ADVANCE PROGRAM

14th International Conference on Optics-photonics Design & Fabrication

"ODF'24, Tucson"
July 10th-12th, 2024

The University of Arizona, Tucson, Arizona, U.S.A.

Organized by
Optics Design Group of The Optical Society of Japan

In Cooperation with (to be confirmed)
JSAP (The Japan Society of Applied Physics)・**OSJ** (The Optical Society of Japan)・**International Commission for Optics**・**EOS** (European Optical Society)・**Optica** (formerly OSA)・**SPIE** (The international society for optics and photonics)・**TPS** (Taiwan Photonics Society)・**The Color Science Association of Japan**・**IEICE** (The Institute of Electronics, Information and Communication Engineers)・**IEIJ** (The Illuminating Engineering Institute of Japan)・**IIEEJ** (The Institute of Image Electronics Engineers of Japan)・**ITE** (The Institute of Image Information and Television Engineers)・**JIEP** (Japan Institute of Electronics Packaging)・**JOEM** (Japan Optomechatronics Association)・**JOMA** (Japan Optical Measuring Instruments Manufacturer's Association)・**JPS** (The Physical Society of Japan)・**Japan Photonics Council**・**JSPE** (The Japan Society for Precision Engineering)・**LSJ** (The Laser Society of Japan)・**OV** (Optics Valley)・**OITDA** (Optoelectronics Industry and Technology Development Association)・**Society for Information Display Japan Chapter**・**SPIJ** (The Society of Photography and Imaging of Japan)・**SPSJ** (The Spectroscopical Society of Japan)

Post-Deadline Paper Submission: May 25th, 2024
Early-Bird Registration Deadline: June 9th, 2024
http://www.odf.jp/

TIME TABLE

1st Day
July 10, 2024 (Wed)
Registration (8:15-17:00)

Room	ILC120
9:00	Opening Session
9:10	Plenary Session
10:30	Short Break
10:40	[W1A] Optical Design / Simulation / Fabrication
11:50	Lunch
13:35	[W4A] New Technologies
14:30	Short Break
14:40	[W4B] New Technologies
15:50	Coffee Break
16:20	[W3A] Optical Systems
17:30	Short Break
17:40	[W3B] Optical Systems
18:50	Group Photo
19:00	end

2nd Day
July 11, 2024 (Thu)
Registration (8:30-17:00)

Room	ILC120
9:00	[Th2A] Optical Components / Devices
10:10	Short Break
10:20	[Th2B] Optical Components / Devices
11:30	Lunch
13:00	Poster Session
16:00	Coffee Break
16:30	[Th1B] Optical Design / Simulation / Fabrication
17:30	Break
18:00	Banquet at Bear Down Gym

3rd Day
July 12, 2024 (Fri)
Registration (8:30-12:00)

Room	ILC120	ILC140
9:00	[F1C] Optical Design / Simulation / Fabrication	[F3C] Optical Systems
10:25	Short Break	
10:35	[F1D] Optical Design / Simulation / Fabrication	[F3D] Optical Systems
11:30		
11:45	Lunch	
13:15		[F4C] New Technologies
13:40	[F2C] Optical Components / Devices	
14:25	Short Break	
14:35	[F2D] Optical Components / Devices	[F4D] New Technologies
15:30	Coffee Break	
16:00	Special Session	
18:00	Closing Session	
18:30	end	

INTRODUCTION

The 14th International Conference on Optics-photonics Design & Fabrication “ODF'24, Tucson” will be held on July 10th-12th, 2024. Optics-photonics design and fabrication will continue to play a significantly important role in the 21st century achieving harmony between technology and the environment. ODF'24 is intended to provide an international forum for original paper presentations and discussions of optics-photonics design and fabrication-related technological and scientific topics. These topics include theory, design, fabrication, testing, applications, and others.

ODF'24 is aimed to promote international collaboration among the participants in this field including related companies’ exhibition.

Collaboration and Competition make progress.

