2025 Optica Imaging Congress Session Guide

Disclaimer: this guide is limited to technical program with abstracts and author blocks as of 08 August. For updated and complete information with special events, reference the online schedule or mobile app.

Monday, 18 August

08:30 -- 10:30
Room: 503 Duckabush
CM1A • Scattering and Wavefront Shaping
Presider: Abbie Watnik; US Naval Research Laboratory, USA

CM1A.1 • 08:30
Fast Wavefront Shaping Using Optical Gradient Descent Optimization, Sagi Monin[1], Marina Alterman[1], Anat Levin[1]; [1]*Technion Israel Inst. of Technology, Israel.* We propose a fast wavefront shaping method to compensate for light scattering, using optical acquisition of the gradient of a score function. This enables simultaneous updates of all parameters in a single measurement.

CM1A.2 • 08:45
Analyzing Multi-Conjugate Wavefront Shaping Corrections, Anat Levin[1], Marina Alterman[1]; [1]*Technion Israel Inst. of Technology, Israel.* Multi-conjugate wavefront shaping systems attempt to correct scattering through a volumetric aberration using multiple planar corrections. We study how many layers are needed and what field-of-view can be corrected with a small number of layers.

CM1A.3 • 09:00
Ultimate Limits of Parameter Estimation From Multiply Scattered Light Using Deep Learning, Ilya Starshynov[1], Maximilian Weimar[2], Lukas M. Rachbauer[2], Günther Hackl[2], Daniele Faccio[1], Stefan Rotter[2], Dorian Bouchet[3]; [1]*Univ. of Glasgow, UK;* [2]*Inst. for Theoretical Physics, Vienna Univ. of Technology, Austria;* [3]*Univ. Grenoble Alpes, CNRS, France.* We present a method for evaluating the precision limit of a parameter estimate and validate it using practical artificial neural network estimators tasked with predicting the position of a scatterer behind a dynamic scattering medium.

CM1A.4 • 09:15
3D Spheroid Imaging Enhancement via Point Spread Function Engineering in High-Throughput Microscopy, Noam Zoref[1], Maytal Avrashami[1], Nadav Opatovski[1], Ilana Barzilai[1], Onit Alalouf[1], Yosi Shamay[1], Yoav Shechtman[1]; [1]*Technion - Israel Inst. of Technology, Israel.* We develop methods for 3D spheroid imaging, utilizing point spread function engineered high-throughput microscopes, and use them to characterize 3D spheroid-fibroblast interactions and improve extended depth-of-field imaging by neural net analysis.

CM1A.5 • 09:30 (Invited)
Volume Representations for Inverse Problems, Sara Fridovich-Keil[1]; [1]*Georgia Inst. of Technology, USA.* We introduce Geometric Algebra Planes, a compressive 3D model that generalizes many radiance field representations and has a natural connection to matrix factorization. We benchmark diverse INRs, including GA-Planes, against a simple interpolated grid baseline, highlighting remaining limitations of INRs and open problems in 3D representation.

CM1A.6 • 10:00 (Invited)
Where Light Loses Its Way, Computation Finds It, Rafael Piestun[1]; [1]*Univ. of Colorado Boulder, USA.* Abstract not available.

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08:30 -- 10:30
Room: 504 Foss
RM1D • Ghost Imaging
Presider: Alexander Rack; European Synchrotron Radiation Facility, France

RM1D.1 • 08:30 (Invited)
High-Energy X-Ray Multipixel Ghost Imaging at 20 µm Resolution: a Scalable Approach for NDT and Biomedical Applications Announced, Sharon Shwartz[1], Or Sefi[1], Adi Ben Yehuda[1], Yishay Klein[1], Ziv Sobol[1], Shalom Bloch[1], Hila Schwartz[1], Eliahu Cohen[1]; *[1]Bar-Ilan Univ., Israel.* We demonstrate high-energy x-ray multipixel ghost imaging achieving 20 µm resolution over 0.9×1 cm^2 with only 1000 realizations. The method opens new avenues for high-resolution, scalable, noninvasive NDT and medical imaging of subsurface and internal structures.

RM1D.2 • 09:00 (Invited)
Phase-Contrast X-ray Ghost Imaging, Margie Olbinado[1]; *[1]Paul Scherrer Institut, Switzerland.* X-ray ghost imaging is a promising approach to achieve low dose. However, it was initially realized with attenuation contrast only. Here, I will present how to achieve X-ray ghost imaging with phase contrast.

RM1D.3 • 09:30
Ghost Projection: Classical Ghost Imaging in Reverse, Andrew Kingston[1], David Ceddia[2], Alaleh Aminzadeh[1], Lindon Roberts[3], Jeremy Brown[4], Daniele Pelliccia[5], Philip Cook[6], Ulf Garbe[7], Filomena Salvemini[7], Joseph Bevitt[7], David Paganin[2]; *[1]Australian National Univ., Australia; [2]Monash Univ., Australia; [3]Univ. of Sydney, Australia; [4]Swinburne Univ. of Technology, Australia; [5]instrument and data tools PTY LTD, Australia; [6]European Synchrotron Radiation Facility, France; [7]Australian Nuclear Science and Technology Organisation, Australia.* Ghost projection is a method for arbitrary beam shaping using a single randomly-patterned mask. It has recently been demonstrated for both x-rays and neutrons. Applications include radiotherapy, lithography, and volumetric additive manufacturing.

RM1D.4 • 09:45
Selecting the Complexity of the Moore-Penrose Pseudoinverse for Emission Ghost Imaging, Kevin J. Coakley[1], Heather H. Chen-Mayer[1], Bruce D. Ravel[1], Nikolai N. Klimov[1], Sarah M. Robinson[1], Daniel Josell[1], Daniel S. Hussey[1]; *[1]National Inst. of Standards and Technology, USA.* We reconstruct X-ray fluorescence signals produced by synchrotron X-rays. In our method, we select the complexity of a Moore-Penrose pseudoinverse by a data-driven method, and study how systematic errors affect results for simulated data.

08:30 -- 10:30
Room: 505 Queets
DM1C • Digital Holographic Techniques for Bio-Imaging I
Presider: Lisa Miccio; Inst. of Intelligent Systems ISASI, Italy

DM1C.1 • 08:30 (Invited)
Lensless Optical Diffraction Tomography for High Space-Bandwidth Product in Vitro Bio-Imaging, Maciej Trusiak[1]; *[1]Warsaw Univ. of Technology, Poland.* We present gigapixel-scale

lensless holotomography achieving isotropic 3D pixel-level resolution within full field-of-view and millimeter-scale depth. A novel angle-calibrated data registration and multi-plane optimization-based reconstruction enable label-free high-fidelity volumetric imaging of challenging technical and biological samples.

DM1C.2 • 08:30 (Invited)
Multiscale Quantitative Phase Imaging Towards Higher Throughput and Higher Resolution for Precision Medicine, Yang Liu[1], Hongqiang Ma[1]; [1]*Univ of Illinois at Urbana-Champaign, USA.* We present a multiscale quantitative phase imaging framework ranging from ultrahigh-throughput mesoscale quantitative phase imaging to high-resolution 3D imaging to enable label-free morphological profiling across millimeter-scale fields and sub-cellular detail, aiming to improve precision oncology.

DM1C.3 • 09:00
AI in Plankton Digital Holography, Victor V. Dyomin[1], Mikhail Kurkov[1], Vladimir Kalaida[1], Igor Polovtsev[1], Alexandra Davydova[1]; [1]*Tomsk State Univ., Russian Federation.* The paper is devoted to neural networks used to recognize the reconstructed particle images in digital holography. It considers the image defocusing during reconstruction and the features and limitations of different particle recognition algorithms.

DM1C.4 • 09:15
Label-Free High-Content Screening by Multi-Modal Bright-Field and Quantitative Phase Digital Holographic Microscopy, Anne Marzi[1], Eva Döpker[1], Jürgen Schnekenburger[1], Björn Kemper[1]; [1]*Univ. of Muenster, Germany.* We combined multi-modal digital holographic quantitative phase and bright-field microscopy with neural network-based image segmentation. The results demonstrate our label-free approach as a tool for high-content imaging at the single cell level.

DM1C.5 • 09:30 (Invited)
Three-Dimensional Computational Fluorescence Imaging of Living Tissues, Osamu Matoba[1]; [1]*Kobe Univ., Japan.* Abstract not available.

08:30 -- 10:30
Room: 506 Samish
PM1E • Structured Light
Presider: Svetlana Avramov-Zamurovic; US Naval Academy, USA

PM1E.1 • 08:30 (Invited)
Structured Terahertz Beams Containing Orbital Angular Momentum for Turbulence Sensing, Yasaman Ghasempour[1], Ruiyi Shen[1]; [1]*Princeton Univ., USA.* We present a model characterizing the impact of atmospheric turbulence on mode orthogonality for structured terahertz beams with orbital angular momentum, demonstrating the potential in atmospheric turbulence estimation for bistatic airborne nodes.

PM1E.2 • 09:00
Classification of Distorted Vortex Beams Using an OAM Mode Sorter and Machine Learning, Owen O'Malley[1], Svetlana Avramov-Zamurovic[1], Peter Judd[2], Daisy Dastrup[1]; [1]*US Naval Academy, USA;* [2]*Naval Research Laboratory, USA.* We demonstrate classification of

vortex beams after propagation through experimental Rayleigh-Bénard underwater convection. We use a mode sorter to extract mode information, which feeds into a machine learning model for beam classification.

PM1E.3 • 09:15
Using 'Frozen Turbulence' State and Structured Light: a Controlled Approach to Underwater Optical Sensing, Svetlana Avramov-Zamurovic[1], Owen O'Malley[1], Peter Judd[2]; [1]*US Naval Academy, USA;* [2]*NRL, USA.* We study the propagation of structured light through underwater turbulence using a controlled Rayleigh-Bénard setup, comparing Gaussian and OAM beams to extract environmental insights from their degradation.

PM1E.4 • 09:30 (Invited)
Emergent Phase Singularities Accompany Coherence Entropy Power-law Scaling and Speckle Localization of Light in Atmospheric Turbulence, Luat Vuong[1]; [1]*Department of Mechanical Engineering, Univ. of California at Riverside, USA.* Atmospheric turbulence is a stochastic refractive medium that generates speckle patterns. We quantify the entropy, speckle localization, and emergent phase singularities with turbulence-induced spatial decoherence.

PM1E.5 • 10:00 (Invited)
HOBBITs and ELFs for Structured Light Applications in Maritime Sensing, Eric Johnson[1]; [1]*Univ. of Central Florida, USA.* In this talk, we explore the application of Higher Order Bessel Beams with spatiotemporal control based on Engineered Light Frequencies to exploit the properties of Frequency Diversity. Specific applications for maritime sensing will be presented.

08:30 -- 10:30
Room: 507 Sauk
IM1B • Compact and Lightweight Imaging Systems
Presider: Kristina Irsch; Institut De La Vision Paris, France

IM1B.1 • 08:30
Single-Layer Color Router: to Propagate or not?, Peter B. Catrysse[1], Shanhui Fan[1]; [1]*Stanford Univ., USA.* We show a single-layer color router with optical efficiency (> 0.7) exceeding single-layer approaches using propagation distance to separate colors. We illustrate the importance of near-field contributions for highly-efficient color separation.

IM1B.2 • 08:45
Hydrogel Fiber Endoscope for High-Resolution Imaging, Peng Chen[1], Keyi Han[1], Zijun Gao[1], Haoyu Xu[1], Zhi Ling[1], Corey Zheng[1], Mithila Sawant[2], Marcus Cicerone[1], Mithila Sawant[2], Shu Jia[1]; [1]*Georgia Inst. of technology, USA;* [2]*School of Medicine, Emory Univ., USA.* We propose HYFEN, a hydrogel fiber-based endoscope for subcellular imaging. This method achieves mode threading and diffraction-limited focus at kilohertz speed, providing a high-resolution diagnostic tool unachievable with conventional modalities.

IM1B.3 • 09:00
Photo-Responsive all-Soft Robotic Lens, Corey Zheng[1], Shu Jia[1]; [1]*Georgia Inst. of Technology, USA.* A photo-responsive bioinspired robotic lens is developed. Through harvesting optical energy via photo-thermally responsive hydrogel, functions including focal tuning and

induced aberration can be achieved within an all-soft and biocompatible device.

IM1B.4 • 09:15
Combining in Situ Microscopic Imaging and Variable Fluorescence Sensing for Photophysiology Studies of sea ice Algae, Béatrice Lessard-Hamel[1], Claudie Rodrigue[1], Marcel Babin[1], Simon Thibault[1]; [1]*Université Laval, Canada.* We present a variable fluorescence sensor with microscopic imaging, integrating a laser diode and dichroic mirror, for in situ analysis of sea-ice, enabling real-time photophysiology measurements to better understand Arctic microalgal adaptations.

IM1B.5 • 09:30
Scalable Hybrid Fabrication of Flexible Fresnel Zone Plate Lens, HyeonJun Kim[1], Hongki Yoo[1]; [1]*Mechanical Engineering, Korea Advanced Inst of Science & Tech, Korea (the Republic of)*. We present a scalable fabrication method for flexible amplitude-type Fresnel zone plates using UV nanoimprinting and doctor blading, enabling low-cost production of flexible diffractive optics suitable for wearable and miniaturized optical systems.

IM1B.6 • 09:30
Advanced *in-Vivo* Optical Sectioning Endo-Microscopic System via Meta-Varifocal and Neural Network, Yu-Hsin Chia[1,2], Yu-Xiang Wang[2,3], Min-Xuan Wang[2,4], Cheng Hung Chu[5], Sunil Vyas[2], Yi-You Huang[1,2], Din Ping Tsai[6], Yuan Luo[2,3]; [1]*Department of Biomedical Engineering, National Taiwan Univ., Taiwan;* [2]*Inst. of Medical Device and Imaging, National Taiwan Univ., Taiwan;* [3]*Program for Precision Health and Intelligent Medicine, National Taiwan Univ., Taiwan;* [4]*National Taiwan Univ., Department of Mechanical Engineering, Taiwan;* [5]*National Taiwan Univ., YongLin Inst. of Health, Taiwan;* [6]*City Univ. of Hong Kong, Department of Electrical Engineering, Hong Kong.* We develop a telecentric meta-varifocal endomicroscopy with neural HiLo sectioning for fast, constant-magnification 3D imaging.

IM1B.7 • 09:45 (Invited)
Optical Metasurface for Biomedical Applications, Yuan Luo[1]; [1]*National Taiwan Univ., Taiwan.* Our metasurface-enabled approach not only simplifies system architecture but also opens new possibilities for high-performance biomedical imaging platforms.

11:00 -- 12:30
Room: Quinault Ballroom
JM2A • Joint Plenary Session
Presider: Partha Banerjee; Univ. of Dayton, USA

JM2A.1 • 11:00 (Plenary)
Beyond Labels: Enhanced 3D Live Cell Imaging Combined With Flow Cytometry, Pietro Ferraro[1]; [1]*Inst. of Intelligent Systems ISASI, Italy.* This presentation explores cutting-edge advancements in label-free 3D live cell imaging, integrating high-throughput flow cytometry with tomographic microscopy. We demonstrate how this combined approach overcomes limitations of traditional 2D and fluorescence-based methods, enabling detailed visualization of cellular architecture and dynamics without the perturbations of labeling.

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JM2A.2 • 11:00 (Plenary)
Pushing the Limits of VR Displays (Without Breaking Them), Ying (Melissa) Geng[1]; [1]*Meta Reality Labs Research, USA.* Over the last decade, VR displays grew from early prototypes — held together by duct tape — to compelling consumer products used by millions. This talk describes the optical innovations necessary to realize this transformation, including addressing longstanding challenges in contrast and form-factor.

14:00 -- 16:00
Room: 503 Duckabush
3M3A • 3D Imaging and Simulation
Presider: Simon Thibault; Université Laval, Canada

3M3A.1 • 14:00
User-Friendly GUI for Super-Resolved Phase Imaging From DHM With Oblique and Structured Illumination, Alan Schenider[1], Sofía Obando-Vásquez[1], Ana Doblas[1]; [1]*Univ. of Massachusetts Dartmouth, USA.* We present an open-source graphical user interface (GUI) for processing DHM holograms with oblique illumination (OI) and structure illumination (SI), reconstructing an isotropic 2D super-resolved phase map.

3M3A.2 • 14:15
Toward Real-Time Volumetric Projection Using two-Photon Excitation in Quantum Dots-Doped Medium., Béatrice Lessard-Hamel[1], Joseph Gaulin[1], Sédick Rabia[1], Joy Sankar Roy[1], Mathieu Rioux[1], Jerome Lapointe[1], Martin Chartrand[2], Hassan Kassi[2], Denis Brousseau[1], Claudine Allen[1], Réal Vallee[1], Frej Mighri[1], Simon Thibault[1]; [1]*Université Laval, Canada;* [2]*Lux Image, Canada.* We present a static volumetric display using two-photon excitation in a quantum dot-doped medium, achieving real-time 3D rendering at 30 Hz. The system enables natural depth perception, with future potential for RGB high-resolution visualization.

3M3A.3 • 14:30 (Invited)
Extracting Pigmentation Map From Skin Color Image and its Application to 3D Imaging, Norimichi Tsumura[1]; [1]*Chiba Univ., Japan.* We used smartphones to measure color and shape simultaneously. About the color, we used RGB camera in the smartphone. We performed the experiments to measure changes in blood flow in foot baths and confirm the effectiveness of our system.

3M3A.4 • 15:00 (Invited)
8K Resolution Ghost Imaging With Locally Exclusive Structured Illumination, Shoma Kataoka[1], Yasuhiro Mizutani[1], Tsutomu Uenohara[1], Yasuhiro Takaya[1]; [1]*Osaka Univ., Japan.* To achieve high-resolution, wide-area defect inspection, we introduce a deep learning ghost imaging method leveraging locally exclusive structured illumination. It enables 8K sub-pixel defect imaging, accurately reconstructing the shape of micro-defects in a large area.

3M3A.5 • 15:30 (Invited)
End-to-End Simulation of Camera Systems for Accelerated Design and Image Quality Tuning, Julie Buquet[1]; [1]*Immervision Inc., Canada.* This talk introduces a full camera system simulation—from optics to post-processing—to streamline design and avoid over-engineering. We illustrate its effectiveness through a use case comparing a physical and simulated module's final image quality.

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14:00 -- 16:00
Room: 504 Foss
RM3D • Laser X-Ray
Presider: Zhehui Wang; Los Alamos National Laboratory, USA

RM3D.1 • 14:00 (Invited)
Laser-Driven High-Resolution MeV X-Ray Tomography, Reed Hollinger[1], Alejandro Figueroa Bengoa[2], Shoujun Wang[1], Sina Zahedpour Anaraki[1], James King[1], Ping Zhang[1], Ghassan Zeraouli[1], Matt Sheats[2], Shannon Scott[2], Joel Heidemann[2], James Hunter[2], Yong Wang[1], Ray Edwards[3], Matt Faulkner[3], Chris Aedy[3], Jorge Rocca[1], Cort Gautier[2]; *[1]Colorado State Univ., USA; [2]Los Alamos National Lab, USA; [3]AWE UK, UK.* We report a demonstration of high-resolution MeV tomography of a dense, large object with a laser-driven x-ray source. Irradiating a 3mm W disc with ~10^{21} Wcm^{-2} laser pulses yielded up to 50 mRad x-ray pulses with energies up to 19 MeV. Resolution was measured to be <200 μm at a magnification of 5.6x but is still limited by the x-ray detector.

RM3D.2 • 14:30 (Invited)
MeV X-ray Sources From High-Intensity Laser Interactions, Dean R. Rusby[1], Shaun Kerr[1], Jackson Williams[1], Andreas Kemp[1], Andrew Macphee[1], Scott Wilks[1], Matt Hill[1], Maurice Aufderheide[1], Jeff Bude[1], Andrew Mackinnon[1]; *[1]Lawrence Livermore National Laboratory, USA.* Laser-driven MeV x-ray sources offer small source sizes and short temporal durations, surpassing conventional accelerators. Recent advancements in laser-plasma interactions, electron acceleration, and target designs enable optimized x-ray generation, supporting applications like radiography and computed tomography. LLNL-ABS-2004325

RM3D.3 • 15:00 (Invited)
Exploring High Energy Density Phenomena Using X-Ray Radiography on the National Ignition Facility (NIF), Tina Ebert[1], Gareth N. Hall[1], Alexandre Do[1], Nobuhiko Izumi[1], Sabrina Nagel[1], David Bradley[1], Shon Prisbrey[1]; *[1]Lawrence Livermore National Laboratory, USA.* High-resolution x-ray radiography with toroidally-bent crystals enables sub-10 μm resolution for quasi-monochromatic high energy density studies. Here, we present the development, characterization and applications of this diagnostic technique to high energy density experiments at the NIF. LLNL-ABS-2004938.

RM3D.4 • 15:30 (Invited)
Laser-Driven Radiation for Imaging, Michael C. Downer[1]; *[1]Univ. of Texas at Austin, USA.* Abstract not available.

