to Néel-type skyrmions via wavelength control across the Reststrahlen band. Using scanning near-field microscopy, we reveal highly confined skyrmion lattices, enabling topological tuning.

THU 2s: Symmetry breaking and nonreciprocal phenomena

Chair: Gennady Shvets, Cornell University, Ithaca, USA

Time: Thursday, 17:00–18:20 Location: Seefeld/Tirol

Invited THU 2s.1 Thursday, 17:00 Seefeld/Tirol

Permittivity-Driven Ultrafast Photonic Bound States in the Continuum — •Andreas Tittl — Nano-Institute Munich, Faculty of Physics, Ludwig-Maximilians-Universität München, Munich, Germany

New concepts for the dynamic control of bound states in the continuum metasurfaces beyond static geometries are presented, focusing on permittivity-asymmetric qBICs. We demonstrate electrical and all-optical tuning, and introduce temporal symmetry breaking for sub-picosecond resonance creation and annihilation.

Invited THU 2s.2 Thursday, 17:25 Seefeld/Tirol

Nonlinear Metasurfaces with Multiple Broken Symmetries — Yuruo Zheng[1], Hooman Barati Sedeh[1], Yaoyang Ji[2], Liang Feng[2], Maria Antonietta Vincenti[3], Michael Scalora[3], and •Natalia M. Litchinitser[1] — [1]Department of Electrical and Computer Engineering, Duke University, Durham, USA — [2]Department of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, USA — [3]Department of Information Engineering, University of Brescia, Brescia, Italy

Symmetry breaking along and across the propagation direction enables mode coupling and nonlinear responses that are otherwise inaccessible in symmetric systems. By combining photonic bandgap effects with metasurface resonances, we realize double-layer dielectric metasurfaces supporting strong third-harmonic generation in the ultraviolet, establishing multilayer symmetry-broken architectures for compact, efficient nonlinear photonics.

Oral THU 2s.3 Thursday, 17:50 Seefeld/Tirol

Geometrical Phase Engineering for Frequency Comb Shaping in Fast Gain Lasers — •Diego Piciocchi, Alexander Dikopoltsev, Ina Heckelmann, Mattias Beck, Giacomo Scalari, and Jérôme Faist — Institute for Quantum Electronics and Quantum Center, ETH Zürich, Zürich, Switzerland

We demonstrate an in-situ method for shaping Optical Frequency Comb spectra in fast-gain lasers. Dual-tone cavity modulation forms a triangular synthetic lattice with a controllable geometric phase, breaking time-reversal symmetry and steering intermodal energy transfer. The fast-gain coherently transfers this dynamics to the stabilized spectrum, enabling spectral control.

Oral THU 2s.4 Thursday, 18:05 Seefeld/Tirol

Cross-talking coupled metasurfaces for asymmetric specular transmission — Abbas Sheikh-Ansari, Ashwin Iyer, and •Behrad Gholipour — University of Alberta, Edmonton, Canada

Asymmetric transmission (AT) of light has been a sought after challenge for decades. Here, we demonstrate wide-band AT in a subwavelength-thickness medium in a metasystem comprising closely coupled cross-talking metasurfaces. The presented platform is fully passive making it immune from bias-drift, and favorable for zero-static-power integrated devices.

THU 6o: Plenary talk

Chair: Rachel Won, Nature Reviews Electrical Engineering,

Time: Thursday, 18:30–19:20 Location: Olympia

Plenary THU 6o.1 Thursday, 18:30 Olympia

Spatiotemporal control of light in complex media — •Hui Cao — Yale University, NEW HAVEN, USA

I will present an overview of our work on controlling light transport in linear and nonlinear multimode systems, in particular spatiotemporal control of pulse propagation in disordered nanostructures. I will show how input field shaping can suppress nonlinear optical effects and control output beam profile of a high-power multimode-fiber amplifier.

FRI 1o: Plenary talk

Chair: Harry Atwater, California Institute of Technology, Pasadena, USA

Time: Friday, 9:00–9:50 Location: Olympia

Plenary FRI 1o.1 Friday, 9:00 Olympia

Fisher Information in Optics — •Stefan Rotter — TU Wien, Institute for Theoretical Physics, Vienna, Austria

Fisher information quantifies how precisely optical measurements can estimate physical parameters. I will present a framework describing how this information is carried by electromagnetic fields and enhanced by nanophotonic structures. Finally, I will show how Fisher information limits the performance of optical metrology based on artificial neural networks.