“Join us at ***ODF'24, Tucson, U.S.A.!***”

SCOPE OF THE CONFERENCE

ODF'24 is an international forum for the engineers and scientists in the field of Optics-photonics Design and Fabrication to exchange their ideas and achievements with the goal of future mutual progress. The conference covers the following major topical categories:

Special Session: “Streamlining sensing, computation, display, and integration as Optics for Autonomous Services and Interactive Systems (OASIS)”

Category 1. Optical Design / Simulation / Fabrication

Lens Design, Lens Design Theory, Illumination Simulation, Non-imaging Optics Design, Freeform Optics, Simulation Software, Fabrication and Testing

Category 2. Optical Components / Devices

Laser, LED, OLED, Detector, Image sensor, DOE/HOE, Thin Film, Coating, Optical Waveguide, Optical Fiber, Integrated Optoelectronic Device, Active Optical Component, Optical MEMS,
Photonic Crystal, Device Fabrication

Category 3. Optical Systems

Camera, Microscopy, Display, Projector, Optical Data Storage, Optical Lithography, Illumination Optics, 3D Image Acquisition, 3D Display, VR/AR, LiDAR, Automotive Optics, Biomedical Optics, Optofluidics, Optical Measurement, Optical Sensing, Spectroscopy

Category 4. New Technologies

AI Optics (Machine Learning, etc.), Computational Imaging and Sensing, Single pixel imaging, Digital Holography, CGH, Nonlinear Optics, Ultrafast Optics, Metamaterial, Plasmonics, Near-Field Optics, Quantum Optics, Nano Structures, Optical Cloaking, Other Future Technologies in Optical Design and Fabrication

TECHNICAL PROGRAM

July 10, 2024 (Wednesday)

9:00-9:10 Opening Session Room: ILC120

Presider:
H. Sakai (Hamamatsu Photonics / Japan)

Opening Remarks
Y. Takashima (The Univ. of Arizona / USA)
M. Hasegawa (Canon / Japan)

9:10-10:30 Plenary Session Room: ILC120

Presiders:
Y. Kawata (Shizuoka Univ. / Japan)
D. Kim (The Univ. of Arizona / USA)

Plenary-01 (Invited)
(9:10) One Ray, Two Rays, Green Ray, Blue Ray
R. N. Pfisterer (Photon Engineering / USA)
What is a ray? What can a single ray do? Can a group of geometrical rays model physical optics phenomena? What can we learn when we trace billions of rays? We will discuss these and other related questions during the plenary talk.

Plenary-02 (Invited)
(9:50) Digital Holography from Conventional to Unconventional
T. Nomura (Wakayama Univ. / Japan)
A briefly review of digital holography is given. As well as conventional digital holography, recent progress of digital holography as a computational optical sensing and imaging is also introduced.

10:30-10:40 Short Break

10:40-11:50 [W1A] C1. Optical Design/Simulation/Fabrication Room: ILC120

Presiders:
M. Mansuripur (The Univ. of Arizona / USA)
Y. Otani (Utsunomiya Univ. / Japan)

W1A-01 (Invited)
(10:40) CNN-Based Analysis of White LED Packaging Design
T. Kashiwao (Kindai Univ. / Japan)
This study presents that convolutional neural networks (CNNs) can recognize packaging structure parts to intensively affect brightness of white LEDs. Important parts are shown as feature maps of CNN models trained with structure images.

W1A-02
(11:05) Aberration Balancing in Lens Imaging Systems
J. Sasián (The Univ. of Arizona / USA)
Berration balancing in lens systems for sharp imaging is discussed. A variety of choices is presented from the point of view of minimizing the variance of the wave aberration function.

W1A-03
(11:20) Ray Tracing in the Presence of Gradient Index Coatings
N. Hagen (Utsunomiya Univ. / Japan)
We consider the impact on optical design when a homogeneous optical element acquires a gradient index surface and discuss examples of where this occurs.

W1A-04

(11:35) Optical Alignment Using Bessel-Gauss Beams

Z. Chen (The Univ. of Arizona / USA), R. E. Parks (Optical Perspectives Group / USA), and D. Kim (The Univ. of Arizona / USA)

The article demonstrates a new approach for achieving high-accuracy alignment with a Bessel-Gauss Beam by utilizing its property of propagating as a paraxial ray.

11:50-13:35 Lunch

13:35-14:30 [W4A] C4. New Technologies Room: ILC120

Presider:

D. Kang (The Univ. of Arizona / USA)

W4A-01 (Invited)

(13:35) Dispersion-Engineered Metasurfaces: Fundamental and Applications

W. Chen (SNOChip / USA)

In this presentation, I will detail the distinctive features of metasurface optics in comparison with refractive and diffractive optics and introduce dispersion-engineered metasurfaces for imaging and sensing applications.