14:00 -- 16:00
Room: 505 Queets
DM3C • Holographic Display and Imaging Systems
Presider: Naveen Nishchal; Indian Inst. of Technology Patna, India

DM3C.1 • 14:00 (Invited)
Physics-Based Advances in SLM Holography for AR Applications: Wireframe Holography and Zero-Order Removal, Marco Astarita[1], Alessandro Cerioni[1], Matteo Ziliani[1], Andrea Bassi[1], Anna Cesaratto[2], Tommaso Ongarello[2], Giulio Cerullo[1], Gianluca Valentini[1], Paolo Pozzi[1]; *[1]Politecnico di Milano, Italy; [2]EssilorLuxottica Smart Eyewear Lab, Italy.* We introduce

two physics-based methods in digital holography for augmented reality: one for real-time wireframe hologram generation from 3D models, and another for zero-order suppression. Together, they address key challenges including speckle, image quality and computation time.

DM3C.2 • 14:30
Computer-Generated Hologram Optimization Tailored for a Spatial Light Modulator System Based on Dual in-Plane Switching Liquid Crystal Displays, Dong-Woo Seo[1], Youngrok Kim[1], Chihyun In[1], Sung-Wook Min[1]; *[1]Kyung Hee Univ., Korea (the Republic of).* We optimize computer-generated holograms for a spatial light modulator system that uses dual in-plane switching liquid crystal displays. Experiments demonstrate improved quality in the reconstructed image despite the limited modulation range.

DM3C.3 • 14:45
Centimeter-Sized Volumetric Display Drawn With Femtosecond Laser Pulses, Yoshio Hayasaki[1]; *[1]Utsunomiya Univ., Japan.* Two types of volumetric displays with a centimeter size are developed. The voxel is generated in air and xenon gas with three-dimensional scanning of focused laser pulses.

DM3C.4 • 15:00
Background Noise Reduction in Phase-Only Holograms, Fan Wang[2], Joanna Starobrat[2,1], Tomoyoshi Ito[2], Tomoyoshi Shimobaba[2]; *[1]Politechnika Warszawska, Poland; [2]Chiba Univ., Japan.* Holograms of images with significant zero-amplitude areas exhibit noise within the image reconstruction. To counteract this, we analyze different noise-canceling phase patterns. We present and compare their effectiveness in simulation and experiment.

DM3C.5 • 15:15
High-Quality 3D Image Display Using a low-Resolution Spatial Light Modulator in Phase and Amplitude Mode., Maria L. Cruz[1], Hector-Eduardo Gilardi-Velazquez[1]; *[1]UP campus Guadalajara, Mexico.* We present a high-quality 3D holographic display method using a low-resolution spatial light modulator. The method is applied in amplitude and phase modes in Fourier holograms.

DM3C.6 • 15:30 (Invited)
Digital Motion-Picture Holography With Incoherent Light Sources, Tatsuki Tahara[1], Hideaki Yoshimura[2], Tomoyoshi Shimobaba[3], Ryo Okamoto[4], David Blinder[5,6], Yuichi Kozawa[7], Tomoya Nakamura[8]; *[1]National Inst of Information & Comm Tech, Japan; [2]The Univ. of Tokyo, Japan; [3]Chiba Univ., Japan; [4]Kyoto Univ., Japan; [5]Vrije Universiteit Brussel (VUB), Belgium; [6]IMEC, Belgium; [7]Tohoku Univ., Japan; [8]Osaka Univ., Japan.* We present digital motion-picture holography for incoherent holographic imaging of motions of objects. Multidimensional digital holographic motion-picture recording is achieved with spatially and temporally incoherent daily-use light such as natural light, fluorescence, and luminescence.

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14:00 -- 16:00
Room: 506 Samish
PM3E • Wavefront Sensing and Turbulence Characterization
Presider: Sivanesan Ponniah; Intellisense Systems Inc., USA

PM3E.1 • 14:00 (Invited)
Overcoming Speckle in Wavefront Sensing for Horizontal-Path Imaging, Matthias T. Banet[1], Derek Burrell[2], Matthew Kalensky[3]; *[1]US Air Force Research Laboratory, USA; [2]Univ. of Arizona, USA; [3]Naval Surface Warfare Center Dahlgren Division, USA.* We discuss three hurdles associated with coherent beacons in adaptive optics and propose potential solutions to the problem of speckle specifically, including: compensated beacon adaptive optics, polychromatic illumination, speckle averaging, and beacon-less image reconstruction techniques.

PM3E.2 • 14:30
Improved Centroid Tracking for Event-Based Shack-Hartmann Wavefront Sensing, Mitchell G. Grose[2,1], Keigo Hirakawa[2]; *[1]MZA Associates Corporation, USA; [2]Electrical Engineering, Univ. of Dayton, USA.* Event-based camera is ideal for Shack-Hartmann wavefront sensing at high temporal resolution. We show that a low-complexity recurrent neural network-based centroid tracking applied to event streams achieves sub-half-pixel accuracy on measured data.

PM3E.3 • 14:45
Correlations Between Z-Tilt, G-Tilt, and Centroid Motion, Jack McCrae[1], Santasri R. Bose-Pillai[1], Steven Fiorino[1]; *[1]Air Force Inst. of Technology, USA.* Correlations between Z-tilt, or Zernike tilt, G-tilt, or gradient tilt and centroid motion as a function of image thresholding level are studied by simulation. The Zernike decomposition of G-tilt is also discussed.

PM3E.4 • 15:00 (Invited)
Updates to the Atmospheric Processing of Starfire Atmospheric Monitor (SAM) Data, Marjorie Gurule[1], Denis Oesch[2]; *[1]The Boeing Company, USA; [2]Leidos, USA.* SAM has been measuring the conditions above the SOR since 2008. SAM is a Shack-Hartmann wavefront sensor system that replaced PAODMS. Comparisons of the turbulence parameters estimated over multiple years from each system show different distributions for the site. Recent investigations have lead to new approaches to processing SAM data.

PM3E.5 • 15:30 (Invited)
Characterization of Laser Propagation Through the Atmosphere Using a Colinear Shack Hartmann Wavefront Sensor, Brett H. Hokr[1]; *[1]EO Solutions, USA.* This study evaluates errors from off-axis turbulence sensing by comparing dual Shack-Hartmann sensors aligned on- and off-axis. Beam predictions from each geometry are benchmarked against actual far-field performance using scaling law models.

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14:00 -- 16:00
Room: 507 Sauk
JM3B • Quantum (Joint COSI/IS)
Presider: Seung Ah Lee; Seoul National Univ.

JM3B.1 • 14:00
Coherent Ultrasound Non-Line-of-Sight 3D Imaging, Tailin Li[2,3], Ilya Starshynov[1], Khaled Kassem[1], Zongliang Xie[2,3], Ge Ren[2,3], Yihan Luo[2,3], Daniele Faccio[1]; *[1]Univ. of Glasgow, UK; [2]National Key Laboratory of Optical Field Manipulation Science and Technology, China; [3]Univ. of Chinese Academy of Science, China.* We demonstrate an ultrasound non-line-of-sight imaging system that achieves diffraction-limited resolution, outperforming optical methods by using phase information and synthetic aperture for 3D scene reconstruction at distances up to 3 meters.

JM3B.2 • 14:15
Direct High-Speed Imaging of Biological Dynamics With Fiber Bundle Optical Reassignment, Corey Zheng[1], Biagio Mandracchia[2,1], Shu Jia[1]; *[1]Georgia Inst. of Technology, USA; [2]Universidad de Valladolid, Spain.* Here, we present epi-fluorescent imaging at 25.6kHz enabled by a custom fiber-optic bundle and conventional sCMOS camera, revealing rapid dynamics including the fastest direct imaging of action-potential associated calcium waves in neurons to date.

JM3B.3 • 14:30
Lunar Transit Silhouette Imaging (LTSI), Bobby Hunt[2], David Sheppard[2], Peter N. McMahon-Crabtree[1]; *[1]US Air Force Research Laboratory, USA; [2]KBR, Inc., USA.* An object orbiting before the Moon casts a shadow. Modeling the shadow yields a Fredholm integral Equation of the Second Kind, possessing a convolution kernel. Wiener filter deconvolution reconstructs a silhouette of the orbiting object.

JM3B.4 • 14:45
ÅNgström-Scale Surface Metrology Enabled by a Compact Milliwatt-Class HHG Source, Daniel S. Penagos Molina[1,2], Mahmoud Abdelaal[2], Wilhelm F. Eschen[1,2], Soo Hoon Chew[3], Robert Klas[1,3], Jens Limpert[2,3], Jan Rothhardt[2,3]; *[1]Helmholtz Inst. Jena, Germany; [2]Friedrich-Schiller-Univ. Jena, Germany; [3]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* In this contribution, we demonstrate high-resolution reflection imaging in the extreme ultraviolet spectral range, achieving sub-nanometer scale axial resolution and, at the same time, high imaging throughput enabled by a milliwatt-class HHG source.

JM3B.5 • 15:00
Single-Pixel Spatial Wavefront Sampling Supported by Hadamard-Based Polar Transformations., Heberley Tobón[1], Lindsey Willstatter[2], Samuel I. Zapata Valencia[1], Stefano Bonora[2], Enrique Tajahuerce[1], Jesús Lancis[1]; *[1]Universitat Jaume I, Spain; [2]CNR-Inst. of Photonics and Nanotechnology, Italy.* The proof of concept of wavefront sensing using single-pixel spatial wavefront sampling is presented. The use of Hadamard-based polar transformation and its performance for measuring aberrated wavefronts is evaluated numerically and experimentally.

JM3B.6 • 15:15 (Invited)
Title to be Announced, Val Zwiller[1]; [1]*Kungliga Tekniska Hogskolan Kista, Sweden.* Abstract not available.

JM3B.7 • 15:45
A Grayscale Coded Illumination for Compressive X-ray Compton Backscattering Imaging, Abdullah Alrushud[1], Edgar Salazar[2], Gonzalo Arce[1]; [1]*Univ. of Delaware, USA;* [2]*Universidad Privada Boliviana, Bolivia, Plurinational State of.* We propose a grayscale coded illumination technique for compressive X-ray compton backscattering imaging. Results show a major improvement over binary illumination patterns in terms of peak signal-to-noise ratio and structural similarity index.

16:30 -- 18:30
Room: 503 Duckabush
3M4A • 3D Imaging and Display I
Presider: Ana Doblas; Univ. of Massachusetts Dartmouth, USA

3M4A.1 • 16:30
DepthVision3D: A Versatile Deep Learning Dataset for 3D Imaging, Shaun Wang[2], Samuel Wang[2], Hieu Nguyen[3,4], Zhaoyang Wang[1]; [1]*Department of Mechanical Engineering, The Catholic Univ. of America, USA;* [2]*Montgomery Blair High School, USA;* [3]*National Inst.s of Health, USA;* [4]*International Univ., Viet Nam.* We present a high-accuracy stereo-vision-based dataset and a generalized image-to-Z framework for 3D reconstruction from a single 2D image, addressing data scarcity and improving prediction accuracy over state-of-the-art UNet models.

3M4A.2 • 16:45 (Invited)
Denoising Photon-Starved Integral Imaging, Adrian Stern[1], Tal Kozakov[1], Omer Hazan[1], Adir Hazan[1]; [1]*Ben-Gurion Univ. of the Negev, Israel.* We provide an overview of photon-starved integral imaging, focusing on the recently introduced S^2N2N method. We demonstrate its capability to implicitly learn noise properties and their magnitude, showcasing its significant utility for image classification.

3M4A.3 • 17:15 (Invited)
What Spatial Light Modulators Can do for 3D Imaging?, Joseph Rosen[1]; [1]*Ben Gurion Univ. of the Negev, Israel.* This review provides a brief roadmap for SLM-aided holographic imaging systems. We begin with the well-known Fresnel incoherent correlation holography recorder and conclude with the most recent versions of interference-free coded aperture holography systems.

3M4A.4 • 17:45 (Invited)
Monocular Lensless Depth Camera Driven by Deep Learning Using Synthetic Data, Seung Ah Lee[1]; [1]*Yonsei Univ., Korea (the Republic of).* Abstract not available.

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16:30 -- 18:30
Room: 504 Foss
RM4D • High-Speed X-Ray Imaging for Material Characterization
Presider: Margie Olbinado; Paul Scherrer Institut, Switzerland

RM4D.1 • 16:30 (Invited)
X-Ray Radiography for Equation of State Measurements of Warm Dense Matter, Willow Martin[1,2], Tilo Döppner[3], Amy Laziski[3], Damian Swift[3], Michael MacDonald[3], Andrea Kritcher[3], Joe Nilsen[3], Neal Bhandarkar[3], Simon Blouin[4], Roger Falcone[5], Siegfried Glenzer[1], Sheng Jiang[3], Rich London[3], Burkhard Militzer[6], Yuan Ping[3], Sarah Shores-Prins[7], Rhyan Reynolds[3], Didier Saumon[8], Philip Sterne[3], Thomas White[7], Heather Whitley[3]; *[1]SLAC National Accelerator Laboratory, USA; [2]Stanford Univ., USA; [3]Lawrence Livermore National Laboratory, USA; [4]Physics and Astronomy, Univ. of Victoria, Canada; [5]Physics, Univ. of California Berkeley, USA; [6]Earth and Planetary Science, Univ. of California Berkeley, USA; [7]Univ. of Nevada, Reno, USA; [8]Los Alamos National Laboratory, USA.* At the National Ignition Facility and OMEGA Laser Facility, we constrain the equation of state of matter by measuring shock Hugoniot states up to Gbar pressures via x-ray absorption and refractive-enhanced radiography.

RM4D.2 • 17:00
The "Shock" Beamtime Block Allocation Group at Beamline ID19 of the ESRF, Alexander Rack[1]; *[1]European Synchrotron Radiation Facility, France.* This contribution shall introduce platforms available at beamline ID19 and underline their potential by selected showcase applications. Community access proposals such as the beamtime Block Allocation Group (BAG) allow for access in a routine manner.

RM4D.3 • 17:15
Simultaneous, Dual-Species Radiography of a Hohlraum-Driven Shock at Omega EP, Mariana Alvarado Alvarez[1], David Broughton[1], Pinghan Chu[1], Chengkun Huang[1], Robert Reinovsky[1], Thomas Schmidt[1], Ian Tregillis[1], Chun-Shang Wong[1], Steven Batha[1]; *[1]Los Alamos National Laboratory, USA.* We design and characterize a platform to radiograph a hohlraum-driven shock simultaneously using two probes: x-rays and protons. The platform was characterized with the VISAR diagnostic and complementary simulations from the LANL code FLAG.

RM4D.4 • 17:30 (Invited)
Ultrafast X-Ray Diffraction and Imaging of Materials in Extreme Conditions, Emma McBride[1]; *[1]Queen's Univ. of Belfast, UK.* Abstract not available.

RM4D.5 • 18:00 (Invited)
X-ray Microscopy of Real-Time Bulk Defect Dynamics, Leora Dresselhaus-Marais[1]; *[1]Stanford Univ., USA.* I will present our new insights into acoustic waves interacting with dislocations, then demonstrate how we directly imaged dislocations moving faster than the speed of sound (transonic dislocations) – providing the first validation of phonon radiation under these unusual conditions.

16:30 -- 18:30
Room: 505 Queets
DM4C • Contemporary Topics in Digital Holography and 3D Imaging I
Presider: George Nehmetallah; Catholic Univ. of America, USA

DM4C.1 • 16:30 (Plenary)
Integration of Programmable Diffraction With Digital Neural Networks, Aydogan Ozcan[1]; [1]*Univ. of California Los Angeles, USA.* I will discuss the integration of programmable diffraction with digital neural networks, also covering various applications such as image analysis, feature detection, object classification, computational imaging and seeing through diffusers and occlusions.

DM4C.2 • 17:15
Deep Learning-Driven Polarization-Sensitive Fourier Ptychographic Microscopy (DL-PFPM), Thuc D. Phan[1]; [1]*Catholic Univ. of America, USA.* A deep learning-based polarization Fourier ptychographic microscopy reconstruction approach that enables acquisition of wide field-of-view and high-resolution birefringence information of specimen from a single recovered complex field image.

DM4C.3 • 17:30 (Tutorial)
Introduction Into the 4th Generation of Optics and its Applications in Modern Technologies, Nelson V. Tabiryan[1]; [1]*Beam Engineering for Adv Measurements Co, USA.* Learn first-hand and gain understanding about the basics of an optical technology that overcomes size, weight, power, and cost limitations of conventional optical systems for augmented reality, non-mechanical LiDAR, power beaming, and space applications.

16:30 -- 18:30
Room: 506 Samish
PM4E • Propagation and Advanced Compensation
Presider: Matthias Banet; US Air Force Research Laboratory, USA

PM4E.1 • 16:30 (Invited)
Imaging Through Turbulence With Digital Holography, Samuel T. Thurman[1]; [1]*Lockheed Martin Coherent Technologies, USA.* We recently developed an efficient scheme for modeling optical propagation through split-step models. We review this work and discuss how it is adapted for use in processing experimental data from a digital holography imaging system.

PM4E.2 • 17:00
Optical Turbulence Characteristics at a Complex Terrain in the Tropics, Ashraya Jayaraj Nechippadath[1], Devika Sunil S.[1], Sunilkumar K[2], Satheesh S K[2], Krishnamoorthy K[2], Anand N. Sarma[1]; [1]*IISER Thiruvananthapuram, India;* [2]*Indian Inst. of Science, India.* The preliminary findings on the diurnal variations in refractive index structure parameter at a complex terrain in the tropics, measured using a Resistance Temperature Detector system, is presented.

PM4E.3 • 17:15
Assessment of Visibility From Nano- and Micro- Aerosol Particle Concentration, Halley E. Turner[1], Steven Fiorino[1], Kevin Keefer[1], Kyle Fitch[1], Jaclyn Schmidt[1,2], Marilyn Dunbar[1]; [1]*Air Force Inst. of Technology, USA;* [2]*Applied Research Solutions, USA.* This study presents a cost-

effective method for estimating visibility from aerosol concentrations. Using low-cost PM2.5 and PM10 sensors coupled with the LEEDR radiative transfer model, visibility is derived & validated against standard observations.

PM4E.4 • 17:30
Degrees of Beam Expansion With Turbulence, Erandi Wijerathna[1], Travis Crumpton[1], Luat Vuong[1]; [1]*Univ. of California at Riverside, USA.* With numerical wave optics simulations, we study the short and long exposure mode field radius (MFR), which increases at varied but higher rates in turbulence than in a vacuum. The MFR increases to a larger degree when larger than the inner scale.

PM4E.5 • 17:45
Three Methods of Retrieving C2 n From Ultrasonic Anemometer-Thermometer Measurements, Andreas Muschinski[1], Samuel D. Beste[1]; [1]*NorthWest Research Associates, USA.* High-quality in-situ observations are needed for the validation of optical remote sensors and optical-turbulence models. Here we compare three methods of retrieving C2 n from ultrasonic anemometer-thermometer measurements.

PM4E.6 • 18:00 (Invited)
Adaptive-Optic Compensation of Aero-Optics Using Tiled Arrays, Matthew R. Kemnetz[1]; [1]*US AFRL Brooks AFB, USA.* Abstract not available.

16:30 -- 18:30
Room: 507 Sauk
JM4B • Advances in Microscopy Systems (Joint COSI/IS)
Presider: Chrysanthe Preza; Univ. of Memphis, USA

JM4B.1 • 16:30 (Invited)
Deep, 3D, High Resolution Metabolic Imaging, Sixian Y. You[1]; [1]*Massachusetts Inst. of Technology, USA.* 3D microscopy suffers from missing-cone axial blurring. SSAI-3D closes the 3D resolution gap by generating synthetic data using multiple aberrated kernels, sparsely fine-tuning a blind-deblurring network, and generalizes to diverse 3D microscopy datasets without knowing the PSF or noise.

JM4B.2 • 17:00
Label-Free Assessment of Atherosclerotic Cells Using Multispectral Fluorescence Lifetime Imaging Microscopy Combined With Differential Phase Contrast Microscopy, Jeongmoo Han[1], Heegeon A. Yang[2], Hyun Jung Kim[3], Hyeong Soo Nam[1], Jin Won Kim[3], Chulmin Joo[2], Hongki Yoo[1]; [1]*Department of Mechanical Engineering, Korea Advanced Inst of Science & Tech, Korea (the Republic of);* [2]*Yonsei Univ., Korea (the Republic of);* [3]*Korea Univ. Guro Hospital, Korea (the Republic of).* Fluorescence lifetime imaging is emerging as a diagnostic tool, its aspects in atherosclerosis remain unclear. We integrated fluorescence lifetime and differential phase contrast imaging to analyze biochemical and structural features of macrophages.

JM4B.3 • 17:15
Real-Time, High-Throughput Super-Resolution Microscopy With Panoramic Integration, Hansol Yoon[1], Kyungduck Yoon[1], Shu Jia[1]; [1]*Georgia Inst. of Technology, USA.* We

present super-resolution panoramic integration for real-time, high-throughput imaging by combining multifocal reassignment, synchronized line-scan, and unsupervised deep learning, achieving scalable imaging with two-fold resolution enhancement.

JM4B.4 • 17:30
Focus-Extended Stokes-Mueller Polarimetric Microscopy, Roman Demczylo[1], Alejandro Silva[1], Juan Llaguno[1], Julia Alonso[1], Ariel Fernández[1]; [1]*Universidad de la Republica, Uruguay.* Stokes parameters retrieval in polarimetric microscopy typically suffers from limited DoF. To address this issue, we present a computational imaging approach that achieves all-in-focus characterization of a sample through its Mueller matrix elements.