9:50–10:05: Coffee break

FRI 2o: Active, reconfigurable and programmable

Chair: Mario Hentschel, University of Stuttgart, Germany

Time: Friday, 10:05–12:20 Location: Olympia

Invited FRI 2o.1 Friday, 10:05 Olympia

Ångström-tunable polarization-resolved solid-state photon sources — •Sergey Bozhevolnyi — Center for Nano Optics, University of Southern Denmark, Odense, Denmark

We propose and experimentally demonstrate a platform based on quantum-emitter-embedded metasurfaces integrated with a micro-electromechanical system (MEMS)-positioned microcavity, enabling on-chip electrical multi-dimensional control of solid-state photon sources. We show that the broadband room-temperature emission from nitrogen-vacancy centers in nanodiamonds can be narrowed to 3.7 nm and tuned with ångström precision.

Oral FRI 2o.2 Friday, 10:30 Olympia

Emerging Directions for Space-Time Metamaterials — •Zeki Hayran and John B. Pendry — Blackett Laboratory, Department of Physics, Imperial College London, London SW7 2AZ, United Kingdom

We explore emerging directions for space-time metamaterials, revealing double refraction with space-time correlated non-diffractive waves and demonstrating all-optical analog computation of Fredholm integral equations through feedback-controlled metasurfaces, enabling ultrafast, reconfigurable, light-based information processing.

Oral FRI 2o.3 Friday, 10:45 Olympia

Mid-infrared light modulation with silicon membrane metasurfaces — •Ivan Sinev[1], Felix Brikh[1], Aleksei Ezerskii[2,3], Olesia Pashina[2], Nikita Glebov[1], Mihail Petrov[2], Sergey Makarov[2,3], and Hatice Altug[1] — [1]EPFL, Lausanne, Switzerland — [2]ITMO University, St. Petersburg, Russia — [3]Qingdao Innovation and Development Center, Qingdao, China

We present dynamically tunable metasurfaces based on silicon membranes that allow to reach record-high resonance quality factors (~3000) for the mid-infrared range with strong amplitude contrast. Using these, we demonstrate efficient electro-thermal and ultrafast all-optical mid-IR modulation schemes. Our CMOS-compatible, wafer-scale platform enables compact, reconfigurable mid-IR devices for sensing, communication, and quantum photonics applications.

Oral FRI 2o.4 Friday, 11:00 Olympia

Active Electrically Switchable Polymer Metasurfaces for Microscope Imaging Functionalities — •Dominik Ludescher[1], Leander Siegle[1], Robert Horvat[1], Pavel Ruchka[1], Junqi Lu[2], Marcos A. Dahlem[2], Sabine Ludwigs[2], Mario Hentschel[1], and Harald Giessen[1] — [1]4th Physics Institute and Research Center SCoPE, Stuttgart, Germany — [2]IPOC - Functional Polymers, Institute of Polymer Chemistry, Stuttgart, Germany

3D-printed optical components have transformed a wide range of applications, yet all demonstrated systems have remained inherently static. Here, we establish the first integration of electrically tunable conducting polymer elements with 3D-printed optics, enabling dynamic and reconfigurable optical functionality.

Oral FRI 2o.5 Friday, 11:15 Olympia

Adaptive Nonlinear Geometric Phase Matching in Engineered Multilayered Thin-Film Lithium Niobate — •Danielle Ben-Haim[1,2], Mai Tal[1,2,3], Xiaoxi Xu[1,2], and Tal Ellenbogen[1,2] — [1]Department of Physical Electronics, School of Electrical Engineering, Tel-Aviv University, Tel-Aviv, Israel — [2]Center for Light-Matter Interaction, Tel-Aviv University, Tel-Aviv, Israel — [3]School of Physics and Astronomy, Tel-Aviv University, Tel-Aviv, Israel

We leverage the versatile platform of thin-film lithium niobate to demonstrate adaptable and spin-controlled geometric phase matching in a multilayered configuration, as a new way to achieve efficient nonlinear generation of light. The experimental results establish a proof-of-concept for this robust and tunable approach, that opens opportunities in nonlinear photonic and quantum systems.

Invited FRI 2o.6 Friday, 11:30 Olympia

Programmable Polariton Nanophotonics with Phase-Change Materials — •Thomas Taubner — Institute of Physics (IA), RWTH Aachen University, Aachen, Germany

We exploit the non-volatile insulator-to-metal transition of the plasmonic phase-change material In3SbTe2 for optical programming surface polariton resonators

on polar crystals and doped semiconductors. The strongly confined resonance modes are investigated with scanning near-field optical microscopy. This study enables rapid prototyping of reconfigurable polariton resonators even with anisotropic 2D-materials.