W4A-02 (Withdrawn)

W4A-03

(14:00) Angular Dependent Metasurfaces for Aberration Correction

Z. Wang (The Univ. of Arizona / USA), Y. Shao (Stanford Univ. / USA), Y. Kim (The Univ. of Arizona / USA), R. Lupoiu, J. A. Fan (Stanford Univ. / USA), and T. D. Milster (The Univ. of Arizona / USA)

Metasurface structures optimized by inverse design algorithms enable versatility of optical response for various applications. This report focuses on aberration correction abilities of angularly dependent metasurfaces.

W4A-04

(14:15) Sub-Wavelength Resolution Micro Glass Optics Additive Manufacturing

Z. Hong, P. Ye, D. A. Roy, and R. Liang (The Univ. of Arizona / USA)

We will report our research trials for the non-sintering, low shrinkage, and user-friendly two-photon polymerization printing technology for high-resolution complex glass optical system development. We will introduce our previous and recent publications for more micro-glass optics potential.

14:30-14:40 Short Break

14:40-15:50 [W4B] C4. New Technologies Room: ILC120

Presider:

N. Yoneda (Kobe Univ. / Japan)

W4B-01 (Invited)

(14:40) Modeling of Optical Fabrication Chains During Optics Design

O. Faehnle (OST Univ. of Applied Sciences / Switzerland)

Results of computer modeling and simulation of the optimal fabrication chain (at minimum cost and risk) for given optical systems design is presented, enabling cost impact analysis during the optical design stage.

W4B-02

(15:05) Scene-Aware Illumination Assisted Learning-Based Hyperspectral Recovery from Dual RGB Images

Y. Sun and R. Liang (The Univ. of Arizona / USA)

We demonstrated a learning-based hyperspectral imaging modality from a pair of RGB images under scene-aware illumination optimization mechanism, in which various scenes yield different optimal illuminations to achieve higher recovery accuracy and more balanced error.

W4B-03

(15:20) Deep Neural Network-Based Classification of Spectrally Encoded Confocal Microscopy Images of Excised Breast Tissues Using a Small Training Dataset

A. Nessaee (The Univ. of Arizona / USA), K. Kose (Memorial Sloan Kettering Cancer Center / USA), E. Brachtel (Thomas Jefferson Univ. / USA), and D. Kang (The Univ. of Arizona / USA)

Spectrally Encoded Confocal Microscopy (SECM) previously demonstrated high accuracy for diagnosing malignancy in excised breast tissues when analyzed manually by pathologists. We applied transfer learning to evaluate a small training dataset's utility for classifier training.

W4B-04

(15:35) Improvement of Image Quality for Infrared Imaging Sensor Using Deep Learning Based on Optical Simulation

T. Furuta and M. Kuwata (Mitsubishi Electric / Japan)

We propose the new method to quickly generate large amounts of training data sets for AI training using the optical simulation and discuss the results of applying the method to the infrared sensor.

15:50-16:20 Coffee Break

16:20-17:30 [W3A] C3. Optical Systems Room: ILC120

Presiders:

T. Milster (The Univ. of Arizona / USA)
M. Takabayashi (Kyushu Inst. of Tech. / Japan)

W3A-01 (Invited)

(16:20) Building a Versatile Dynamic Imaging System for Detonators and Sub-Components

A. M. Manuel, S. W. Wagnon, and W. L. Shaw (Lawrence Livermore National Laboratory / USA)

HELIOS (High Explosive Laser Imaging Optical System) is LLNL's capability for visualizing exploding foil initiators and detonators in flight. The imaging system from the laser backlight through to the high-speed framing cameras will be described.

W3A-02

(16:45) Development of a Sun-Tracking Linear Stokes Imaging Polarimeter

C. M. DeLeon and M. K. Kupinski (The Univ. of Arizona / USA)

This work highlights the development of a ground-based sun-tracking Stokes imaging polarimeter (SUNTRAP) operating in the ultraviolet (355 nm) and visible (630 nm, 525 nm, 470 nm; RGB) wavelengths. SUNTRAP will enable novel characterizations of skylight polarization.

W3A-03

(17:00) A High-Speed Variable Focus Camera System Using Ultrafast Switching Mirrors

S. Hu, K. Shimasaki, and I. Ishii (Hiroshima Univ. / Japan)

This study introduces a high-speed variable focus optical system with ultrafast switching mirrors that achieves millisecond-level response times and enables simultaneous multifocal imaging in standard camera-lens systems, overcoming environmental and lens parameter limitations.