JM4B.5 • 17:45
Purity-Based Axial Distance Calibration for Ptychography, Chang Liu[1,2], Wilhelm F. Eschen[1,2], Daniel S. Penagos Molina[1,2], Leona Licht[1,2], Mahmoud Abdelaal[2], Jan Rothhardt[1,2]; [1]*Helmholtz Inst. Jena, Germany;* [2]*Friedrich-Schiller-Univ. Jena, Inst. of Applied Physics, Germany.* We present an axial calibration method based on probe purity in mixed-state ptychography. It outperforms sharpness-based approaches in generalizability, offering high-fidelity and robust reconstruction across complex and weakly scattering samples.

JM4B.6 • 18:00
High-Speed Fourier Ptychographic Microscopy System for Live Microorganisms Imaging, Kaizhang Kang[1], Ming Sun[1], Yogeshwar N. Mishra[1], Wolfgang Heidrich[1]; [1]*CEMSE, King Abdullah Univ. of Science and Technology, Saudi Arabia.* We present a high-speed Fourier ptychographic microscopy system with a custom LED module that is 535 times brighter than an off-the-shelf board, achieving 150 fps live microorganisms imaging and reducing motion blur.

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Tuesday, 19 August

08:30 -- 10:30
Room: 503 Duckabush
3Tu1A • 3D Imaging and Display II
Presider: Osamu Matoba; Kobe Univ., Japan

3Tu1A.1 • 08:30 (Invited)
Recent Advances in Multipath Light Propagation Correction in Camera-Projector 3D Scanners, Frank Billy Djupkep Dizeu[1]; [1]*National Research Council Canada, Canada.* In this presentation, we highlight our recent advances (modeling, light encoding/decoding strategies, light path inventory, and illumination component separation) in correcting multipath light propagation in projector-camera 3D scanners. We also report on the metrological performances achieved for the measurement of 3D shapes in such a context.

3Tu1A.2 • 09:00 (Invited)
Developing Computational Inverse-Scattering Methods for High-Throughput Biological Imaging, Shwetadwip Chowdhury[1]; [1]*Univ. of Texas at Austin, USA.* We develop inverse-scattering methods for volumetric bio-imaging. Here, we address current limitations in volumetric acquisition speed and limited imaging field-of-view by using multiplexed illumination for faster frame rates and on-chip systems for centimeter-scale samples.

3Tu1A.3 • 09:30
Separating Sample Thickness and Refractive Index From a Single Phase Maps, Clivens Joseph[1], Ana Doblas[1]; [1]*Univ. of Massachusetts Dartmouth, USA.* A mathematical computational framework is presented to solve for the refractive index and thickness decouple in quantitative phase imaging via Digital Holographic Microscopy.

3Tu1A.4 • 09:45
Ultra-Wide Near-eye Displays With Penta-Channel Waveguide, Xiaojun Wu[1], Jinfeng Wang[1], Chao Ping Chen[1], Chao Li[1], Jingzhi Wang[1], Mingli Ni[2]; [1]*Shanghai Jiao Tong Univ., China;* [2]*National Virtual Reality Innovation Center, China.* We present an ultra-wide near-eye display featuring penta-channel waveguide. The core idea is to divide its field of view into five by placing in-couplers within regions, which are merely exclusive to subsets of field of view.

3Tu1A.5 • 10:00 (Invited)
Towards Systems Light-Field and Super-Resolution Biophotonics, Shu Jia[1]; [1]*Georgia Inst. of Technology, USA.* Abstract not available.

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08:30 -- 10:30
Room: 504 Foss
ITu1D • Advances in Biomedical In Vivo Imaging I
Presider: Ofer Levi; Univ. of Toronto, Canada

ITu1D.1 • 08:30 (Invited)
Recent Advances in Low Cost OCT, Adam Wax[1]; [1]*Duke Univ., USA.* Optical Coherence Tomography offers high resolution imaging of biological structures but can be limited in application due to its cost. We discuss recent advances to increase access by improving the performance of low cost OCT.

ITu1D.2 • 09:00
Suppression of Multipath Artifacts in Double-Clad Fiber for Catheter-Based Multimodal Optical Coherence Tomography, Youngeun Cho[1], Jeongmoo Han[1], Yeon Hoon Kim[1], Hyeong Soo Nam[1], Min Woo Lee[2], Young-Jin Kim[1], Jin Won Kim[3], Hongki Yoo[1]; [1]*Korea Advanced Inst. fo Science and Technology, Korea (the Republic of);* [2]*Dotter Inc., Korea (the Republic of);* [3]*Cardiovascular Center, Korea Univ. Guro Hospital, Korea (the Republic of).* We present a multipath artifact-reduction collimator with index-matched cladding for multimodal endoscopic OCT, achieving up to 8.9 dB SNR improvement by minimizing DCF-induced artifacts and enhancing image quality.

ITu1D.3 • 09:15
Extending the Depth-of-Field in Spatial Frequency Domain Imaging With a Cubic Phase Mask, Dylan H. Dao[1], Jie Jiao[1], Lindsay Kuramoto[1], Ofer Levi[1,2]; [1]*The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, Univ. of Toronto, Canada;* [2]*Inst. of Biomedical Engineering, Univ. of Toronto, Canada.* We demonstrate an extended depth-of-field spatial frequency domain imaging system with a cubic phase mask in the imaging pathway. We observe up to a 3x increase in the depth-of-field, both with and without deconvolving aberrations.

ITu1D.4 • 09:30
Estimation of Quantitative Retinal Hemodynamic Biomarkers Using Real-Time Doppler Holography, Yann Fischer[1], Zacharie Auray[1], Michael Atlan[1]; [1]*ESPCI, France.* Real-time Doppler holography enables non-invasive quantification of retinal blood flow and vascular biomarkers. Its precision, sensitivity, and scalability position it as a powerful tool for early diagnosis and monitoring of vascular health.

ITu1D.5 • 09:45
Mapping Arterial Distribution in the Dorsum of Foot by Using Pulse Wave Video, Hibiki Endo[1], Masato Takahashi[1], Norimichi Tsumura[1]; [1]*Chiba Univ., Japan.* We estimated the spatial phase of rPPG signals in the instep and attempted to identify arterial locations. As a result, we found that inverted waveforms spread in a band-like pattern in some areas.

ITu1D.6 • 10:00 (Invited)
Recent Advances in Bidirectional Optical-Acoustic Neural Interfacing, Shy Shoham[1]; [1]*New York Univ., USA.* Combining ultrasound's tissue penetrability with optical contrasts offers untapped brain imaging opportunities. We demonstrate an optoacoustic signature for near-infrared genetically encoded calcium indicators, advancing functional optoacoustic neuro-tomography (FONT) towards implementation in studying the live brain.

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08:30 -- 10:30
Room: 505 Queets
DTu1C • Applications of Digital Holography and 3D Imaging I
Presider: Tatiana Latychevskaia; Paul Scherrer Institut, Switzerland

DTu1C.1 • 08:30 (Invited)
High-Speed 3D Imaging of Dynamic Object by Parallel Phase-Shifting Digital Holography, Yasuhiro Awatsuji[1], Yuki Kumon[1], Sudheesh Rajput[1], Tomoyoshi Inoue[1], Kenzo Nishio[1], Hou Natsu[2], Manoj Kumar[3], Osamu Matoba[4]; *[1]Kyoto Inst. of Technology, Japan; [2]National Inst. of Advanced Industrial Science and Technology, Japan; [3]Amity Univ. Punjab, India; [4]Kobe Univ., Japan.* The authors review recent progress in parallel phase-shifting digital holography for high-speed imaging of dynamic objects. A movie of three-dimensional distribution of air temperature heated by a soldering iron has been presented.

DTu1C.2 • 09:00
Nondestructive Detection of Blind Holes in Plexiglas by Thermal Loading and Phase-Stepping Digital Shearography, Kazi M. Abedin[1], Awatef R. Al Jabri[1], S.M. Mujibur Rahman[1], Kai-Erik Peiponen[2]; *[1]Sultan Qaboos Univ., Oman; [2]Physics and Mathematics, Univ. of Eastern Finland, Finland.* We used digital shearography to detect blind holes of 10mm diameter and 15mm depth in Plexiglas block. Thermal loading was used to increase temperature of the block by 80C, thereby enabling detection of deep holes.

DTu1C.3 • 09:15 (Invited)
Interferometric Scattering Microscopy and its Applications, Anna Kashkanova[1]; *[1]Max-Planck-Inst Physik des Lichts, Germany.* Interferometric Scattering Microscopy (iSCAT) pushes the limits of label-free detection to the single-molecule level. I will present several examples for the use of iSCAT in characterization, tracking and imaging of biological entities at the nanoscale.

DTu1C.4 • 09:45
High-Frequency Dynamic Morphology Detection of MEMS Micromirror Based on Digital Stroboscopic Holography With an Acousto-Optic Modulation, ZhiHao Li[1], Wenjing Zhou[1], Yingjie Yu[1]; *[1]School of Mechatronic Engineering and Automation, Shanghai Univ., China.* We address temporal resolution constraints of mechanical strobes by using an acousto-optic modulator-based programmable stroboscopic source synchronized with high-frequency vibration phases, achieving holographic sampling of dynamic morphologies.

08:30 -- 10:30
Room: 506 Samish
PTu1E • Turbulence Characterization
Presider: Natan Kopeika; Ben-Gurion Univ. of the Negev, Israel

PTu1E.1 • 08:30 (Invited)
Turbulence Height Profiles in Different Environments, Miranda van Iersel[1], Noah Bia[1], David Voelz[1], Robert Hull[1]; *[1]New Mexico State Univ., USA.* Turbulence strength changes with height above the ground. Close to the Earth the environment has an influence on atmospheric

turbulence and should be considered. The effects of the environment on turbulence are studied.

PTu1E.2 • 09:00
A new Model for the Layered Structure of Atmospheric Optical Turbulence in the Tropics, Rohan Thakur[1], Devika Sunil S.[1], Anand N. Sarma[1], Sunilkumar K[2], Satheesh S. K.[2], Krishnamoorthy K[2]; *[1]IISER Thiruvananthapuram, India; [2]Indian Inst. of Science, India.* Optical propagation in satellite-to-Earth communication links rely on the layered structure of optical turbulence. Using long-term radiosonde observations, we present a new model for the vertical variations in refractive index fluctuations.

PTu1E.3 • 09:15
Advancing Atmospheric Boundary Layer Turbulence Monitoring Through High-Temporal-Resolution Neuromorphic Vision, Marco Sepulveda[1], Pablo Garrido[1], David Valero[1], Maximiliano Torres[1], Esteban Vera[1], Dario G. Perez[1]; *[1]Pontificia Univ Catolica de Valparaiso, Chile.* Even-based cameras characterize atmospheric boundary layer turbulence by capturing wandering and scintillation at µs speed, extracting C_n^2 and Hurst exponents showing departures from OK models with greater precision than conventional techniques.

PTu1E.4 • 09:30 (Invited)
Turbulence Forecasting with Machine Learning Optimized for Numerical Weather Prediction Data, Mitchell G. Grose[1], Eric Magee[1], Yakov Diskin[1], Matthew Whiteley[1]; *[1]MZA Associates Corporation, USA.* An optical turbulence machine learning model trained with local weather measurements but applied to weather forecasts suffers from biases between the data sources. We optimize with forecast data and demonstrate improved optical turbulence forecasting.

PTu1E.5 • 10:00 (Invited)
Atmospheric Turbulence Profiling Using Single-Ended Lidar, Sivanesan Ponniah[1]; *[1]Intellisense Systems Inc., USA.* A new single-ended lidar technology to profile atmospheric optical turbulence is demonstrated. This new method uses backscattering enhancement-based direct detection method to measure range resolved optical turbulence along any line of sight.

08:30 -- 10:30
Room: 507 Sauk
CTu1B • Data-Driven Imaging and Design
Presider: Abbie Watnik; US Naval Research Laboratory, USA

CTu1B.1 • 08:30 (Invited)
Data-Driven Computational Imaging Systems Optimization, Nick Antipa[1]; *[1]Univ. of California San Diego, USA.* I will discuss data-driven methods for jointly optimizing the optics and algorithms of computational imaging systems, including applications to 3D microscopy, privacy-preserving computer vision, and efficient image rendering incorporating wave optics effects.

CTu1B.2 • 09:00
Robust Neural Surrogates for Freeform Wave Simulation, Charles Dove[1], Jatearoon Boondicharern[1], Laura Waller[1]; *[1]Univ. of California Berkeley, USA.* We present a new method, based on adversarial search, for training a neural network to simulate wave-material interaction.

Whereas previous methods are viable only up to about 20 variable material parameters, we demonstrate 2560.

CTu1B.3 • 09:15
Non-Paraxial Layered Diffraction Simulator for Inverse Design of Lensless Imaging Optics, Yong Guk Kang[1], Donggeon Bae[1], Nakkyu Baek[2], Hyojun Ahn[1], Taeyoung Kim[2], Kyung Chul Lee[1], Seung Ah Lee[3]; *[1]School of Mechanical and Aerospace Engineering/SNU-IAMD, Seoul National Univ., Korea (the Republic of); [2]School of Electrical and Electronic Engineering, Yonsei Univ., Korea (the Republic of); [3]Department of Mechanical engineering, Seoul National Univ., Korea (the Republic of).* We present a non-paraxial wave simulator for thick optical systems, incorporating geometrical distortion via skewed and shifted angular spectrum propagation, enabling the inverse design of optical elements for lensless imaging systems.

CTu1B.4 • 09:30
Information-Theoretic Bayesian Optimization of Imaging Systems, Leyla Kabuli[1], Nalini M. Singh[1], Henry Pinkard[1], Laura Waller[1]; *[1]Univ. of California Berkeley, USA.* We present an imaging system design framework using Bayesian optimization and mutual information. Our approach, demonstrated in lensless imaging and radio astronomy, does not require encoding models or image reconstruction.

CTu1B.5 • 09:45
Snapshot Hyperspectral Imaging via Compressive Sensing and Implicit Neural Representation, Jatearoon Boondicharern[1], Amir Reza Vazifeh[1], Jason Fleischer[1]; *[1]Princeton Univ., USA.* We propose a snapshot hyperspectral imaging method using randomized aperture codes and implicit neural representations. It shows high performance across a range of hyperspectral datasets, without any external supervision or cross-band information.

CTu1B.6 • 10:00 (Invited)
AI-Enhanced Optical Microscopy, Fei Xia[1]; *[1]Univ. of California Irvine, USA.* Optical microscopy has long been challenged by hardware limitations. In this talk, I'll show how we leverage state-of-the-art AI tools to transcend these constraints—tackling imaging challenges from accelerated acquisition to enhanced, high-resolution image restoration.

11:00 -- 13:00
Room: 503 Duckabush
3Tu2A • AR/VR and 3D Imaging
Presider: Simon Thibault; Université Laval, Canada

3Tu2A.1 • 11:00
Understanding Cell Nuclei Dynamics Through Refractive Index Microscopy, Alejandro Silva[1], Felipe Parietti[1], Juan Llaguno[1], Roman Demczylo[1], Belén Gaál[1], Jimena Hochmann[1], Miguel Arocena[1], Julia Alonso[1], Ariel Fernández[1]; *[1]Universidad de la Republica, Uruguay.* Refractive Index maps of cell cultures are analyzed by incorporating deep learning for labeling and segmentation along with physics-based tools to determine kinematic observables. Validation experiments for cell nuclei rotation are presented.

3Tu2A.2 • 11:15 (Invited)
Novel Broadband Light Sources for 3D and Hyperspectral Imaging, Shaival Buch[1], Shrenik Deliwala[2], Missael Garcia[2], Qingsong Wang[1], Craig Schiller[1], Jing Zhou[1], Huiling Zhu[1], William Grube[1], Vikram Singh[1]; *[1]Energetiq Technology Inc, USA; [2]Emcode Photonics, LLC, USA.* High-brightness, broadband light sources have diverse applications. Two applications are highlighted: (1) UV-VIS light SD-OCT for non-destructive testing of optical and semiconductor materials, and (2) spectrally encoded light hyperspectral imaging for tissue measurements.

3Tu2A.3 • 11:45 (Invited)
Optical Architecture for Foveated Display Technology, Hong Hua[1], Pengyinjie Lyu[2]; *[1]Univ of Arizona, Coll of Opt Sciences, USA; [2]3D Visualization and Imaging Systems laboratory, J. C. Wyant College of Optical Sciences, Univ. of Arizona, USA.* In this talk, I will provide an overview on how the foveation characteristics of the human visual system can be applied for designing more efficient display technologies and present the recent progress and development of foveated display technologies for virtual and augmented reality systems.

3Tu2A.4 • 12:15
Computational Algorithm That Enables Automatic Focusing for Underwater Lensless Holographic Images, Matthew Aguiar[1], Benjamin Grassian[3], Carlos Trujillo[2], Andone Lavery[3], Ana Doblas[1]; *[1]Univ. of Massachusetts Dartmouth, USA; [2]EAFIT Univ., Colombia; [3]Woods Hole Oceonographic Institutions, USA.* We have developed an autofocusing method for underwater lensless holographic images, providing rapidly focused reconstructed amplitude images to quantify marine taxa.

3Tu2A.5 • 12:30 (Invited)
Vision Correction in AI/AR Glasses With Varifocal Lenses Based on Liquid Crystals, Kun Gao[1]; *[1]GoerTek Electronics Inc., USA.* This talk presents large-aperture liquid crystal lenses for presbyopia and myopia, integrated with AR/AI glasses, addressing prescription correction and enhancing XR user experience through advanced light control and tunable optical performance.

11:00 -- 13:00
Room: 505 Queets
DTu2C • Applications of Digital Holography and 3D Imaging II
Presider: Naveen Nishchal; Indian Inst. of Technology Patna, India

DTu2C.1 • 11:00 (Keynote)
Multi-Dimensional Optical Sensing and Imaging in Degraded Environment, Bahram Javidi[1]; *[1]Univ. of Connecticut, USA.* This keynote presents an overview of multidimensional imaging approaches for sensing, visualization, detection, and classification in degraded-environments.

DTu2C.2 • 11:45 (Invited)
Pushing Profiling Accuracy Limit of Interferometric Quantitative Phase Microscopy, Renjie Zhou[1]; *[1]Chinese Univ. of Hong Kong, Hong Kong.* Abstract not available.

DTu2C.3 • 12:15
Differentiable Event-Based Holography, Chutian Wang[1], Shuo Zhu[1], Jingqian Wu[1], Ni Chen[1], Edmund Y. Lam[1]; *[1]Univ. of Hong Kong, Hong Kong.* We present an event-based computational

holographic imaging technology utilizing automatic differentiation. Our end-to-end paradigm, Ev-Holo, shows promising results that could advance the field and enable new applications.

11:00 -- 13:00
Room: 506 Samish
RTu2E • High-Speed X-Ray Imaging
Presider: Laura Smilowitz; Los Alamos National Laboratory, USA

RTu2E.1 • 11:00 (Invited)
X-Ray Particle Velocimetry, Simo Mäkiharju[1]; [1]*Univ. of California Berkeley, USA.* X-Ray Particle Velocimetry is becoming increasingly useful for the fluid dynamics community as developments in algorithms, tracers, sources, and detectors enable the undertaking of ever more ambitious experiments at synchrotrons, and also in laboratory settings.

RTu2E.2 • 11:30 (Invited)
X-Ray Densitometry Unveils Multiphase Flows, Udhav Gawandalkar[1], Harish Ganesh[2], Steven Ceccio[2,3], >Filippo Coletti[1], Christian Poelma[4]; [1]*ETH Zurich, Switzerland;* [2]*Department of Naval Architecture and Marine Engineering, Univ. of Michigan, USA;* [3]*Department of Mechanical Engineering, Univ. of Michigan, USA;* [4]*Mechanical Engineering, Delft Univ. of Technology, Netherlands.* Multiphase flows are ubiquitous in numerous industrial and environmental flows. The presence of a dispersed phase such as bubbles or particles, make these flows optically opaque rendering optical flow diagnostics inadequate. We show that X-rays can circumvent the opacity to reveal phase distribution providing exciting insights in these flows.

RTu2E.3 • 12:00 (Invited)
New Time-Resolved 3D Imaging Opportunities at Advanced X-Ray Sources, Pablo V. Villanueva Pérez[1,2], Yuhe Zhang[1,2], Zisheng Yao[1,2], Zhe Hu[1,2], Julia Rogalinski[1,2], Eleni Myrto Asimakopoulou[3,1], Tobias Ritschel[4], Robert Klöfkorn[1], Francisco Garcia-Moreno[5], Malgorzata Makowska[6], Bratislav Lukić[7], Alexander Rack[7], Kim Nygård[3]; [1]*Lunds Universitet, Sweden;* [2]*NanoLund, Sweden;* [3]*MAX IV, Sweden;* [4]*Univ. College London, UK;* [5]*Helmholtz Zentrum Berlin, Germany;* [6]*Paul Scherrer Inst., Switzerland;* [7]*ESRF, France.* Diffraction-limited storage rings and X-ray free-electron lasers offer an opportunity to push 3D spatiotemporal resolution. This presentation discusses novel tools to retrieve micrometer resolution 3D movies of dynamical processes with kHz dynamics and beyond.

RTu2E.4 • 12:30 (Invited)
Ultra-High Speed X-Ray Imaging at the APS-U Opportunities Additive Manufacturing and Beyond, Samuel Clark[1], Kamel Fezzaa[1]; [1]*Argonne National Laboratory, USA.* With the APS-U upgrade completed and beamline 32-ID in scientific commissioning this talk will give an overview of past successes in ultra-high-speed radiography as well as new the capabilities and the capabilities on the horizon.