Invited FRI 2o.7 Friday, 11:55 Olympia

Silicon-Rich Nitride Nonlinear Nanophononics — Dmitrii Belogolovskii, Masudur Rahman, Karl Johnson, Vladimir Fedorov, Nikola Alic, Abdoulaye Ndao, Paul K. L. Yu, Noah Rubin, and •Yeshaiahu Fainman — University of California, San Diego, USA

We present recent progress in the development and characterization of silicon-rich nitride nonlinear optical material that is compatible with CMOS manufacturing processes for modulation, switching and nonlinear wave mixing of light.

FRI 1s: Imaging and FI

Chair: Baile Zhang, Nanyang Technological University, Singapour

Time: Friday, 10:05–12:05 Location: Seefeld/Tirol

Invited FRI 1s.1 Friday, 10:05 Seefeld/Tirol

Plasmonic Metasurface as an Imaging Device: Multi-spectral Infrared Microscopy with Vibrational Contrast — •Gennady Shvets — School of Applied and Engineering Physics, Cornell University, Ithaca, USA

I will describe an experimental technique developed in our lab – Metasurface Enabled Epi-illumination Microscopy (MEEM) – utilizing vibrational contrast to produce mid-infrared (MIR) images of evolving live cells with diffraction-limited spatial resolution. Transparency of silicon in MIR enables us to use standard semiconductor substrates with plasmonic antennas on top.

Invited FRI 1s.2 Friday, 10:30 Seefeld/Tirol

New concepts and platforms in metasurfaces: from imaging to tunable devices — •Uriel Levy — Hebrew Univ of Jerusalem, Jerusalem, Israel

We demonstrate new design, material and fabrication platforms for the implementation of dielectric metasurfaces. Devices range from advanced metalenses with improved imaging capabilities at various spectral ranges to tunable metasurfaces that can operate in the linear and the nonlinear regime. We also discuss and demonstrate reconfigurable metasurface devices.

Oral FRI 1s.3 Friday, 10:55 Seefeld/Tirol

Controlling Fisher Information Flow in Sub-atomic Precision Optical Metrology — Thomas Grant[1], Cheng-Hung Chi[1], •Kevin F. MacDonald[1], and Nikolay I. Zheludev[1,2] — [1]University of Southampton, Southampton, United Kingdom — [2]Texas A&M University, College Station, USA

We show that measurement precision in light scattering metrology can be enhanced manifold by controlling the flow of Fisher Information near a target object via the design of its environment. In experimental nanowire localization measurements at λ = 640 nm, we achieve ~61 pm ($<\lambda/10{,}000$) precision using this approach.

Oral FRI 1s.4 Friday, 11:10 Seefeld/Tirol

Self-optimizing quantum parameter estimation with adaptive multiplane light conversion — •Abhinav Sinha and Kai Wang — McGill University, Montréal, Canada

We demonstrate a programmable photonic neural network that adaptively learns optimal measurement strategies for quantum parameter estimation. Using in-situ SPSA training to maximize the mean Classical Fisher Information, the SLM-based system self-optimizes its measurement basis to the parameter distribution, approaching the Quantum Fisher Information limit.

Oral FRI 1s.5 Friday, 11:25 Seefeld/Tirol

Smaller Objects can be Resolved with Higher Resolution — Taeyong Chang[1], •Giorgio Adamo[1,2], and Nikolay I. Zheludev[2,3] — [1]Centre for Disruptive Photonic Technologies, SPMS and TPI, Nanyang Technological University, Singapore, Singapore — [2]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom — [3]Texas A&M University, Institute for Advanced Study, College Station, Texas, USA

We show that knowledge of an object's overall size is a fundamental information resource for resolution beyond the Abbe-Rayleigh diffraction limit and report a new super-resolution imaging technique that achieves higher resolution for smaller objects. We experimentally demonstrate $\lambda/8$ label-free resolution with no assumption about sub-wavelength objects' shape and complexity.

Invited FRI 1s.6 Friday, 11:40 Seefeld/Tirol

Complex Frequency Illumination in Imaging: A Comparison of Physical and Synthetic Approaches — •Jacob Khurgin — Johns Hopkins University , Baltimore, USA

I analyze the use of complex frequency illumination in super-resolution imaging and find that while generating real complex frequency waveforms can be beneficial in noisy environments, synthesizing them post-detection offers no advantages compared to existing image processing methods.

FRI 3o: Closing Ceremony

Time: Friday, 12:30–14:00 Location: Olympia

Student poster awards presentation\par Concluding remarks\par Beer reception