2025 Optica Imaging Congress Session Guide

Disclaimer: this guide is limited to technical program with abstracts and author blocks as of 08 August. For updated and complete information with special events, reference the online schedule or mobile app.

11:00 -- 13:00
Room: 507 Sauk
CTu2B • Super-Resolved Imaging and Ptychography
Presider: David Brady; Univ. of Arizona, USA

CTu2B.1 • 11:00 (Invited)
High Axial Resolution and Imaging Speeds Three-Dimensional Live Cell Imaging, Xiaoshuai Huang[1]; [1]*Peking Univ., China.* To investigate the intricate structures, dynamic behaviors, and interactions of organelles that govern cell states and fates in three-dimensional space,we developed the super-resolution imaging technologies with high axial resolution, high imaging speeds, and minimal phototoxicity.

CTu2B.2 • 11:30
Fourier Holo-Ptychographic Microscopy, Malgorzata Kujawinska[1], Zhuoshi Li[2,3], Yefeng Shu[2,3], Jiasong Sun[2,3], Qian Shen[2,3], Peng Gao[4], Michal Ziemczonok[1], Maciej Trusiak[1], Qian Chen[3], Chao Zuo[2,3]; [1]*Inst. of Micromechanics and Photonics, Warsaw Univ. of Technology, Poland;* [2]*Smart Computational Imaging Laboratory (SCILab), Nanjing Univ. of Science and Technology, China;* [3]*Jiangsu Key Laboratory of Spectral Imaging & Intelligent Sense, China;* [4]*School of Physics, Xidian Univ., China.* We present a novel hybrid digital holography-Fourier ptychography approach for high-accuracy, speckle-free synthetic-aperture quantitative phase imaging. The feasibility of FHPM is verified on USAF phase resolution target and complex phantoms.

CTu2B.3 • 11:45
Compact Fouier Ptychographic Microscope, Maksymilia Chlipala[1], Piotr Arcab[1], Mikolaj Rogalski[1], Maciej Trusiak[1], Piotr Zdankowski[1]; [1]*Politechnika Warszawska, Poland.* Fourier Ptychographic Microscopy (FPM) is a computational imaging method that enable large field-of-view imaging with submicron resolution. A compact microdisplay illumination enables a robust and compact FPM system with automatic callibration.

CTu2B.4 • 11:45
Fourier Ptychography With Unknown Sample Motion, Matthew A. Chan[1], Casey Pellizzari[2], Christopher Metzler[1]; [1]*Univ. of Maryland at College Park, USA;* [2]*Department of Physics and Meteorology, USA Air Force Academy, USA.* We introduce Fourier Ptychography with Unknown Sample Motion, a novel method that generates measurement diversity through target motion. Furthermore, we incorporate a learning-based approach for calibration-free phase retrieval.

CTu2B.5 • 12:00
Ptychographic Imaging Ellipsometry Using Visible and Extreme Ultraviolet Light, Matthias Gouder[1,2], Fengling Zhang[1,2], Antonios Pelekanidis[1,2], Lars Loetgering[3], Stefan Witte[4,1]; [1]*Advanced Research Center for Nanolithography, Netherlands;* [2]*Laserlab Vrije Universiteit Amsterdam, Netherlands;* [3]*Carl Zeiss Microscopy Solutions, Germany;* [4]*Imaging Physics, Faculty of Applied Sciences, Technische Universiteit Delft, Netherlands.* We show how to utilize ptychographic measurements in reflection, to obtain maps of height and refractive indices, using visible and extreme ultraviolet light sources. This technique enables high-resolution imaging of multi-element microstructures.

CTu2B.6 • 12:15
Residual Neural Network for End-to-End Optimization of Coded Illumination-Based Quantitative Phase Imaging**,** Zahra Khodabakhshi Fard[1], Laura Waller[1]; [1]*Univ. of California Berkeley, USA.* We present an end-to-end optimization for quantitative phase imaging using a residual neural network to optimize illumination patterns and phase retrieval, achieving higher accuracy and fewer artifacts than differential phase contrast microscopy.

CTu2B.7 • 12:30
Focusing Delivery Schemes: a Comparative Analysis for Extreme UltraViolet Ultrafast Tabletop Ptychography**,** Antonio E. Mazzarone[1], Carmelo Grova[1], Jonathan Barolak[4], Daniel Adams[5], Cristian Svetina[2,3], Giulia Fulvia Mancini[1]; [1]*Department of Physics, Univ. of Pavia, Laboratory for Ultrafast X-Ray and Electron Microscopy, Italy;* [2]*IMDEA Nanociencia, X-ray Wave-mixing Spectroscopies Group (X-WaveS), Spain;* [3]*European XFEL, Germany;* [4]*Department of Physics, Univ. of Pavia, Italy;* [5]*Department of Physics, Colorado School of Mines, USA.* We analyze in a comprehensive and quantitative approach the trade-off among beam delivery, its properties at the image plane, and achievable resolutions for Ultrafast Tabletop EUV Ptychography, retaining high throughput and data processing speed

14:30 -- 16:30
Room: 503 Duckabush
3Tu3A • Hyperspectral and 3D Applications
Presider: Osamu Matoba; Kobe Univ., Japan

3Tu3A.1 • 14:30 (Invited)
3D Quantitative Phase Imaging Techniques for Organoids and in Vivo Applications, Xi (Dawn) Chen[1]; [1]*Northwestern Univ., USA.* We present advanced 3D quantitative phase imaging techniques, including artificial confocal microscopy and SEEQPI, for organoid and in vivo applications. These methods provide label-free, high-resolution imaging with enhanced contrast and depth, enabling new insights into biological structures.

3Tu3A.2 • 15:00 (Invited)
Strobo-Stereoscopy Towards on-Machine Surface Metrology and Inspection, Xiangyu Guo[1], Chabum Lee[2]; [1]*Arizona State Univ., USA;* [2]*Texas A&M Univ., USA.* This work introduces a 3D vision system combining Strobo-Stereoscopy and Fluorescent Strobo-Stereoscopy for on-machine inspection, enabling accurate surface reconstruction and defect detection on reflective, rotating parts across diverse industrial applications.

3Tu3A.3 • 15:30 (Invited)
Single-Shot Incoherent Digital Holography Aiming to Capture Three-Dimensional Video, Tetsuhiko Muroi[1], Teruyoshi Nobukawa[1], Kei Hagiwara[1]; [1]*Japan Broadcasting Corporation, Japan.* This paper introduces two types of configurations using the parallel phase-shifting methods. A setup employing a Michelson interferometer achieved video capture at 60 fps. The other, with a liquid crystal lens, captured a person outside.

3Tu3A.4 • 16:00
SPLIN-HUNTD: Spectral Variability Aware Linear and Nonlinear Autoencoder for Hyperspectral Underwater Target Detection, Suresh Aala[1], Veena Grace Dova[1], Sravan kumar sikhakolli[1], Sathish Kuppan Pandurangan[2], Karthikeyan Elumalai[1], Sunil

chinnadurai[1]; [1]*SRM Univ. - AP, India;* [2]*zurich american, USA.* Underwater target detection faces challenges from spectral variability. SPLINHUNTD, integrating linear & nonlinear decoders with a variability-aware loss function, improves hyperspectral unmixing & outperforms existing methods with 0.9903 AUC.

3Tu3A.5 • 16:15
Efficient Hyperspectral Image Classification of the Krishna River Basin in Andhra Pradesh Using Hybrid Ensemble Learning Models, Venkata Krishna Saathvik Muddana[1], Kesava Sriram Kothamasu[1], Suresh Aala[1], Karthikeyan Elumalai[1], Sunil chinnadurai[1]; [1]*SRM Univ. - AP, India.* We propose an efficient hyperspectral classification framework for the Krishna River Basin using LSTM-based auto-labelling and hybrid ensembles, achieving 99% accuracy and enabling robust land cover analysis in data-scarce remote sensing scenarios.

14:30 -- 16:30
Room: 504 Foss
ITu3D • Imaging and Vision
Presider: Olivier Francois; Huawei Technologies, Finland

ITu3D.1 • 14:30 (Invited)
Eight Ages of Image Quality, Scott J. Daly[1]; [1]*Dolby Laboratories, Inc., USA.* The history of image quality has undergone a series of ages, each with distinct applications and levels of quantification, modelling, statistical analysis. This talk will cover perceptual quality for color images, video, and three-dimensional signals.

ITu3D.2 • 15:00
Estimating Internal Latency of Vision Systems Using Only Monitor Output, Hyuno Kim[1], Yuji Yamakawa[1]; [1]*The Univ. of Tokyo, Japan.* This work presents an analytic method for estimating the internal latency of a vision system composed of a camera and a computer, relying solely on the system's output displayed on a monitor.

ITu3D.3 • 15:15
Estimation of Cognitive Based on Features From Facial Expressions and Heart Rate Variability, Yuki Itaya[1], Hirokazu Doi[2], Masato Takahashi[1], Norimichi Tsumura[1]; [1]*Chiba Univ., Japan;* [2]*Nagaoka Univ. of Technology, Japan.* We propose estimating participants' cognitive bias from physiological features, assuming that such bias induces stress in the participants. In the experiment, gender bias, a form of cognitive bias, was classified with an accuracy of 79.1%.

ITu3D.4 • 15:30 (Invited)
Quantifying Visual Experience for Perceptual Research, Aaron Nichols[1]; [1]*Meta Reality Labs, USA.* Novel research devices can enable longitudinal, quantitative studies of visual experience. These will support improved models explaining which dimensions of visual experience matter, informing ways to better meet the needs of the visual system.

ITu3D.5 • 16:00 (Invited)
Computational Displays and Psychophysics, Alex Chapiro[1]; [1]*Meta Reality Labs Research, USA.* Abstract not available.

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14:30 -- 16:30
Room: 505 Queets
DTu3C • Applications of Digital Holography and 3D Imaging III
Presider: Lisa Miccio; Inst. of Intelligent Systems ISASI, Italy

DTu3C.1 • 14:30 (Tutorial)
LCOS Spatial Light Modulators for Applications in Digital Holography, Hagen Stolle[1]; [1]*HOLOEYE Photonics AG, Germany.* We provide an overview on applications of LCOS Spatial Light Modulators in digital holography and introduce references to relevant research works. We also focus on latest developments in SLM technologies for real holographic applications.

DTu3C.2 • 15:30
Phase Retrieval from Two-Plane Holograms with Unknown Separation Distance in a Portable Digital Holographic Microscope., Maria L. Cruz[1], Orlando Montoya-Marquez[1]; [1]*UP campus Guadalajara, Mexico.* We present a method for phase retrieval using two holograms with an unknown separation distance. The sample is contained in a pupil. We also present a holographic microscope mount that facilitates the hologram recording

DTu3C.3 • 15:45 (Keynote)
Beam Projection and Wavefront Correction Using Digital Holography, Abbie T. Watnik[1]; [1]*US Naval Research Laboratory, USA.* Abstract not available.

14:30 -- 16:30
Room: 506 Samish
RTu3E • Scintillators and Detectors
Presider: Francesca Cova; Universita degli studi di Milano-Bicocca, Italy

RTu3E.1 • 14:30 (Invited)
Color Tunable X-ray Scintillation by Lanthanide-Doping of Nanoparticles for Molecular Imaging and Cancer Therapeutics, Megan Neufeld[1], Eunseo Choi[1], Conroy Sun[1]; [1]*Pharmaceutical Sciences, Oregon State Univ., USA.* Lanthanide-doped metal-organic frameworks were synthesized and investigated for their radioluminescent properties. Upon irradiation, sharp, tunable emission peaks were observed in the visible to near-infrared range, demonstrating their potential for X-ray-based imaging applications.

RTu3E.2 • 15:00 (Invited)
High-Efficiency High Energy Photon Radiography Panels, Federico Moretti[1]; [1]*Lawrence Berkeley National Laboratory, USA.* In this presentation, the applications of MeV radiography will be presented and discussed. Particular focus will also be given to the materials that are currently used as well as new developments currently being investigated.

RTu3E.3 • 15:30 (Invited)
Recent Advancements in Lead Halide Perovskite Nanocrystals for Scintillation Applications, Francesco Carulli[1]; [1]*Univ. of Milano-Bicocca, Italy.* Abstract not available.

RTu3E.4 • 16:00 (Invited)
Heterostructured Approach for Scintillation Applications, Gregory Bizarri[1]; [1]*Cranfield Univ., UK.* Abstract not available.

14:30 -- 16:30
Room: 507 Sauk
CTu3B • AI-Based Imaging and Microscopy
Presider: Julia Alonso; Universidad de la Republica, Uruguay

CTu3B.1 • 14:30
Neural Fields in Computational Microscopy for Biomedical Applications, Haowen Zhou[1], Brandon Feng[2], Oumeng Zhang[1], Haiyun Guo[3], Siyu Lin[1], Mingshu Liang[1], Siyuan Yin[1], Catherine Deng[1], Christopher Metzler[4], Changhuei Yang[1]; [1]*California Inst. of Technology, USA;* [2]*Massachusetts Inst. of Technology, USA;* [3]*Rice Univ., USA;* [4]*The Univ. of Maryland, College Park, USA.* We present the adaptation of neural fields with low-rank representations in computational microscopes for data packaging, efficient image reconstructions, and system error compensation.

CTu3B.2 • 14:45
Deep Prior-Based Phase Retrieval in Zernike Phase Contrast Microscopy, Zinan Zhou[1], Keiichiro Toda[2], Rikimaru Kurata[3], Kohki Horie[1], Ryoichi Horisaki[3], Takuro Ideguchi[1,2]; [1]*Department of Physics, Graduate School of Science, UTokyo, Japan;* [2]*Inst. for Photon Science and Technology, Graduate School of Science, UTokyo, Japan;* [3]*Department of Information Physics and Computing, Graduate School of Information Science and Technology, UTokyo, Jordan.* We achieve quantitative phase imaging using Zernike phase contrast microscopy combined with an untrained neural network, eliminating manual regularization and demonstrating accurate, robust phase retrieval on diverse samples.

CTu3B.3 • 15:00
3D on-Chip Refractive Index Microscopy With Multi-Slice Beam Propagation, Sibi Chakravarthy Shanmugavel[1], Shwetadwip Chowdhury[1]; [1]*Univ. of Texas at Austin, USA.* We present an on-chip imaging method for 3D refractive-index reconstruction over large fields of view using angular diffraction measurements from a sample placed directly on a sensor, enabled by a reformulated multi-slice beam propagation model.

CTu3B.4 • 15:15
High-Fidelity Unsupervised Phase-to-Color Virtual Staining via Edge-Aware Cyclic Training, Jong Ho Kim[1], Hyesuk Chae[2], Kyung Chul Lee[1], Donggeon Bae[1], Yong Guk Kang[1], Seung Ah Lee[1]; [1]*Seoul National Univ., Korea (the Republic of);* [2]*Yonsei Univ., Korea (the Republic of).* We propose a virtual staining framework for phase images using a decoupled encoder-decoder and edge regularization network, improving unsupervised phase-to-intensity translation for label-free histopathology with enhanced visual quality.

CTu3B.5 • 15:30
Comparative Analysis of Deep Decoder and U-Net Architectures for Phase Reconstruction From Intensity Measurements Using Untrained Neural Networks, Alireza Sheikhsofla[1], Shane Carney[1], Alexander Khmaladze[1], Jonathan C. Petruccelli[1]; [1]*SUNY at Albany, USA.* This study examines untrained neural networks (UNNs) for phase retrieval using

defocused PCIs, comparing U-net and deep decoder. U-net performs better at short defocus, while deep decoder outperforms as defocus distance increases.

CTu3B.6 • 15:45 (Invited)
Title to be Announced, Lucrezia Chester[1]; [1]*LightHearted AI, UK.* Abstract is not available.

CTu3B.7 • 16:15
Physics-Informed Unsupervised Learning for Single Photon Imaging, Haosen Liu[1], Haitao Nie[1], Edmund Y. Lam[1]; [1]*Univ. of Hong Kong, Hong Kong.* By embedding imaging physics, we develop an unsupervised framework to enable image restoration learning for single photon imaging with only the training data degraded by the blurring effect, Poisson noise, and readout noise.

16:30 -- 18:00
Room: Elwha Ballroom
JTu4A • Joint Posters Session I

JTu4A.1
Doing Reliable Turbulent Propagation Simulations, Carolina Rickenstorff[1]; [1]*Autonomous Univ. of Puebla, Mexico.* Turbulent optical propagation simulations are a formidable challenge to newcomers interested in doing them. We show basic results of the point source (PT) numerical propagation that serve as the first check towards more complicated simulations.

JTu4A.2
Analysis of the Relationship Between Blood Pulsation and Biological State by Calculating the Spatial SNR of Pulse Wave, Ryosuke Imai[1], Hibiki Endo[1], Masato Takahashi[1], Norimichi Tsumura[1]; [1]*Chiba Univ., Japan.* This study examines pulse wave changes due to biometric state variations using SNR and finds that certain states must be considered for accurate non-contact biometric estimation using camera-acquired pulse waves.

JTu4A.3
Generalizable Denoising and Detail Restoration Pipeline for Two-Photon Fluorescence Imaging via Self-Supervised Learning and Frequency Domain Optimization, Zhengyuan Pan[1]; [1]*Shanghai Jiao Tong Univ., China.* We develop a self-supervised denoising method for two-photon imaging using diagonal redundancy sampling and spectral mixing. Also, a Fourier reweighting module recovers structural details, enabling resolution enhancement under low-photon conditions.

JTu4A.4
Capacity-Enhanced Image Encryption Using Azimuthally Polarized Structured Light, Neha Choudhary[1], Allarakha Shikder[1], Naveen K. Nishchal[1]; [1]*Indian Inst. of Technology Patna, India.* This study proposes a novel technique for simultaneously securing multiple images in a single array of azimuthally polarized vector vortex beam.

JTu4A.5
Preliminary Investigation of Hologram Compression Using Tensor Decomposition, Tomoyoshi Shimobaba[1], Fan Wang[1], David Blinder[2,3], Joanna Starobrat[4], Chung-Hsuan Huang[5], Tatsuki Tahara[6], Chau-Jern Cheng[5], Peter Schelkens[2,3], Tomoyoshi

Ito[1]; *[1]Chiba Univ., Japan; [2]Department of Electronics and Informatics (ETRO), Vrije Universiteit Brussel (VUB), Belgium; [3]IMEC, Belgium; [4]Faculty of Physics, Warsaw Univ. of Technology, Poland; [5]Inst. of Electro-Optical Engineering, National Taiwan Normal Univ., Taiwan; [6]Applied Electromagnetic Research Center, Radio Research Inst., National Inst. of Information and Communications Technology (NICT), Japan.* Hologram compression presents a significant challenge, as holograms differ fundamentally from ordinary images. To address this, this study proposed a lossy hologram compression method utilizing tensor decomposition.

JTu4A.6
Direct Phase Modulation for Image Reconstruction at Tilted Plane Based on Fresnel Transform, Hsuan-Ting Chang[1], Tai-Jyun Dong[1], Chih-Hao Chuang[2], Chien-Yu Chen[3]; *[1]Department of Electrical Engineering, National Yunlin Univ of Science and Tech, Taiwan; [2]Department of Photonics, Feng Chia Univ., Taiwan; [3]Graduate Inst. of Color and Illumination Technology, National Taiwan Univ. of Science and Technology, Taiwan.* We propose a method which can directly modulate the original phase-only function retrieved by using Gerchberg Saxton algorithm so that the same target image can be reconstructed at a tilted reconstruction plane.

JTu4A.7
Study of Phase Change by Mechanical Stress Induced Birefringence in an Acrylic Cube with Digital Holography, Ram Kumar[1], Naveen K. Nishchal[1]; *[1]Indian Inst. of Technology Patna, India.* This study presents a quantitative approach to examine the phase fluctuations in response to varying levels of compressive stress applied to an acrylic cube exhibiting birefringence.

JTu4A.8
Development of Phase Retrieval Holographic Particle Measurement System Using a GPU Equipped SBC, Yohsuke Tanaka[1], Dai Nakai[1], Mitsuki Ishiyama[1], Daisuke Fujimoto[1]; *[1]Kyoto Inst. of Technology, Japan.* We propose a particle measurement system based on phase retrieval holography using two holograms. The system employs a simple optical setup and GPU-equipped single-board computer with Julia-based package for scientific and engineering applications.

JTu4A.9
Super-Resolution Self-Interference Incoherent Digital Holography via Dual-Sensor Acquisition, Youngrok Kim[1], Sung-Wook Min[1]; *[1]Kyung Hee Univ., Korea (the Republic of).* Resolution limitation is a fundamental problem of digital holography. We propose a dual-sensor configuration and the feed-forward network-based super-resolution algorithm for geometric phase self-interference incoherent digital holography.

JTu4A.10
Single Cell Nanoparticle Uptake Analysis by Correlative Tomographic Phase and Fluorescence Microscopy, Esther Teitge[1], Anne Marzi[1], Álvaro Barroso[1], Jürgen Schnekenburger[1], Björn Kemper[1]; *[1]Univ. of Muenster, Germany.* In a proof-of-concept study with tomographic phase microscopy and fluorescence imaging we investigated cellular association and uptake of labeled nanoparticles and dye-loaded chitosan nanocapsules in human lung epithelial cells and mouse macrophages.

JTu4A.11
Optical Scanning Holographic Microscopy With Different Depth of Fields, Jung-Ping Liu[1,2], Chen-Hsiang Huang[1]; *[1]Feng Chia Univ., Taiwan; [2]Digital Optics Center, Feng Chia Univ., Taiwan.* Optical scanning holographic Microscopy (OSHM) features three-dimensional imaging not only in the coherent mode but also in the incoherent mode. Here we discuss two setups of OSHM for imaging with large depth of field (DOF) and low DOF, respectively.

JTu4A.12
Optical Asymmetric Fully Phase Image Encryption Using Transport of Intensity Equation, Shivam Tripathi[1], Sonu Kumar Rao[1], Naveen K. Nishchal[1]; *[1]Indian Inst. of Technology Patna, India.* Phase images are more sensitive and offer better security. This study presents the idea of fully phase image encryption under an asymmetric approach employing the transport of intensity equation.

JTu4A.13
3D Surface Measurement by Using Polarization Sensitive Digital Holography, Yu-Chih Lin[1]; *[1]Feng Chia Univ., Taiwan.* A 3D measurement method is proposed by using the polarization sensitive digital holography. The angle between the sample and incident beam can thus be calculated from this reconstructed polarized beam to give the 3D surface.

JTu4A.14
Eye Tracking-Based Compensation for Lens Boundary Artifacts in Light Field Displays, Wonseok Son[1], Youngrok Kim[1], Sung-Wook Min[1]; *[1]Department of Information DIsplay, Kyung Hee Univ., Korea (the Republic of).* We propose an eye-tracking-based compensation method for 2D-mode light field displays. By adjusting the Gaussian blur kernel size based on light path deviation, our approach mitigates angle-dependent artifacts and improves intensity uniformity.

JTu4A.15
Freeform Metasurface Color Router for CMOS Image Sensor With Chief ray Angle Consideration, Taewon Choi[1], Youngjin Kim[1], Hyeongyu Choi[1], Yoonchan Jeong[1]; *[1]Seoul National Univ., Korea (the Republic of).* We propose a freeform metasurface color router with chief ray angle consideration designed via topology optimization, which achieves uniform routing efficiency across the peripheral regions of the sensor and significantly improves image quality.

JTu4A.16
Quantum-Accelerated Imaging for Space Domain Awareness Challenges, Hyunsoo Choi[1], Fanglin Bao[2], Hyoung Won Baac[1], Zubin Jacob[3]; *[1]Sungkyunkwan Univ., Korea (the Republic of); [2]Westlake Univ., China; [3]Birck Nanotechnology Center, School of Electrical and Computer Engineering, Purdue Univ., USA.* Space Domain Awareness faces challenges like small angular separation, atmospheric turbulence, and extreme brightness ratios. Quantum-accelerated imaging (QAI) effectively addresses these limitations, demonstrating outstanding performance.

JTu4A.17
Sensor Simulator for Observation of the Re-Entry Spectral Signatures from Orbit., Teymoor Ali[1], Vasili Savitski[2], Andrew Campbell[1], Jaime Zabalza[1], Paul Murray[1]; *[1]Univ. of Strathclyde, UK; [2]Fraunhofer Centre for Applied Photonics, UK.* A simulation framework for satellite-based detection of atmospheric re-entry debris, integrating spectral synthesis, orbital

propagation, and sensor modelling to predict IR/UV signatures and evaluate performance for debris tracking applications.

JTu4A.18
Low-Dose Characterization of MEMS Dynamics via Dynamical System Regularization, Yaocheng Tian[1], Boyu Zhang[2], Diptiman Kundu[2], Difei Zhang[1], Zirui Guo[3], Xiaoyin Zheng[4], Yichen Gan[4], Yarun Kankanallu[4], Yu-Chen Karen Chen-Wiegart[4], Hanfei Yan[3], Chris Jacobsen[2], Horacio Espinosa[2], George Barbastathis[1]; *[1]Massachusetts Inst. of Technology, USA; [2]Northwestern Univ., USA; [3]National Synchrotron Light Source II, Brookhaven National Laboratory, USA; [4]Stony Brook Univ., USA.* We develop a method that reconstructs nano-oscillator displacement from low-dose diffraction movies by jointly optimizing over dynamics and optical model; the formulation readily extends to simultaneously retrieve unknown sample shape and probe.

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Wednesday, 20 August

08:30 -- 10:30
Room: 503 Duckabush
3W1A • 3D Acquisition and Deep Learning
Presider: Ana Doblas; Univ. of Massachusetts Dartmouth, USA

3W1A.1 • 08:30
Assessing Sickle Cell Anemia With Digital Holographic Microscopy: a Comparative Study Under Normoxia and Hypoxia Conditions, Maria J. Gil Herrera[1], Sayen Plaza-Vega[2], Viviana Clavería[2], Karina Ortega[3,1], Rene Restrepo[1], Raul Castaneda[1], Carlos Trujillo[1]; *[1]Universidad EAFIT, Colombia; [2]Pontificia Universidad Católica de Valparaíso, Chile; [3]Universidad Politécnica de Tulancingo, Mexico.* This study uses Digital Holographic Microscopy to compare red blood cells from sickle cell anemia patients under normoxic and hypoxic conditions, aiming to assess morphological and optical changes supporting early diagnostics with unstained samples.

3W1A.2 • 08:45
Overview of Super-Resolution Techniques Suitable for Digital Holographic Microscopy, Sofía Obando-Vásquez[1], Rene Restrepo[2], Carlos Trujillo[2], Ana Doblas[1]; *[1]Univ. of Massachusetts Dartmouth, USA; [2]Universidad EAFIT, Colombia.* We present an overview of super-resolution techniques for quantitative phase imaging (QPI), including Structured Illumination, Speckle Illumination, Fourier Ptychography, and Second-Harmonic Generation microscopy.

3W1A.3 • 09:00
Fast Phase Compensation via Optical Vortex in Telecentric Digital Holographic Microscopy, Karina Ortega[1,2], Rene Restrepo[1], Alfonso Padilla[2], Raul Castaneda[1], Ana Doblas[3], Carlos Trujillo[1]; *[1]Optics and Photonics Laboratory, School of Applied Science and Engineering, Universidad EAFIT, Colombia; [2]Universidad Politécnica de Tulancingo, Mexico; [3]Electrical and Computer Engineering, Univ. of Massachusetts Dartmouth, USA.* A novel method for phase aberration compensation in digital holographic microscopy is presented. The method utilizes an optical vortex to facilitate fast phase correction, thereby avoiding the need for computationally intensive iterative procedures.

3W1A.4 • 09:15
High-Resolution 3D Cell Imaging Using Light-Field Physics-Aware Deep Learning Framework, Xuanwen Hua[1], Keyi Han[1], Shu Jia[1]; *[1]Georgia Tech, USA.* We developed a deep-learning-driven light-field microscope using a physics-aware neural network. We demonstrated the framework with fixed and live cell imaging at a higher resolution and reconstruction speed compared with deconvolution methods.

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08:30 -- 10:30
Room: 504 Foss
IW1D • Computational and Spectral Imaging
Presider: Francisco Imai; Apple Inc., USA

IW1D.1 • 08:30 (Invited)
Label-Free Molecular Imaging of Cells and Their Thermal Diffusion Dynamics, Michelle Y. Sander[1]; [1]*Boston Univ., USA.* Time-resolved mid-infrared photothermal imaging with sub-micron spatial resolution is presented for analyzing the molecular composition and thermal diffusion dynamics of cell and tissue models.

IW1D.2 • 09:00
Multi VCSEL Illumination SFDI for Fast Optical Tissue Property Evaluation, Sidy Ndiongue[1], Jie Jiao[1], Dylan H. Dao[1], Lindsay Kuramoto[1], Ofer Levi[1]; [1]*Univ. of Toronto, Canada.* We demonstrate a rapid (8.2Hz), low speckle-noise SFDI technique using a multiple wavelength vertical-cavity-surface-emitting-laser (VCSEL) illumination. Minimizing light source induced thermal effects improves the measurement error.

IW1D.3 • 09:15 (Invited)
Quantitative Stimulated Raman Scattering Imaging: From Small Molecules to Tissues, Dan Fu[1]; [1]*Univ. of Washington, USA.* Unraveling the complex function of biological systems requires spatially resolved chemical measurements. I will present our efforts in SRS instrumentation and measurements for quantitative analysis of small-molecule drugs and cells in living biological systems.

IW1D.4 • 09:45 (Invited)
Image Restoration Through Inversion by Direct Iteration (InDI), Mauricio Delbracio[1]; [1]*Google LLC, USA.* InDI, a novel supervised image restoration method, avoids "regression to the mean" by iteratively refining images, similar to diffusion models. It achieves state-of-the-art results on diverse tasks. I'll also highlight novel on-device image processing on Google Phones, demonstrating the real-world impact of advanced restoration techniques

IW1D.5 • 10:15
Metasurface-Based Single-Pixel Hyperspectral Imaging, Haitao Nie[1], Yaping Zhao[1], Edmund Y. Lam[1]; [1]*The Univ. of Hong Kong, Hong Kong.* We present a lightweight, filter-based single-pixel hyperspectral imaging system enabled by metasurface and deep learning, achieving high spectral reconstruction fidelity even at low sampling ratios.

08:30 -- 10:30
Room: 505 Queets
DW1C • X-Ray, Electron Holography and Phase Imaging Techniques
Presider: Tatiana Latychevskaia; Paul Scherrer Institut, Switzerland

DW1C.1 • 08:30 (Invited)
3D and Atomic Level Electromagnetic Field Observations by Electron Holography, Toshiaki Tanigaki[1]; [1]*Research & Development Group, Hitachi, Ltd, Japan.* High voltage electron holography microscope with aberration corrector has been developed. Electrons on catalysis nanoparticle has been measured. Observations of magnetic filed

distributions in 3D skyrmion and crystal lattice were realized.

DW1C.2 • 09:00
Complex-Valued Refractive Index Reconstruction With Multi-Slice Beam Propagation, Peter Wagenaar[1], Jeongsoo Kim[1], Shwetadwip Chowdhury[1]; [1]*Univ. of Texas at Austin, USA.* We present a novel reformulation of multi-slice beam propagation to reconstruct 3D *complex-valued* refractive index (RI) towards the goal of RI-tomography in absorptive and multiple-scattering samples. Initial results are shown in absorptive beads.

DW1C.3 • 09:15
Denoising Diffusion Probabilistic Model Applied to Process Speckle Noise in Digital Holography Interferometry, Silvio Montresor[1], Marie Tahon[1], Pascal Picart[1]; [1]*Le Mans Universite, France.* This work presents adaptation of denoising diffusion probabilistic model to process speckle noise which occurs in digital holography. Algorithm is tested on a database constituted with 24 noisy phase maps which traduce DHI conditions.

DW1C.4 • 09:30
Volumetric Refractive Index Imaging via Quantitative Transmission Optical Coherence Diffraction Tomography, Martyna Mazur[1], Wojciech Krauze[1], Arkadiusz Kus[1], Aleksandra Piekarska[1], Malgorzata Kujawinska[1]; [1]*Warsaw Univ. of Technology, Poland.* We introduce qtOCDT, a quantitative volumetric imaging method that combines OCT processing elements with ODT reconstruction algorithms to obtain 3D refractive index distributions of investigated objects in transmission-mode OCT.

DW1C.5 • 09:45
Implementing Transport of Intensity for Unwrapped Phase Retrieval Using Dual Wavelengths, Hammid Al-Ghezi[1], Mohammad AlBaqer Al-Ghezi[1], Partha P. Banerjee[1]; [1]*Univ. of Dayton, USA.* Unwrapped phase retrieval combining concepts of multi-wavelength digital holography (MWDH) and transport of intensity (TI) is obtained by relating the longitudinal displacement between defocused images in TI with the wavelength difference in MWDH.

DW1C.6 • 10:00 (Invited)
X-ray Holographic Nano-Imaging: From Phase Retrieval and Optics to Applications, Tim Salditt[1], Paul Philip Meyer[1]; [1]*Georg-August-Universität Gottingen, Germany.* We address the central challenge how to invert a coherent X-ray near-field hologram, present an approach to achieve super-resolution in X-ray inline holography and show holographic phase retrieval applied in full-field incoherent imaging.

08:30 -- 10:30
Room: 506 Samish
RW1E • Algorithms
Presider: Zhehui Wang; Los Alamos National Laboratory, USA

RW1E.1 • 08:30
Revealing Data Heterogeneity in Large Diffraction Datasets Using 2D Multi-Model EMC, Zhou Shen[1,2], Kartik Ayyer[1,2]; [1]*CNI, Max Planck Inst. for the Structure and Dynamics of Matter, Germany;* [2]*Center for Free-Electron Laser Science, Germany.* X-ray free electron lasers capture single-particle diffraction patterns at scale. We showcase a classification algorithm that

enables online monitoring and heterogeneity analysis, accelerating insights from massive, structurally diverse datasets.

RW1E.2 • 08:45
The 3-Ring Flash X-ray System: Few View Reconstruction Algorithms for 3D Movies of Dynamic Events, Kathryn Harke[1], Finnegan Wilson[2], Anthony J. Hardy[1], Seemeen Karimi[1], Veronica Eliasson[2], Kyle Sullivan[1], Joesph Tringe[1]; *[1]Lawrence Livermore National Laboratory, USA; [2]Colorado School of Mines, USA.* The 3-Ring Flash X-ray System is comprised of fifteen 450-kV flash X-ray sources opposite fifteen digital detectors, spherically arranged with 3-fold symmetry. This system can take a three-frame 3D X-ray movie of dynamic events.

RW1E.3 • 09:00
Tomographic Reconstruction With Two-Energy Synchrotron X-ray for 3D Material Property Phase Retrieval, Heyang (Thomas) Li[1], Kaisi Chen[1]; *[1]Mathematics and Statistics, Univ. of Canterbury, New Zealand.* We extend phase retrieval to dual-energy data using a linear iterative method, boosting signal-to-noise ratio 4 to 6 times and improving low-attenuation material discrimination by density in volume.

RW1E.4 • 09:15
Phase Retrieval and Reconstruction in X-ray Computed Tomography: a Review, Kaisi Chen[1], Heyang (Thomas) Li[1], James Atlas[1]; *[1]Univ. of Canterbury, New Zealand.* Reviews X-ray CT theory, challenges, including artefacts, noise, and low-contrast materials, with maths derivation and evaluation of phase retrieval methods for accuracy and adaptability, and CT recon using traditional and deep learning methods.

RW1E.5 • 09:30
Deep Learning-Based Spatio-Temporal Fusion for High-Speed X-ray Radiography, Songyuan Tang[1], Tekin Bicer[1], Kamel Fezzaa[1], Samuel Clark[1]; *[1]Argonne National Laboratory, USA.* A deep learning-based algorithm is developed and evaluated that can reconstruct simultaneously high-resolution high-framerate X-ray image sequences through spatio-temporal fusion, achieving an average peak signal-to-noise ratio of more than 35 dB.

08:30 -- 10:30
Room: 507 Sauk
CW1B • Coded Imaging Systems and Algorithms
Presider: Liang Gao; Univ. of California Los Angeles, USA

CW1B.1 • 08:30
Proof of Concept for the Simultaneous Improvement of Resolution and Frame Rate Using Coded Aperture Imaging With a Dual Optical System, Masahiro Usui[1], Nobuhiro Kinoshita[1], Teruyoshi Nobukawa[1], Norihiko Ishii[1], Kei Hagiwara[1], Tetsuhiko Muroi[1]; *[1]Science & Technology Research Laboratories, NHK (Japan Broadcasting Corporation), Japan.* We propose a coded aperture imaging system capable of simultaneously capturing images at higher resolutions and frame rates. A dual-optical system that integrates a digital micromirror device with two image sensors can improve image quality.

CW1B.2 • 08:45
Accelerated Deconvolution for Multiplexed Sensor Array Videos Using Neural Networks, Chaoying Gu[1], Kevin C. Zhou[1,2], Laura Waller[1]; *[1]Univ. of California Berkeley, USA; [2]Univ. of Michigan - Ann Arbor, USA.* We present a Fourier-based neural network for a high-throughput imaging system using a diffractive optical element to multiplex a sensor array, enabling parallelizable single-shot reconstruction with up to 30x speedup over iterative methods.

CW1B.3 • 09:00
SMART-SPI: Towards an Integrated Framework for Advanced Computational Single-Pixel Imaging Systems, Marcos A. Obando[1,2], Samuel I. Zapata Valencia[3], Heberley Tobón Maya[3], Lindsey Willstater[4], Tanja Tarvainen[2], Stefano Bonora[5], Jesús Lancis[3], Enrique Tajahuerce[3], Felix Lucka[1]; *[1]Centrum Wiskunde & Informatica, Netherlands; [2]Univ. of Eastern Finland, Finland; [3]Universitat Jaume I, Spain; [4]CNR - Inst. of Photonics and Nanotechnology, Italy; [5]Department of Physics, Politecnico di Milano, Italy.* We introduce SMART-SPI, a framework for efficient integration of advanced experimental and computational research in single-pixel imaging, such as compressed-sensing image reconstruction, and automatic illumination pattern and optics adaptation.

CW1B.4 • 09:15
Compressive Sensing Model for Hadamard-Based Single-Pixel Microscopy Supported by Kernel Density Estimators, Heberley Tobón[1], Samuel I. Zapata Valencia[1], Marcos A. Obando[2], Felix Lucka[2], Enrique Tajahuerce[1], Jesús Lancis[1]; *[1]Universitat Jaume I, Spain; [2]Centrum Wiskunde & Informatica, Netherlands.* A statistical compressive sensing model for Hadamard-based single-pixel microscopy (HSPM) is constructed using kernel density estimators on a data base of microscopy images. The model's performance is evaluated using a HSPM experimental set-up.

CW1B.5 • 09:30 (Invited)
Title to be Announced, Charles A. Bouman[1]; *[1]Purdue Univ., USA.* Abstract not available.

CW1B.6 • 10:00 (Invited)
Title to be Announced, Xin Yuan[1]; *[1]Westlake Univ., China.* Abstract not available.

10:30 -- 12:00
Room: Elwha Ballroom
JW2A • Joint Posters Session II

JW2A.1
Novel Principles and Technologies for Near-Infrared Static Interference Imaging of Mars Atmospheric Wind Field, Chunmin Zhang[1], Dingyi Wang[3], Zhengyi chen[2]; *[1]Xi'an Jiaotong Univ., China; [2]Xi'an Jiaotong Univ., China; [3]Univ. of New Brunswick, Canada.* Novel principles and technologies for near-infrared static interference imaging of Mars atmospheric wind field.

JW2A.2
Single-Pixel Image-Free Object Localization Based on Global Search, Suqin Nan[2], Yang Guo[2], Shuming Jiao[1], Zhibing Zhang[2], Xuanpengfan Zou[3], Lin Luo[2], Wei Tan[3], Xianwei Huang[3], Yanfeng Bai[3], Xiquan Fu[3]; *[1]Great Bay Univ., China; [2]Hunan Univ. of Technology and Business, China; [3]Hunan Univ., China.* We propose a single-pixel image-free object localization method

based on global search (SPIF-GSOL). The localization is realized by target matching with a transformed template in an unknown scene.

JW2A.3
Efficient Integration of Finite Transducer Size in Model-Based Radiation-Induced Acoustic Computed Tomography, Christy Chan[1], Prabodh Pandey[1], Liangzhong Xiang[1]; [1]*Univ. of California Irvine, USA.* Conventional RACT assumes point detectors, ignoring finite size and directionality. We introduce a semi-analytic model with a precomputed look-up table to efficiently account for transducer size without costly sub-detector approximations.

JW2A.4
Subpixel-Resolution in Digital Lensless Microscopy, Ritish Kamboj[1], Satish K. Dubey[1]; [1]*Indian Inst. of Technology Delhi, India.* We present a simulation study demonstrating subpixel-resolution phase retrieval in lensless microscopy by modeling pixel binning and object support constraints, enabling accurate recovery from highly undersampled diffraction intensity measurements.

JW2A.5
Development of Improved Holographic Modal Wavefront Sensor, Anitta Jomy[1], Amritha Jayan[1], Dinesh N Naik[1], Biswajit Pathak[1]; [1]*IIST, India.* In this paper, we propose an improved version of holographic modal wavefront sensing (HMWS) method based on five-point analysis with condition on intensity for better wavefront estimation with reduced crosstalk, compared to the conventional HMWS.

JW2A.6
Compressed Sensing Phase Estimation in Patterned Illumination Microscopy, Lindsey Willstatter[1,2], Heberley Tobón Maya[3], Samuel I. Zapata Valencia[3], Stefano Bonora[1], Jesús Lancis[3], Enrique Tajahuerce[3]; [1]*Istituto di Fotonica Nanotecnologie CNR, Italy;* [2]*Department of Physics, Politecnico di Milano, Italy;* [3]*Universitat Jaume I, Spain.* This paper investigates how compression techniques enhance spatial wavefront sampling, enabling more efficient estimation of system aberrations in both square and polar Hadamard representations.

JW2A.7
Multispectral Extended Depth-of-Field Imaging via Stochastic Wavefront Optimization, Exequiel E. Oliva[1], Nelson Díaz[1], Samuel Pinilla[2], Esteban Vera[1]; [1]*PUCV, Chile;* [2]*Science and Technology Facilities Council, Rutherford Appleton Laboratory, UK.* This work presents a multispectral diffractive optical element design for extended depth-of-field imaging. Using stochastic optimization the proposed approach enhances spectral fidelity and depth invariance, outperforming state of the art methods.

JW2A.8
Ptychographic Wavefront Sensing With a Camera Array and Diffraction Grating, Gregory Nero[1], Xiao Wang[1], Andre Van Rynbach[2], David Brady[1]; [1]*Wyant College of Optical Sciences, Univ. of Arizona, USA;* [2]*Sensors Directorate, Wright-Patterson, Air Force Research Laboratory, USA.* A nine-aperture camera array which captures field information through a common diffraction grating is deployed to achieve ptychographic wavefront estimation and dynamic refocusing of a converging beam through a circular planar object.

JW2A.9
Enhanced Image Analysis With CNN Integration for Tracking Porphyromonas Gingivalis Outer Membrane Vesicle Dynamics, Seohyun Lee[1], Hideaki Ota[1], Hideo Higuchi[2], Takehiro Yamaguchi4[3], Ryoma Nakao[3]; *[1]Univ. of Tokyo, Japan; [2]Tohoku Univ., Japan; [3]National Inst. of Infectious Diseases, Japan.* In this study, a CNN-integrated method combining DBSCAN and polar co- ordinate conversion was developed to track P. gingivalis OMV dynamics and endocytosis, providing insights into their intracellular transport and potential impact on host cells.

JW2A.10
Compressive Analyzer for Transmission and Scattering Spectra and Fluorescence Dynamics, Lukas Klein[1,2], Karel Zidek[2]; *[1]Technical Univ. of Liberec, Czechia; [2]Regional Centre for Special Optics and Optoelectronic Systems (TOPTEC), Inst. of Plasma Physics of the Czech Academy of Sciences, Czechia.* We showcase a versatile single-pixel camera system for multidimensional imaging. With simple light source and detector changes and no sample movement, transmission, scattering, and fluorescence dynamics can be characterized within the same area.

JW2A.11
Regularization Filter Passband Width Improvement on Quantitative Phase Imaging for Biological Assays in MS-TIE, Alejandro Silva[1], Miguel Arocena[1], Julia Alonso[1]; *[1]Universidad de la Republica, Uruguay.* We propose a modification to Quantitative Phase Imaging methods based on TIE, focusing on optimizing the regularization filter's passband width to achieve improved phase retrieval performance in biological imaging applications.

JW2A.12
Deep-Learning-Driven Metalens Array Encoder for Snapshot Hyperspectral Imaging, Yeongmyeong Park[1], Taewon Choi[1], Youngjin Kim[1], Hyeongyu Choi[1], Haesung Lee[1], Yoonchan Jeong[1]; *[1]Seoul National Univ., Korea (the Republic of).* We propose a metasurface-based snapshot hyperspectral imaging system that encodes spatial phase and spectral information and reconstructs spectral images using an E2E optimized dual-branch network, achieving superior accuracy over baselines.

JW2A.13
Securing Multiple Images Using Discrete Cosine Transform and Arnold Transform, Rahul Kumar[1], Sonu Kumar Rao[1], Naveen K. Nishchal[1], Ayman Alfalou[2]; *[1]Indian Inst. of Technology Patna, India; [2]L@B ISEN YNCREA, France.* This paper proposes a multi-image encryption method combining Arnold transform and discrete cosine transform with enhanced robustness and resistant against cryptographic attacks.

JW2A.14
Object Tracking Using Chirp-Encoded Non-Linear Fringe-Adjusted Joint Transform Correlator, Jyoti Bikash Mohapatra[1], Akash Pal[1], Naveen K. Nishchal[1]; *[1]Indian Inst. of Technology Patna, India.* This study introduces chirp encoding into non-linear fringe-adjusted joint transform correlator to produce a single correlation peak per matching. The chirp function refines peak defocusing, enhancing tracking ability under complex backgrounds.

JW2A.15
Compact Depth-Enhanced Light Field Camera System Using Electrically Tunable Geometric Phase Lens Module, Hak Rin Kim[2,1], Hyeon-Su Jeong[2], Munkh-Uchral Erdenebat[3,4], Jin-Hyeok Seo[2], Min-Seok Kim[2], Young-Min Cho[2], Jae-Won Lee[3], Jun-Mo Lee[1], Tae-Hyun Lee[2,5], Kyung-Il Joo[5]; *[1]School of Electronics Engineering, Kyungpook National Univ., Korea (the Republic of); [2]School of Electronic and Electrical Engineering, Kyungpook National Univ., Korea (the Republic of); [3]Center for Semiconductor-Specialized Univ., Kyungpook National Univ., Korea (the Republic of); [4]School of Information and Communication Engineering, Chungbuk National Univ., Korea (the Republic of); [5]Spatial Optical Information Research Center, Korea Photonics Technology Inst., Korea (the Republic of).* We propose a compact geometric phase lens-based light-field camera that achieves full-color, depth-enhanced imaging by actively tuning focus and compensating chromatic aberration, overcoming depth range limits in conventional LF systems.

JW2A.16
Non-Uniformity Correction and Temperature Estimation With Physical Prior, Navot Oz[1,2], Omri Berman[1,2], Nir sochen[3], David Mendlovic[2], Iftach Klapp[1]; *[1]Volcani Inst Agricultural Research Ctr, Israel; [2]EE, Tel-Aviv Univ., Israel; [3]Applied Math, Tel-Aviv Univ., Israel.* : This work jointly estimated estimates temperature and corrects nonuniformity in low-cost thermal cameras. Single and multi-image physical aware deep learning approaches are presented. Results show error of less than 0.5 C on real data.

JW2A.17
Grid-Based 3D U-Net for Robust Light-Sheet Microscopy Deconvolution, Hakki Motorcu[1], Mujdat Cetin[1]; *[1]Univ. of Rochester, USA.* Spatially varying blur and mixed Poisson-Gaussian noise degrade light-sheet microscopy measurements. We introduce a physics-informed 3D U-Net that leverages a PSF grid as an explicit prior, robustly restoring fine details from degraded measurements.

JW2A.18
AnyAtom: Domain-Randomized Atomic Priors for Electron Tomography, Krishna Mani[1], Nalini M. Singh[1], Tiffany Chien[1], Colin Ophus[2], Laura Waller[1]; *[1]UC Berkeley, USA; [2]Stanford Univ., USA.* We present a method for atomic structure recovery from limited-angle tomographic volumes using a general atomic prior learned from randomized synthetic data. Our model robustly removes artifacts and generalizes to diverse structures.

14:30 -- 16:30
Room: 503 Duckabush
DW3A • Contemporary Topics in Digital Holography and 3D Imaging II
Presider: Naveen Nishchal; Indian Inst. of Technology Patna, India

DW3A.1 • 14:30
3D-DeepZern: a Deep Convolutional Neural Network for Tomographic Reconstruction Based on Zernike Polynomials, Quang S. Trieu[1], Dominick Rizk[1], George Nehmetallah[1]; *[1]Catholic Univ. of America, USA.* We propose a deep learning-based Zernike polynomial method to encode a 3D tomogram into a 1D vector and decode it to reconstruct the tomogram, offering faster and less memory consuming than the Zernike analytical one.

DW3A.2 • 14:45 (Tutorial)
Computational 3D Fluorescence Microscopy, Laura Waller[1]; [1]*Univ. of California Berkeley, USA.* This tutorial will review and compare methods for capturing 3D fluorescence information in a microscope, with a particular focus on computational single-shot methods (e.g. light field, PSF engineering).

DW3A.3 • 15:45 (Keynote)
Faster, Smaller, Darker: Optical Physics and Data Science Coming Together to Image Under Extreme Conditions, George Barbastathis[1]; [1]*Massachusetts Inst. of Technology, USA.* Abstract not available.

14:30 -- 16:30
Room: 504 Foss
RW3D • Particle Radiography
Presider: Hui Chen; Lawrence Livermore National Laboratory, USA

RW3D.1 • 14:30 (Invited)
Enhanced Neutron Radiographic Capability Using MJ-Class Dense Plasma Focus, Clément Goyon[1], Owen Drury[1], Amanda Youmans[1], Jaebum Park[1], Sophia Rocco[1], Andrew Cigal[1], Anthony Link[1], Justin Sin[1], Dennis Han[1], James Walters[1], Adura Jibodu[2], Steven Chapman[1], Andréa Schmidt[1], Christopher Cooper[1]; [1]*Lawrence Livermore National Laboratory, USA;* [2]*Mechanical engineering, Stanford, USA.* The MJOLNIR radiography platform at LLNL combines neutron bursts lasting tens of nanoseconds with an advanced imaging system. Enhancements to scintillation, intensification, coupling, and readout enable radiographs in high-radiation environments with improved precision and reliability.

RW3D.2 • 15:00 (Invited)
Time of Flight Positron Emission Tomography With Depth of Interaction Identification, Marco Pizzichemi[1]; [1]*Council Europeenne Recherche Nucleaire, Switzerland.* Scintillators play a crucial role in metabolic imaging techniques, such as Positron Emission Tomography (PET). We will discuss their impact on the current frontier of PET, combining timing resolution and depth of interaction identification.

RW3D.3 • 15:30
Material Strength Measurements in Novel Strain and Strain Rate Regimes Using Proton Radiography, Sky K. Sjue[1], Alexander Ames[1], Jeremy Danielson[1], Christopher Morris[1], JeeYeon Plohr[1], Elise Tang[1], Zhaowen Tang[1]; [1]*Los Alamos National Laboratory, USA.* We estimate the potential of proton radiography at Los Alamos to measure the strength (flow stress) of metals at extreme strains and strain rates using multiple experimental platforms, including realistic experimental uncertainties.

RW3D.4 • 15:45
Overview and Current Status of Neutron Imaging at Oak Ridge National Laboratory, James R. Torres[1], Yuxuan Zhang[1], Jean-Christophe Bilheux[1], Shimin Tang[1], Chen Zhang[1], Harley Skorpenske[1], Roger Hobbs[1], Kevin Yahne[1], Singanallur Venkatakrishnan[1], Hassina Bilheux[1]; [1]*Oak Ridge National Laboratory, USA.* Neutron imaging is a non-destructive technique used to study the internal structure and composition of various materials. Enclosed is

an overview of the current ORNL imaging capabilities that support materials research.

RW3D.5 • 16:00 (Invited)
Frontiers in Neutron Radiography: Neutron Particle Imaging and Detection With Optical Based Timepix Sensors, Alexander M. Long[1], Adrian S. Losko[2], Tsviki Y. Hirsh[4], Alexander Wolfertz[2], Tim T. Jäger[3], Sven C. Vogel[1]; *[1]Los Alamos National Laboratory, USA; [2]Forschungs-Neutronenquelle Heinz Maier-Leibnitz, Germany; [3]Technische Universität Darmstadt, Germany; [4]Soreq NRC, Israel.* This work presents an optical-based Timepix sensor system for neutron imaging, combining event-mode data acquisition with unparalleled temporal and spatial precision. Its modular design enables diverse applications, advancing neutron radiography across materials science, nuclear engineering, and industrial research.

14:30 -- 16:30
Room: 505 Queets
DW3C • Digital Holographic Techniques for Bio-Imaging II
Presider: Lisa Miccio; Inst. of Intelligent Systems ISASI, Italy

DW3C.1 • 14:30
Confocal Holographic Scanning Microscope: Design and Implementation on the Base of Olympus, Yuri Zakharov[1], Xuejun Zhang[1], Umar Khan[1], Lev T. Perelman[1]; *[1]Harvard Univ., USA.* We present a new confocal holographic scanning microscope. An insert to Olympus FV-1000 microscope convert it to holographic one. Wave front reconstruction allows to get phase map and refractive index of living cells refocusing along the sample.

DW3C.2 • 14:45 (Keynote)
Strategies for Exploiting Multiple Scattering Information in Holographic Imaging, Lei Tian[1]; *[1]Boston Univ., USA.* Abstract not available.

DW3C.3 • 15:30
Correlative Common-Path Refractive Index Tomography and Fluorescence of Organoid, Pawel Goclowski[1], Julianna Winnik[2], Vishesh Dubey[1], Piotr Zdankowski[2], Maciej Trusiak[2], Ujjwal Neogi[3], Mukesh Varshney[3], Balpreet S. Ahluwalia[1], Azeem Ahmad[1]; *[1]Physics and Technology, The Arctic Univ. of Norway, Norway; [2]Mechatronics, Warsaw Univ. of Technology, Poland; [3]Laboratory Medicine, Karolinska Inst.t, Sweden.* We present a novel approach to refractive index tomography, based on lateral shearing common path interferometry. Method effectively suppresses multiple scattering and is well suited for imaging of heterogeneous, highly scattering organoid samples.

DW3C.4 • 15:45 (Invited)
From Phase to Cell Phenotypes: DHM and AI Advancing Neuropsychiatric Diagnostics, Pierre M. Marquet[1]; *[1]Université Laval, Canada.* Using advanced DHM technologies like polychromatic DHM, we extract ultra-low-noise quantitative phase signals that reveal disease-specific cellular phenotypes; AI now replicates this signal without complex optics, opening new avenues for scalable, accessible neuropsychiatric diagnostics.

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Disclaimer: this guide is limited to technical program with abstracts and author blocks as of 08 August. For updated and complete information with special events, reference the online schedule or mobile app.

14:30 -- 16:30
Room: 506 Samish
PW3E • Propagation and Ground-to-Space Applications
Presider: Dario Perez; Pontificia Univ Catolica de Valparaiso, Chile

PW3E.1 • 14:30 (Invited)
Advanced Laser Beacon Research for Atmospheric Turbulence Sensing, Lauren Schatz[1]; [1]*US Air Force Research Laboratory, USA.* In our investigation we explore different wavefront sensing techniques in simulation and in hardware to maximize turbulence sensing. In this proceedings we detail the work that has been performed so far, which includes initial results of end-to-end simulations and the design and comissioning of a new LGS-ExAO testbed at SOR.

PW3E.2 • 15:00
Turbulence Correction by Conjugated Beacon Waves, Mikhail Charnotskii[1]; [1]*Independent researcher, USA.* Wave optics simulation used to calculate mean irradiance of beams corrected by beacon conjugation. Simulations confirm earlier theoretical calculations. Mean irradiance has Strehl ratio one with two-scale profile for deep turbulence conditions.

PW3E.3 • 15:15
Experimental Validation of Anisoplanatism Measurement Error on Extended Source, Mathieu Esclingand[1], Nicolas Vedrenne[1], Yann Lai-Tim[1], Vincent Michau[1], Thierry Fusco[1]; [1]*ONERA, France.* Anisoplanatism limits the performance of adaptive optics in atmospheric focusing. We experimentally characterize the effect of anisoplanatism on Shack-Hartmann wavefront sensing and compare our results with predictions from an analytical model.

PW3E.4 • 15:30
Anisoplanatism Reduction Demonstration Using Binary Star Measurements, Perrine Lognoné[1], Richard Wilson[1], James Osborn[1]; [1]*Durham Univ., UK.* We demonstrate angular phase estimation from on-axis phase and intensity measurements and statistical priors using binary star Shack-Hartmann data. Applied to pre-compensated GEO-Feeder links, this technique can boost reliably achievable data rates.

PW3E.5 • 15:45
Compact Indoor Test Range Design for Atmospheric Sensors, Jason D. Schmidt[1]; [1]*MZA Associates Corporation, USA.* The development cycle of optical instruments that operate over long propagation paths outdoors can benefit from indoor testing. This paper describes general principles for building a scaled indoor test range with controlled conditions.

PW3E.6 • 16:00 (Invited)
Quantifying Atmospheric Effects on Optical Propagation, Leda Sox[1], Christopher Valenta[1], Don Harris[1]; [1]*Georgia Tech Research Inst., USA.* A subset of sensing techniques that provide quantitative measurements of parameters relevant to optical propagation through the atmosphere will be presented in this talk.

2025 Optica Imaging Congress Session Guide

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14:30 -- 16:30
Room: 507 Sauk
CW3B • 3D Computational Imaging
Presider: Liang Gao; Univ. of California Los Angeles, USA

CW3B.1 • 14:30 (Invited)
Interferometric Multi-Beam Photon-Counting Fourier-BASIS Computational Imaging Lidar, Kelvin H. Wagner[1], Kai-Ting Ting[1], Channing Philbrick[1], Dan Feldkhun[1,2]; *[1]ECE, Univ. of Colorado Boulder, USA; [2]LambdaMetrics, USA.* Multi-beam interferometric Fourier-BASIS computational imaging in the single-photon regime provides a new type of quantum enhancement of the sensitivity of a LIDAR without entanglement since each received photon click encodes multiple simultaneous complex measurements.

CW3B.2 • 15:00
Fourier-Basis Active Structured Illumination Sensing (F-BASIS) Computational Lidar Imaging Through Time-Varying Turbulence, Channing Philbrick[1,2], Michael Brand[1], Daniel Feldkhun[1,3], Kelvin H. Wagner[1], William Rhodes[4]; *[1]Univ. of Colorado Boulder, USA; [2]BAE Systems Space & Mission Systems, USA; [3]Lambdametrics LLC, USA; [4]Florida Atlantic Univ., USA.* We demonstrate the high-quality reconstruction of a remote target imaged through time-varying optical turbulence using a compact crossed acousto-optic device implementation of the F-BASIS computational lidar imaging technique.

CW3B.3 • 15:15
Hardware-Aware Coding Function Design for Compressive Single-Photon 3D Cameras, David E. Parra[1], Felipe Guiterrez-Barragan[2], Trevor Seets[1], Andreas U. Velten[1]; *[1]Univ. of Wisconsin Madison, USA; [2]Independent Researcher, USA.* Single-photon 3D camera practicality is limited by hardware. In-sensor coding addresses data rates, yet underperforms under illumination constraints. We present a coding design that outperforms current codes while adhering to hardware constraints.

CW3B.4 • 15:15
Range Chatter Reduction in Depth Imagery by Using a Synthetic Imaging Technique, Ganesh D. Petterson[1], Matthias T. Banet[2], James R. Fienup[1]; *[1]Univ. of Rochester, USA; [2]US Air Force Research Laboratory, USA.* We demonstrate a technique which exploits knowledge of speckled pupil-plane fields to reduce “range chatter” for different facets of a moving object in coherent 3-D imaging. Resultant images are recombined using a synthetic imaging technique.

CW3B.5 • 15:30
High-Resolution Multimodal Tomography With a Plenoptic Hard X-Ray Laboratory System, Shiqi Xu[1], Rachna Parwani[1], Nathan Johnson[1], Felix Wechsler[3], Andrea Bertoncini[4], Gerhard Krampert[1], Marie-Christine Zdora[2], Matthew Andrew[1]; *[1]Zeiss, USA; [2]Monash Univ., Australia; [3]EPFL, Switzerland; [4]Nanoscribe, Germany.* We report a lab-based high-resolution tomography system for simultaneous retrieval of absorption, phase, and darkfield signals in the hard X-ray spectrum.

CW3B.6 • 15:45
Correlation Tomography for Measuring 3D Air Turbulence, Tolga Gurcan[1], Shaurya Aarav[2], Jason Fleischer[1]; *[1]Princeton Univ., USA; [2]Sorbonne Universite, France.* We add depth

resolution to Background Oriented Schlieren by introducing a second synchronized camera. Two-point correlations of displacements measured from both views enable spatial localization of turbulence.

CW3B.7 • 16:00
Ellipsometric Characterization of Copper Nitride: Depth Profiling of Optical Constants, Manuel Ballester[1], Almudena Marquez[2], Eduardo Blanco[2], Jose Manuel Manuel[2], Maria Isabel Rodriguez-Tapiador[3], Susana Fernandez[3], Florian Willomitzer[4], Aggelos Katsaggelos[1], Emilio Marquez[2]; *[1]Northwestern Univ., USA; [2]Univ. of Cadiz, Spain; [3]CIEMAT, Spain; [4]Univ. of Arizona, USA.* This work presents a ellipsometry analysis of Cu3N films. We employ a multi-oscillator dispersion model to determine a parameterized complex refractive index, given as a function of film depth, revealing spatially dependent optoelectronic properties.

17:00 -- 18:30
Room: 503 Duckabush
DW4A • Contemporary Topics in Digital Holography and 3D Imaging III
Presider: George Nehmetallah; Catholic Univ. of America, USA

DW4A.1 • 17:00 (Invited)
Breaking the Speed Barrier: High-Speed Light-Field Microscopy for Kilohertz to Terahertz 3D Imaging, Liang Gao[1]; *[1]Univ. of California Los Angeles, USA.* Light-field microscopy provides powerful sub-cellular 3D visualization but historically suffers speed limitations from large data acquisition. I'll discuss our computational optics innovations enabling volumetric imaging at kilohertz to terahertz frame rates.

DW4A.2 • 17:30
Correction of Inter-Frame Translational Motion in Optical Diffraction Tomography, Jeongsoo Kim[1], Shwetadwip Chowdhury[1]; *[1]Univ. of Texas at Austin, USA.* We propose a 3D space-time inverse-scattering framework for motion-corrected optical diffraction tomography by jointly reconstructing the sample's 3D refractive index and estimating its translational motion during data acquisition.

DW4A.3 • 17:45
Ray Tracing and Physical Optics Based Simulator for Digital Holographic Microscopy, Paul Parant[2,1], François Paquet-Mercier[1], Pierre M. Marquet[2,1], Simon Thibault[2]; *[1]Brain Research Center CERVO, Canada; [2]Centre d'Optique Photonique et Laser, Université Laval, Canada.* This work introduces a simulation pipeline for digital holographic microscopy that integrates ray tracing, optical modeling, hologram generation, digital processing, and phase reconstruction using Ansys Zemax OpticStudio.

DW4A.4 • 18:00 (Invited)
Advances in 3D Tomographic Phase Microscopy, Peter So[1]; *[1]Massachusetts Inst. of Technology, USA.* Abstract not available.

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17:00 -- 18:45
Room: 504 Foss
IW4D • Image Computation and Machine Learning
Presider: Peter Catrysse; Stanford Univ., USA

IW4D.1 • 17:00 (Invited)
Scalable Machine Learning Based Image Segmentation and Analysis Pipelines, Caleb R. Stoltzfus[1]; [1]*Alpenglow Biosciences, USA.* To meet the demands of clinical and pharma imaging, we combine light-sheet microscopy with intelligent segmentation pipelines, enabling scalable scout/zoom workflows and robust feature extraction from complex 3D human datasets.

IW4D.2 • 17:30
Deep Learning Segmentation of Wrapped Phase Images, Don Bonifacio[1], Laterriean M Minaya[1], Xuan Liu[1]; [1]*New Jersey Inst. of Technology, USA.* Phase-resolved microscopy enables imaging of live cells. Segmentation of quantitative phase images faces challenges due to phase wrapping artifacts. We developed a phase-augmented deep learning approach to segment cells from wrapped phase images.

IW4D.3 • 17:45
Visually Undetectable Real-World Attacks on CMOS Sensors for Deep Neural Networks, Adir Hazan[1], Zvi Stein[1], Adrian Stern[1]; [1]*Ben-Gurion Univ. of the Negev, Israel.* We overview a recent invisible optical adversarial attack that exploits the rolling shutter effect in CMOS cameras. Using designed light pulses, we disrupt DNN performance while satisfying photopic invisibility in real-world physical settings.

IW4D.4 • 18:00
Tunable 3D Structured Illumination Microscopy (TSIM) System With Fast Single-Slice Processing, Arash Atibi[1], Abdulaziz Alqahtani[1], Chrysanthe Preza[1]; [1]*Univ. of Memphis, USA.* The novel incoherent-illumination TSIM system, with plug-and-play processing, enhances lateral resolution and optical sectioning, reducing data and time compared to the traditional 3-wave interference 3D-SIM system's 3D processing.

IW4D.5 • 18:15
Complementarity of Telescope Diameters for Space Surveillance : the PROVIDENCE Case, Nicolas Vedrenne[1], Cyril Petit[1], Pierre-Louis Mayeur[1], Ugo Tricoli[1], Yves-Michel Frédéric[1], Romain Fétick[1], Jean-François Sauvage[1], Frédéric Cassaing[1], Thomas Advani[1], Pierre-Emmanuel Haensler[1], Axel Vincent-Randonnier[1], Thierry Fusco[1]; [1]*ONERA, France.* For the PROVIDENCE project, the joint exploitation of high resolution images provided by a multi-meter telescope, a fine space scene model, and low resolution information from a network of small-diameter telescopes is being analyzed.

IW4D.6 • 18:30
Compact Spectral Camera With Deep Learning-Enabled Spectrum Decoding, Jingyan Chen[1], Yuqing Cao[1], Yuxing Li[1], Yanmin Zhu[1], Edmund Y. Lam[1]; [1]*Univ. of Hong Kong, Hong Kong.* We present a compact system for capturing spectral images with low cost and miniaturized setup. The system is capable of effectively decoding three-dimensional data across 450 spectral channels without requiring any pre-collimation.

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17:00 -- 18:30
Room: 505 Queets
DW4C • Applications of Digital Holography and 3D Imaging IV
Presider: Yuan Luo; National Taiwan Univ., Taiwan

DW4C.1 • 17:00 (Keynote)
Motion-Compensated 3D Digital Holography Through Turbulence, James R. Fienup[1]; [1]*Univ. of Rochester, USA.* Chirped-frequency digital holography produces 3-D images. Target-motion-induced blurring in range can be corrected using the dual-frequency pilot-tone approach. Atmospheric-turbulence-induced anisoplanatic blurring in the transverse dimensions can be corrected using image sharpening algorithms.

DW4C.2 • 17:45
Diffraction-Based Simulator to Appraise Target Image Quality in Fourier Transform Deflectometry, Kyu-Taek Kim[1,2], Nicolas Colin[3], Mourad Bentahar[1], Pascal Picart[1]; [1]*Le Mans Universite, France;* [2]*IRT Jules Verne, France;* [3]*Nantes Universite, France.* This paper presents a numerical simulator to appraise the quality of images from the target in deflectometry. The simulator enables roughness and surface slopes to be taken into account.

DW4C.3 • 18:00 (Invited)
Mid-Infrared Coded Aperture Holography, Vijayakumar Anand[1], Agnes Pristy Ignatius Xavier[1], Molong Han[2], Daniel Smith[2], Soon Hock Ng[2], Jitraporn Vongsvivut[3], Joseph Rosen[4], Saulius Juodkazis[2]; [1]*Tartu Ülikooli, Estonia;* [2]*Swinburne Univ. of Technology, Australia;* [3]*ANSTO, Australia;* [4]*Ben Gurion Univ. of the Negev, Israel.* The mid-infrared (MIR) region remains one of the least accessible for realizing holography with spatially incoherent light sources. This work discusses advancements in coded aperture MIR incoherent holography concepts over the past five years.

17:00 -- 18:30
Room: 506 Samish
PW4E • Aerosols
Presider: Santasri Bose-Pillai; Air Force Inst. of Technology, USA

PW4E.1 • 17:00 (Invited)
Practical Aerosol MTF: Imaging for Various Atmospheric and Instrumentation Conditions, Natan S. Kopeika[1], Arkadi Zilberman[1]; [1]*School of Electrical and Computer Engineering, Ben-Gurion Univ. of the Negev, Israel.* AbstraPractical aerosol MTF emphasizes how spatial cutoff frequency may change due to scattering/extinction and instrumentation limitations (field-of-view, detector dynamic range, finite spatial frequency bandwidth). Various instrumentation and aerosol situations are considered.

PW4E.2 • 17:30
Estimation of Atmospheric Extinction From Vertical Profiles of Black Carbon Using Balloon-Borne Observations, Sunilkumar K[1], Ajay A[1], Anand N. Sarma[2], Krishnamoorthy K[1], Satheesh S. K.[1]; [1]*Indian Inst. of Science, India;* [2]*IISER, Thiruvananthapuram, India.* We present balloon-borne black carbon vertical profiles over a tropical region and derive extinction coefficients using Mie scattering model. These observations could improve optical channel

characterization and WRF-Chem modelled aerosol profiles.

PW4E.3 • 17:45
Comparison of Aerosol Dynamics During Normal Diurnal and Eclipse Events, Steven Hernandez[2], Melissa K. Beason[1], Steven Fiorino[1], Kevin Keefer[1], Darren Holland[1]; *[1]Air Force Inst. of Technology, USA; [2]Defense Threat Reduction Agency, USA.* Analyzing four datasets, we investigate relationship between aerosol concentration, geometric mean diameter and turbulence. Measurements from locations experiencing totality during US 2024 eclipse are compared to those from normal solar events.

PW4E.4 • 18:00 (Invited)
Unique Correlation of Aerosol Chemical Speciation and Optical Effects, Marilyn Dunbar[2,1], Tony Hostutler[2], Steven Fiorino[1], Kevin Keefer[1]; *[1]Air Force Inst. of Technology, USA; [2]Air Force Research Laboratory, USA.* Atmospheric radiative effects are heavily influenced by ambient aerosol loading, size and composition. Aerosol physio-chemical properties and size distribution were measured using a variety of instruments to correlate their physical and optical properties.

17:00 -- 18:30
Room: 507 Sauk
CW4B • Computational Displays and Cameras
Presider: Chris Metzler; Univ. of Maryland at College Park, USA

CW4B.1 • 17:00 (Invited)
Sensing and Display Tradeoffs in Augmented Reality, Scott C. McEldowney[1]; *[1]Consultant, USA.* I'll examine the challenges in developing consumer AR, focusing on the compounded tradeoffs in display and sensing systems, and explore how new modalities like polarization could offer architectural advantages.

CW4B.2 • 17:30
A Physical Camera Model for Object Tracking Through Pancake Display in XR Headset, Chien-Hung Lu[1], Liying Chi[1], Xilong Wang[1], Hui Wang[1], Shuai Dong[1], Xiang Long[1], Junliang Shan[1], Bowei Zhang[1]; *[1]Bytedance, USA.* A camera model is proposed for tracking applications on XR devices. The model utilizes display parameters and near-infrared camera lenses for efficient optimization, improving 27.5% of testing error over the prior art.

CW4B.3 • 17:45
Compact Lensless Eye Tracker Based on Polarization-Multiplexed Point Spread Function Design, Changyoon Yi[1,2], Hyeonyong Lee[1,2], Taeyoung Kim[1], Kyung Chul Lee[3,2], Nakkyu Baek[1,2], Joonsik Park[1,2], Yong Guk Kang[3,2], Kyunghoon Jung[2], Yimin Ding[4], Yatong An[4], Seung Ah Lee[3]; *[1]School of Electrical and Electronic Engineering, Yonsei Univ., Korea (the Republic of); [2]School of Mechanical and Aerospace Engineering/SNU-IAMD, Seoul National Univ., Korea (the Republic of); [3]Department of Mechanical Engineering, Seoul National Univ., Korea (the Republic of); [4]Meta Reality Labs, USA.* We propose a compact lensless eye tracker that simultaneously extracts glint and pupil features using a polarization-multiplexed point spread function, enabling raw-domain glint localization and pupil reconstruction for accurate gaze estimation.

CW4B.4 • 18:00
Near-Real Time Stitching for a Multifocal Camera Array, Adel Al-Ghazwi[1], Gordon Hageman[1], Kimberly Doty[1], David J. Brady[1]; [1]*Univ of Arizona, Coll of Opt Sciences, USA.* We demonstrate a proof-of-concept for near-real-time stitched video from a multi-focal heterogeneous camera array. Hardware acceleration enables high-resolution panoramic frames at ~5 frames per second, demonstrating feasibility for streaming.

CW4B.5 • 18:15
Camera Against Display: an Automated and Precise Mutual Photometric Calibration Method, Ruixiang Chai[1], Jipeng Sun[2], Jack Tumblin[1]; [1]*Northwestern Univ., USA;* [2]*Department of Computer Science, Princeton Univ., USA.* We present a calibration method that controls camera-display pair to assess their photometric response functions. Our fully automated process balances the duration with increased accuracy and includes temperature correction for improved reliability.

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Thursday, 21 August

08:30 -- 10:30
Room: 503 Duckabush
DTh1A • AI in Digital Holographic Techniques for Bio-Imaging
Presider: George Nehmetallah; Catholic Univ. of America, USA

DTh1A.1 • 08:30 (Invited)
Deep Learning Holography for Realtime Biological Particle Analysis, Jiarong Hong[1]; [1]*Univ. of Minnesota Twin Cities, USA.* We present deep learning-enabled digital inline holography for scalable, real-time, label-free analysis of rare biological particles, including circulating tumor cells for cancer diagnostics using patient blood and microbial contaminants for sterility monitoring in pharmaceutical products.

DTh1A.2 • 09:00
Deep Learning for Projection Correction in Single-Shot Holographic Tomography, Michal T. Gontarz[1], Arkadiusz Kus[1], Malgorzata Kujawinska[1]; [1]*Warsaw Univ. of Technology, Poland.* Single-Shot Holographic Tomography enables fast quantitative analysis of an object's refractive index but is prone to errors caused by overlapping spectra of multiplexed projections. The paper proposes a DL-based solution for correcting these errors.

DTh1A.3 • 09:15 (Keynote)
Recent Advancements in Holotomography, in Vivo Mouse Brain Imaging, and the Application of Artificial Intelligence, YongKeun Park[1]; [1]*Korea Advanced Inst of Science & Tech, Korea (the Republic of).* Abstract not available.

08:30 -- 10:30
Room: 504 Foss
lTh1D • Advances in Biomedical In Vivo Imaging II
Presider: Kristina Irsch; Institut De La Vision Paris, France

lTh1D.1 • 08:30
A Deep Ultraviolet-Excited Fluorescence Imaging System for Rapid Assessment of Large Tissue Specimens, Tongtong lu[1], Tianling Niu[2], David Helminiak[3], Julie Jorns[4], Dong Hye Ye[5], Mollie Patton[4], Tina Yen[6], Bing Yu[2]; [1]*Univ. of Wisconsin Oshkosh, USA;* [2]*Joint Department of Biomedical Engineering, Marquette Univ. and Medical College of Wisconsin, USA;* [3]*Department of Electrical and Computer Engineering, Marquette Univ., USA;* [4]*Department of Pathology & Laboratory Medicine, Medical College of Wisconsin, USA;* [5]*Department of Computer Science, Georgia State Univ., USA;* [6]*Department of Surgery, Medical College of Wisconsin, USA.* Rapid assessment of large tissue specimens enables intraoperative tumor margin assessment. Here, we report the development of a deep ultraviolet-excited fluorescence imaging system designed for this application.

lTh1D.2 • 08:45
Enhanced 3D Resolution via Boosted Speckle Illumination and Point Spread Function Estimation, Pau Riera Rodriguez[2], Byungjae Hwang[1], Kristina Irsch[1], Rafael Piestun[2]; [1]*Vision Inst. - Sorbonne Univeristy, INSERM, CNRS, France;* [2]*Department of Electrical, Computer, and Energy Engineering, Univ. of Colorado Boulder, USA.* We enhance optical sectioning and

spatial resolution in speckle illumination fluorescence microscopy. We boost the speckle images using the PSF estimated from the speckle data, yielding a two-fold improvement in resolution and sectioning capability.

ITh1D.3 • 09:00
Real Time Joint Super-Resolution and Radiometric Nonuniformity Correction of Low-Cost Thermal Camera, navot Oz[1], Nir sochen[2], David Mendlovic[2], Iftach Klapp[1]; [1]*Volcani Inst Agricultural Research Ctr, Israel;* [2]*Tel Aviv Univ., Israel.* The proposed method corrects the nonuniformity and enhances the spatial resolution of a low-cost LWIR Camera. Results show ~ 1 C error on real data, and spatial resolution enhanced by a factor of ×4.

ITh1D.4 • 08:30 (Invited)
Imaging the Structure and Function of the Brain on Multiple Scales, Karel Svoboda[1]; [1]*Allen Inst. for Neural Dynamics, USA.* We will review recent advances in two realms: 1) tracking the dynamic signals that underlie neural computation; 2) mapping the wiring of the brain. We will finish by discussing outstanding challenges in the field.

ITh1D.5 • 09:00 (Invited)
Measuring Input-Output Operations of Mouse Cortical Neurons Using Synaptic Imaging, Kaspar Podgorski[1]; [1]*Allen Inst. for Neural Dynamics, USA.* Using novel imaging tools, we have simultaneously recorded hundreds of synaptic inputs to, and firing of, individual neurons in behaving mice. These high-bandwidth measurements reveal how neurons transform input patterns into output.

08:30 -- 10:30
Room: 505 Queets
DTh1C • Quantitative Phase Processing, Retrieval Techniques and Applications I
Presider: Tatiana Latychevskaia; Paul Scherrer Institut, Switzerland

DTh1C.1 • 08:30 (Invited)
The Role of QPI in Environmental Monitoring, Vittorio Bianco[1], Marika Valentino[1], Giusy Giugliano[1], Francesca Borrelli[1], Daniele Pirone[1], mariapia pierro[1], Lisa Miccio[1], Pasquale Memmolo[1], Pietro Ferraro[1]; [1]*Consiglio Nazionale delle Ricerche-ISASI, Italy.* We discuss QPI methods to study the health status of the environment. QPI can detect pollutants like microplastics and heavy metals, and characterize the primary microorganisms populating aquatic ecosystems, highlighting indirect consequences of climate change.

DTh1C.2 • 09:00
Occlusion-Capable Holographic Augmented Reality Near-Eye Display Using a Digital Micromirror Device, Woongseob Han[1], Chanseul Lee[1], Jae-Hyeung Park[1]; [1]*Department of Electrical and Computer Engineering, Seoul National Univ., Korea (the Republic of).* We propose an occlusion-capable holographic augmented reality near-eye display using a digital micromirror device (DMD). Leveraging a time-multiplexing, the DMD serves as both Fourier filter for holographic display and real-scene mask for occlusion.

DTh1C.3 • 09:15
Spatially Reconfigurable Foveated Display Using Phase-Based Beam Steering, Jiyun Han[1], Myeong-Ho Choi[2], Kwang-soo Shin[3], Jae-Hyeung Park[1]; *[1]Department of Electrical and Computer Engineering, Seoul National Univ., Korea (the Republic of); [2]Inter-Univ. Semiconductor Research Center, Seoul National Univ., Korea (the Republic of); [3]Department of Electrical and Computer Engineering, Inha Univ., Korea (the Republic of).* We propose a spatially reconfigurable display system that uses phase-only spatial light modulator (SLM)-based beam steering to dynamically reshape pixel layouts, enabling adaptive foveated rendering beyond the fixed-structure of display panels.

DTh1C.4 • 09:30
Aerosol Detection and Characterization Using Digital Inline Holography, Punyasloka Sahoo[2,4], Alma F. Gonzalez[3,4], Cameron Garman[1], Cole Maedlin[1], Samuel Schiller[1], Ajithamithra Dharmasiri[2,4], Mark Harlow[1], Bikas Vaidya[1], Aart J. Verhoef[4,3], Alexei V. Sokolov[2,4]; *[1]Lynntech Inc, USA; [2]Physics and Astronomy, Texas A&M Univ., USA; [3]Soil & Crop Sciences, Texas A&M Univ., USA; [4]Inst. of Quantum Science & Engineering, Texas A&M Univ., USA.* This paper uses digital inline holography to analyze aerosol morphology in their natural environment, identifying potential biological threats. It captures particles as small as 1 µm, enhancing detection and characterization of aerosols accurately.

DTh1C.5 • 09:45 (Invited)
Superphantoms for Quantitative Phase Imaging, Michal Ziemczonok[1]; *[1]Politechnika Warszawska, Poland.* Superphantoms are crafted from imaging and functional data to replicate optical and structural properties of biological samples. The talk is focused on the design, fabrication and validation of phantoms with adjustable phase, refractive index distribution, absorption, scattering etc., and their applications.

08:30 -- 10:30
Room: 506 Samish
RTh1E • Instrumentations and Methods
Presider: Marie-Christine Zdora; Monash Univ., Australia

RTh1E.1 • 08:30 (Invited)
Development and Demonstration of Compact Laser-Driven Muon Sources for Radiography, Brendan A. Reagan[1,2]; *[1]Lawrence Livermore National Laboratory, USA; [2]Department of Electrical and Computer Engineering, Colorado State Univ., USA.* High energy muons can transmit through hundreds of meters of material enabling radiography of large objects not otherwise possible. Simulations and experimental results on the development of a laser-driven muon source will be presented.

RTh1E.2 • 09:00
Flash X-ray Source and Digital Detector Characterization Using Monte Carlo Methods, Anthony J. Hardy[1], Kathryn Harke[1], Maurice Aufderheide[1], James Hall[1], Jerel Smith[1], Finnegan Wilson[2], Veronica Eliasson[2], Kyle Sullivan[1], Joesph Tringe[1]; *[1]Lawrence Livermore National Security LLC, USA; [2]Colorado School of Mines, USA.* Digital flash radiography renders quantitative assessments of tomographic reconstruction feasible. However, the source spectrum and detector response must be known. The purpose is to present a method for characterization using Monte Carlo methods.

RTh1E.3 • 09:15
A Quantitative Comparison of Digital Detector, Computed Radiography, and Film for Flash X-ray Radiography Detection, Finnegan Wilson[1], Kathryn Harke[2], Anthony J. Hardy[2], Dylan Kline[2], Kyle Sullivan[2], Joesph Tringe[2], Veronica Eliasson[1]; *[1]Colorado School of Mines, USA; [2]Lawrence Livermore National Laboratory, USA.* Image quality metrics were explored across a range of detectors and parameters with a 450kVp flash X-ray system. Peak voltage, film pack assembly, source filtering, and detector choice were investigated for individual and interacting effects.

RTh1E.4 • 09:30
Quantifying the Location of a Moving 1D Interface in Time Integrated Radiography, Michael R. Armstrong[1], Kathryn Harke[1], David Martinez[1], Mukul Kumar[1]; *[1]Lawrence Livermore National Laboratory, USA.* Here we present simulations and experiments of time integrated radiographic imaging of a moving 1D interface. We discuss the trade-off between motion blurring of the interface and signal to noise with increasing integration time.

RTh1E.5 • 09:45
Evaluation of Hardware and Software Methods to Mitigate the off-Focal Source in Transmission Geometry x-ray Systems, Klara Steklova[1], Andrew Kingston[1], Andrew Fielding[2], Adrian P. Sheppard[1], Benjamin Young[1]; *[1]Australian National Univ., Australia; [2]School of Chemistry and Physics, Queensland Univ. of Technology, Australia.* Off-focal x-rays are undesirable secondary x-rays emitted from an x-ray source that can lead to significant artifacts in industrial and medical imaging. Here, we test and verify several software and hardware mitigation strategies.

RTh1E.6 • 10:00 (Invited)
Single-Shot Full-Field X-Ray Imaging With High-NA Reflective Optics, Junpei Yamada[1], Gota Yamaguchi[2]; *[1]Osaka Univ., Japan; [2]RIKEN SPring-8 Center, Japan.* We are developing high-speed and high-resolution X-ray imaging by combining high-brilliance X-ray sources with advanced KB optics. This talk presents single-pulse XFEL in-line holography with 10 nm resolution as a demonstration, and discusses future prospects.

08:30 -- 10:30
Room: 507 Sauk
CTh1B • Thin and Lensless Optics
Presider: Seung Ah Lee; Seoul National Univ.

CTh1B.1 • 08:30
Spectrometer Using Stacked Disordered Metasurfaces, Gookho Song[1], Dong-gu Lee[1], Mooseok Jang[1]; *[1]Korea Advanced Inst of Science & Tech, Korea (the Republic of).* We introduce a compact spectrometer based on stacked disordered metasurfaces, achieving ~1 nm spectral resolution across 440–660 nm. Wavelength-dependent speckle patterns were characterized *a priori*, enabling calibration-free, on-sensor spectroscopy.

CTh1B.3 • 08:45
Extended Field-of-View Lensless Imaging With Random Multi-Focal Lenslet Arrays, Clara S. Hung[1], Leyla A. Kabuli[1], Laura Waller[1]; *[1]Univ. of California, Berkeley, USA.* We demonstrate extended field-of-view imaging beyond the sensor for phase mask-based lensless imagers in simulation and experiment. We discuss design tradeoffs including point spread function size, multiplexing, and sparsity.

CTh1B.4 • 09:00
Privacy-Preserving Imaging With Lensless Cameras Using Shift-Variant Point Spread Functions, Kyung Chul Lee[1], Donggeon Bae[1], Taeyoung Kim[2], Joonsik Park[2], Yong Guk Kang[1], Nakkyu Baek[2], Seung Ah Lee[1]; *[1]Department of Mechanical Engineering, Seoul National Univ., Korea (the Republic of); [2]School of Electrical and Electronic Engineering, Yonsei Univ., Korea (the Republic of).* We propose a method to encrypt the scene at the hardware level by designing the forward model of a lensless camera with engineered shift-variant transfer function and to decode the encrypted scene with a physics-based neural network.

CTh1B.5 • 09:15
Task-Optimized Lensless Imaging With Trainable Phase Masks for Compact Spatial Encoding, Taeyoung Kim[1], Jongho Kim[2], Jaewoo Jung[1], Seung Ah Lee[3]; *[1]School of Electrical and Electronic Engineering, Yonsei Univ., Korea (the Republic of); [2]School of Mechanical and Aerospace Engineering/SNU-IAMD, Seoul National Univ., Korea (the Republic of); [3]Department of Mechanical and Aerospace Engineering, Seoul National Univ., Korea (the Republic of).* We propose a lensless imaging system jointly optimizing a trainable phase mask as the network's first layer, enabling multi-task learning in reduced sampling scenarios and outperforming conventional systems in classification and image generation task.

CTh1B.6 • 09:30 (Invited)
Seeing Beyond RGB: Imaging via Learning Optics and Image Processing, Yifan Peng[1]; *[1]Univ. of Hong Kong, Hong Kong.* This talk covers several representative imaging scenarios that seek to retrieve and deliver information beyond just 2D color intensities, namely, hyperspectral and RGBD imaging, as well as near-eye 3D displays.

CTh1B.2 • 10:00
Enabling Wide Field-of-View Imaging via Jointly Learned Off-Aperture Encoding, Haoyu Wei[1], Edmund Y. Lam[1], Yifan Peng[1]; *[1]Univ. of Hong Kong, Hong Kong.* We propose an end-to-end off-aperture DOE design, co-optimizing position and optical properties. This overcomes on-aperture DOE limitations in localized aberration correction, significantly improving wide field-of-view image quality.

CTh1B.7 • 10:15
A Comparative Study of Envelope Extraction Strategies for the Spectral Analysis of Thin Films, Manuel Ballester[1], Almudena Marquez[2], Santiago Lopez-Tapia[1], Susana Fernandez[3], John Bass[4], Dorian Minkov[5], Christoph Würsch[6], Florian Willomitzer[4], Emilio Marquez[2], Aggelos Katsaggelos[1]; *[1]Northwestern Univ., USA; [2]Univ. of Cadiz, Spain; [3]CIEMAT, Spain; [4]Univ. of Arizona, USA; [5]Technical Univ., Bulgaria; [6]Eastern Switzerland Univ. of Applied Sciences, Switzerland.* We compare envelope finding algorithms for film transmittance spectra. A global optimization search is reported as the most reliable method, which ensures precise optical property extraction of the film materials, albeit with higher computation cost.

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11:00 -- 12:30
Room: 503 Duckabush
DTh3A • Computer Generated Holograms and Metasurface Holograms
Presider: Yuan Luo; National Taiwan Univ., Taiwan

DTh3A.1 • 11:00 (Invited)
Computer Holography Meets Quantum Computing, Tomoyoshi Shimobaba[1], Fan Wang[1], Masato Shotoku[1], Yudai, Fujima[1], Tomoyoshi Ito[1]; [1]*Chiba Univ., Japan.* Hologram calculations present a significant bottleneck for future holographic displays demanding extensive fields of view and wide viewing angles. To address this challenge, this study proposes quantum computer-generated holography.

DTh3A.2 • 11:30
Computer-Generated Rainbow Hologram From Point Cloud Obtained by NeRF, Hiroshi Yoshikawa[1], Makoto Oikawa[1], Takeshi Yamaguchi[1]; [1]*Nihon Univ., Japan.* NeRF neural network is used to obtain 3D object data for computer-generated rainbow hologram. 3D point cloud is obtained from two different implementations and combined with virtual objects. Reconstructed images of holograms are compared.

DTh3A.3 • 11:45
Efficient Generation of Axially Multi-Focused Spot Arrays Based on a Novel Iterative Algorithm, Yuting Shi[1], Haining Yang[1]; [1]*Southeast Univ. (China), China.* We generate a multi-focused spot array with 0.98 uniformity along the optical axis by employing a phase-only liquid crystal on silicon (LCOS) and a weighted Gerchberg–Saxton (WGS) iterative algorithm.

DTh3A.4 • 12:00
Eye-box Expansion Technique for Holographic Displays by Overlapping Replicated High-Order Diffraction Terms, Myeong-ho Choi[1], Jae-Hyeung Park[2]; [1]*Inter-Univ. Semiconductor Research Center, Seoul National Univ., Korea (the Republic of);* [2]*Department of Electrical and Computer Engineering, Seoul National Univ., Korea (the Republic of).* We propose an eye-box expansion technique for holographic displays by optically replicating and overlapping the high-order diffraction terms of the spatial light modulator, achieving a large and seamless eye-box without additional filtering.

DTh3A.5 • 12:15
Metalens-Based Light-Sheet Fluorescence Microscopy, Hung-Chuan Hsu[1,2], Chun Chun Chang[1,2], Bo-Wei Huang[1,2], Sunil Vyas[1], S-Ja Tseng[3,4], Cheng Hung Chu[1,4], Kuang-Yuh Huang[2,5], Takuo Tanaka[6,7], Din Ping Tsai[8,9], Yuan Luo[1,4]; *[1]Inst. of Medical Device and Imaging, National Taiwan Univ., Taiwan; [2]Department of Mechanical Engineering, National Taiwan Univ., Taiwan; [3]Department of Pharmacology, National Cheng Kung Univ., Taiwan; [4]YongLin Inst. of Health, National Taiwan Univ., Taiwan; [5]Graduate School of Advanced Technology, National Taiwan Univ., Taiwan; [6]Innovative Photon Manipulation Research Team, RIKEN Center for Advanced Photonics, Japan; [7]Metamaterial Laboratory, RIKEN Cluster for Pioneering Research, Japan; [8]Department of Electrical Engineering, City Univ. of Hong Kong, Hong Kong.* Metalens-based dual-sided LSFM utilizes paired cylindrical metalenses to generate uniform twin light-sheets, eliminating shadow artifacts. The mouse lung tissues are measured by the system to offer high-resolution and sectioning imaging results.

11:00 -- 12:30
Room: 504 Foss
PTh3D • Numerical Simulation Studies
Presider: Jason Schmidt; MZA Associates Corporation, USA

PTh3D.1 • 11:00
Analysis of Starfire Optical Range's Atmospheric Monitoring Methods Using WaveProp Simulation and Numerical Modeling, Julianna Sommer[1], Santasri R. Bose-Pillai[1], Jack McCrae[1], Steven Fiorino[1]; *[1]Air Force Inst. of Technology, USA.* Causes for discrepancies in measured Fried's coherence length between the Starfire Optical Range Atmospheric Monitor (SAM) and the Portable Atmospheric Optical Data Measurement System (PAODMS) are investigated and a correction scheme is proposed.

PTh3D.2 • 11:15
Phase Screens for the Dual-Wavelength Adaptive Optics Simulations, Mikhail Charnotskii[1]; *[1]Independent researcher, USA.* We propose phase screens generation technique for wave optics simulations of adaptive optics systems where beacon and beam have different wavelengths. Technique accounts for the diffraction related wavelength dependence of the turbulent optical paths.

PTh3D.3 • 11:30 (Invited)
Comparison of Laser Propagation Through Turbid and Turbulent Media With Statistical Optics, Nathaniel A. Ferlic[1]; *[1]Naval Air Warfare Ctr, USA.* Statistical models of light scattering in a turbulent and turbid medium lay within the same mathematical framework. The effects of this are discussed in the context of wave optics simulations.

PTh3D.4 • 12:00 (Invited)
Numerical Modeling of Atmospheric Effects on Electromagnetic Wave Propagation, Udaysankar Nair[1]; *[1]Univ. of Alabama in Huntsville, USA.* This talk examines the role of atmospheric models that assimilate ground-based, airborne, and satellite observations to predict turbulence and optical properties affecting electromagnetic wave propagation, emphasizing their utility in both applied and theoretical studies.

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11:00 -- 12:30
Room: 505 Queets
DTh3C • Quantitative Phase Processing, Retrieval Techniques and Applications II
Presider: Yuan Luo; National Taiwan Univ., Taiwan

DTh3C.1 • 11:00
Real-Time Holographic Display for AR Glasses Using a Non-Iterative CGH Algorithm, Ya-Hsuan Lee[1], Chun-Huang Ko[1], Wei-Ren Chen[1], Wei-Feng Hsu[1]; *[1]National Taipei Univ. of Technology, Taiwan.* We present a non-iterative algorithm for generating computer-generated holograms, enabling real-time holographic display in augmented reality glasses using a compact near-eye system with a spatial light modulator and holographic optical element.

DTh3C.2 • 11:15
Conditional Neural Holography: a Distance-Adaptive CGH Generator, Yuto Asano[1], Kenta Yamamoto[1], Tatsuki Fushimi[2], Yoichi Ochiai[2]; *[1]Graduate School of Comprehensive Human Science, Univ. of Tsukuba, Japan; [2]R & D Center for Digital Nature, Japan.* Our distance-adaptive CGH generator combines zone plate encoder with augmented HoloNet, enabling variable propagation distance specifying while maintaining image quality comparable to fixed-distance methods with practical synthesis speed and accuracy.

DTh3C.3 • 11:30 (Invited)
Ultrafast Optofluidic Single-Cell Quantitative Phase Imaging - From Instrumentation to Generative AI Analytics, Kevin K. Tsia[1]; *[1]Univ. of Hong Kong, Hong Kong.* Abstract not available.

11:00 -- 12:30
Room: 506 Samish
RTh3E • Biomedical Application
Presider: Liangzhong Xiang; Univ. of California Irvine, USA

RTh3E.1 • 11:00 (Invited)
X-Ray Induced Acoustic Imaging, Prabodh Pandey[1], Siqi Wang[2], Leshan Sun[1], Yuchen Yan[1], Gilberto Gonzalez[3], Zhehui Wang[5], Yong Chen[4], Liangzhong Xiang[1]; *[1]Univ. of California Irvine, USA; [2]Stanford Univ., USA; [3]The Univ. of Texas Health Science Center at Houston, USA; [4]Univ. of Oklahoma Health Sciences Center, USA; [5]Los Alamos National Laboratory, USA.* X-ray–induced acoustic imaging enables 3D imaging from a single x-ray projection via acoustic detection, achieving sub-millimeter to millimeter resolution while reducing radiation exposure. It offers a promising approach for radiographic imaging and in vivo radiation dosimetry.

RTh3E.2 • 11:30
A Graphical User Interface for Forward and Inverse Problems in Radiation-Induced Acoustic Imaging, Yashita Nithyananthan[1], Prabodh Pandey[1], Liangzhong Xiang[1]; *[1]Univ. of California Irvine, USA.* We developed a MATLAB-based GUI for radiation-induced acoustic computed tomography using a semi-analytic model to compute pressure signals from 2D/3D dose maps and performs matrix-free, model-based image reconstruction in homogeneous media.

RTh3E.3 • 11:45
X-ray Speckle-Based Imaging for Virtual Histology, Marie-Christine Zdora[1], Kaye S. Morgan[1]; [1]*Monash Univ., Australia.* We report on recent developments of X-ray speckle-based imaging for virtual histology. This includes extending its imaging capabilities towards larger samples and dynamic studies at a new speckle-based micro-CT setup at the Australian Synchrotron.

RTh3E.4 • 12:00 (Invited)
Laser-Driven X-Ray Imaging, Benjamin Barbrel[1]; [1]*ALPhANOV, France.* Abstract not available.

11:00 -- 12:30
Room: 507 Sauk
CTh3B • Event-Based Sensing
Presider: Esteban Vera; Pontificia Univ Catolica de Valparaiso, Chile

CTh3B.1 • 11:00
Leveraging Spatiotemporal Event Distributions for Point-Object Tracking, Connor Hashemi[1], Dennis Melamed[1], Nitesh Menon[1], Scott McCloskey[1]; [1]*Kitware, Inc., USA.* We analyze spatiotemporal event distributions from moving point-objects in event-based sensors using Fisher information. This analysis reveals underutilized spatial cues about velocity that enable low-latency tracking with short time batches.

CTh3B.2 • 11:15
Development of an Autofocus Algorithm for Event-Based Cameras for Space Awareness and Astronomical Applications., Vladimir Cisternas[1], Vicente Westerhout[1], Esteban Vera[1]; [1]*Optolab, PUCV, Chile.* We present an autofocus algorithm for event-based cameras especially crafted for space surveillance applications. The algorithm searches for a local minimum of events triggered by the apparent natural motion of the stars due to atmospheric turbulence.

CTh3B.3 • 11:30 (Invited)
Title to be Announced, Prasanna V. Rangarajan[1]; [1]*Southern Methodist Univ., USA.* Abstract not available.

CTh3B.4 • 12:00
Low-Latency Object Tracking Through Scattering Media With Event Camera, Yuqing Cao[1], Shuo Zhu[1], Rongzhou Chen[1], Jingyan Chen[1], Edmund Y. Lam[1]; [1]*The Univ. of Hong Kong, Hong Kong.* We use an event camera to track objects through scattering media, achieving enhanced robustness with lower latency than frame-based systems. This method paves the way for high-speed, low-power sensing in complex environments.

CTh3B.5 • 12:15
Event-Based Rapid Organoid Imaging, Rongzhou Chen[1], Yuxing Li[1], Chutian Wang[1], Shaohua Ma[2], Edmund Y. Lam[1]; [1]*Univ. of Hong Kong, Hong Kong;* [2]*Tsinghua Shenzhen International Graduate School, Tsinghua Univ., China.* We present a microfluidic and event-sensor system for rapid, low-phototoxicity organoid imaging. A neuromorphic framework corrects motion, yielding high-quality images.

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On Demand

FD1 • Optica Congress On-Demand Session

FD1.1
Cameraless T-ray Lattice Imaging for Metrology of Quantum Dots, Anis Rahman[1]; [1]*Applied Research and Photonics Inc, USA.* Cameraless lattice imaging is demonstrated for polymeric ionic liquid impregnated with quantum dots. A DDE-based T-ray source is used with a nanoscanner for wavelength-decoupled atomic scale imaging with bigger wavelengths.

FD1.2
SRDTrans: Spatial Redundancy Transformer for High-Performance Self-Supervised Fluorescence Image Denoising, Sihan Jing[1], Qi Zhang[1], Xinyang Li[1]; [1]*Tsinghua Univ., China.* SRDTrans is a high-performance self-supervised denoising transformer for fluorescence time-lapse imaging that does not rely on the similarity between adjacent frames and achieves state-of-the-art performance on different imaging modalities.

FD1.3
Feature-Domain Phase Retrieval for High-Fidelity Computational Microscopy, Shuhe Zhang[1], Liangcai Cao[1]; [1]*Tsinghua Univ., China.* We propose Feature-Domain Phase Retrieval (FD-PR) for computational microscopy. FD-PR uses image features to guide the reconstruction of optical wavefronts and takes advantage of invariance components of images against mismatches of physical models.

FD1.4
Model-Based Deep Learning Approach for Dynamic Holographic Reconstruction, Yunhui Gao[1], Liangcai Cao[1]; [1]*Tsinghua Univ., China.* We propose a model-based deep learning framework for dynamic holographic reconstruction. By exploiting the deep spatiotemporal priors learned from video datasets, we realized time-resolved holographic imaging of dynamic samples.

FD1.5
Advancements in Breast Cancer Detection and Analysis by Integrating Digital Holographic Imaging With Attention Mechanism Using VGG19, Leena Thomas[1,2]; [1]*Kerala Technological Univ., India;* [2]*Electronics and Communication, College of Engineering Kallooppara, India.* Digital holography is a promising method to analyze the three-dimensional information of breast tissues. Improved image quality and reduced noise contribute to a more accurate and reliable interpretation of breast tissue features.

FD1.6
Evaluation of High-Speed Transceivers for Free-Space Optical Communication Beyond 5G Networks, Saad Saeed[1], Abdullah Nafis Khan[2,1], Usman Younis[1]; [1]*Information Technology Univ., Pakistan;* [2]*The Interdisciplinary Research Center for Communication Systems and Sensing, King Fahd Univ. of Petroleum and Minerals, Saudi Arabia.* High-speed transceivers consisting laser diode and photodiode are evaluated to provide 130 Mbps data rate over short-cell B5G networks. Real-time transmission and reception of square wave signals are demonstrated with a comparison to existing models.

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JD1 • Joint Posters Session (On-Demand)

JD1.1
Comparative Analysis of Terahertz and Diffuse Optical Imaging for Glioma Detection: a Simulation Study, Shimaa Mahdy[2], Omnia H. Abd El-Rahman Nematallah[1]; *[1]Cairo Univ., Egypt; [2]Department of Electrical Engineering, Egyptian Academy for Engineering and Advanced Technology, Egypt.* This paper presents a comparative study between terahertz and diffuse optical imaging techniques for glioma detection using COMSOL simulation platform. THz imaging revealed better results in terms of peak signal-to-noise ratio and mean square error.

JD1.2
Corrosion Behaviour Recognition of TiN&TiNO Thin Layers Grown on 304L Stainless Steel via Laser Speckle Imaging, Doaa Youssef[1], Hanan A. Abd El-Fattah[3], Aliaa Abdelfatah[2], Samar R. AlSayed Ali[1]; *[1]Laser Inst. (NILES) Cairo Univ., Egypt; [2]Metallurgy, Faculty of Engineering - Cairo Univ., Egypt; [3]Chemical Engineering, Canal High Inst. of Engineering and Technology, Egypt.* The study performed shows the capability of laser speckle photography as a nondestructive, inexpensive, and high-speed procedure to detect the corrosion behavior of fabricated thin layers on 304L stainless steel coated by PVD sputtering.

JD1.3
Novel Image Analysis Approach and Machine Learning for Speckle-Based Roughness Estimation of Machined Surfaces, Samar R. AlSayed Ali[1], Doaa Youssef[1]; *[1]Laser Inst. (NILES) Cairo Univ., Egypt.* This study introduces a non-destructive laser speckle imaging system based on novel image analysis and machine learning for estimating the average roughness of machined surfaces prepared by the laser cladding technique under different conditions.

JD1.4
Deep Learning-Enhanced Thermal Imaging for Automated Burn Severity Classification, Fatma Heikal[1], Omnia H. Abd El-Rahman Nematallah[1], Jala El-Azab[1], Tawfik Ismail[1]; *[1]Cairo Univ., Egypt.* This study uses YOLOv8 trained on infrared images of porcine skin at different burn degrees to classify burn severity. Results show precision peaking at 0.9, supporting its potential for objective burn assessment in clinical diagnostics.

JD1.5
DLCI: Caustic Image Generation Using Deep Learning, Trieu H. Nguyen[1], George Nehmetallah[1]; *[1]Catholic Univ. of America, USA.* We developed a Deep Learning based method for generating user-defined Caustic Images (DLCI) that requires less computing power and time to synthesize compared to traditional caustic images algorithms.

JD1.6
Retinex-Based Lensless Reconstruction With Physical Fusion and Diffusion Enhancement in Low-Light Conditions, Ziyang Liu[1], Tianjiao Zeng[1], Xu Zhan[1], Xiaotian Li[1], Xiaoling Zhang[1]; *[1]UESTC, China.* To combat the severe degradation of lensless imaging quality in low-light conditions, we propose a reconstruction network that uses Retinex decomposition, integrating physical model fusion with conditional diffusion model enhancement techniques.