W3A-04

(17:15) Limited Area Sensing by Projected Volume Light Curtain

T. Makita and H. Kawano (Mitsubishi Electric / Japan)

Our new sensing device takes images only when people or objects exist in certain areas with depth. Synchronously controlling laser illumination and a rolling shutter camera enables dynamic changes of sensing areas.

17:30-17:40 Short Break

17:40-18:50 [W3B] C3. Optical Systems Room: ILC120

Presiders:

N. Chen (The Univ. of Arizona / USA)
S. Hu (Hiroshima Univ. / Japan)

W3B-01 (Invited)

(17:40) Lattice Lightsheet Microscopy with Standard Cover Glass: A Challenge for Optical Design

M. Hanft, L. C. Wittig, and U. Boehm (Carl Zeiss / Germany)

Lattice Lightsheet Microscopy is a gentle method of fluorescence microscopy. The talk outlines important development steps. In addition, challenges and solutions resulting from standard sample preparation will be presented from the perspective of optical design.

W3B-02

(18:05) Accurate Eye-Tracking from Deflectometric Information Using Deep Learning

J. Choi (The Univ. of Arizona / USA), J. Wang (Northwestern Univ. / USA), T. Wang (ETH Zurich / Switzerland), and F. Willomitzer (The Univ. of Arizona / USA)

We introduce an accurate eye-tracking method that exploits deflectometric information and uses deep learning to reconstruct the gaze direction. We demonstrate real world experiments with evaluated gaze errors below 1 degree.

W3B-03

(18:20) Development of a Cross-Polarized Portable In Vivo Confocal Ophthalmoscope for Corneal Imaging

K. Marcelino, M. Sugimura, R. Romero, J. Zhao, K. Konecny, K. Kim (The Univ. of Arizona / USA), M. Rajadhyaksha (Memorial Sloan Kettering Cancer Center / USA), J. Chidambaram (The Univ. of Manchester / UK), and D. Kang (The Univ. of Arizona / USA)

The established corneal ulcer diagnostic technique involves invasive corneal scrapes and multi-day waits for tissue pathogen culture development. We developed a cross-polarized portable in vivo confocal ophthalmoscope for high-speed, non-contact cornea imaging.

W3B-04

(18:35) Digitally-Directed Beams for Microscale Inspection

H. Ohno (Toshiba / Japan)

Digitally-directed beams, capable of instantaneously controlling their direction at every point within a field of view, are proposed for the inspection of microscale defects in manufacturing processes.

18:50-19:00 Group Photo

July 11, 2024 (Thursday)

9:00-10:10 [Th2A] C2. Optical Components / Devices Room: ILC120

Presiders:

M. Yamagata (Panasonic Automotive Systems / Japan)
H. Choi (The Univ. of Arizona / USA)

Th2A-01 (Invited)

(9:00) Liquid Crystal Polarization Holograms for Virtual Reality Displays

Z. Li, X. Wang, H. Cheng, L. Lu, and B. Silverstein (Meta Reality Lab / USA)

Liquid crystal polarization holograms (LCPH) are polarization-sensitive holograms that can be used in VR applications. They offer benefits such as accommodation, foveated display, and pancake cavity formation with chromatic aberration correction due to their polarization selectivity.

Th2A-02

(9:25) Optical Architecture of Single-Chip 2-Dimensional Image Steering Towards Compact Smart AR Display

Y. Pei, T. Zhang, X. Deng, G. M. Nero, J. Chan, J. C. Chang, T. L. Lee, P. Liu, C. Luo, and Y. Takashima (The Univ. of Arizona / USA)

A diffractive and reflective hybrid image steering by MEMS spatial light modulator enables a new lidar optical architecture that increases effective pixel count of SLM in a time multiplexed manner.

Th2A-03

(9:40) Ring-Shaped Lithography for Structuring Spherical Surfaces

D. Stumpf, X. Uwurukundo, and R. Brunner (Univ. of Applied Sciences Jena / Germany)

A custom lithography tool employing axicons to produce a ring-shaped light distribution is utilized to expose gray level structures in photoresist on spherical surfaces.

Th2A-04

(9:55) Unprecedentedly Accurate Measurements of Electro-Optic Coefficients Using the Teng and Man Method to Eliminate Wavelength-Dependent Errors

Y. Enami (Nagasaki Univ. / Japan)

We measure highly accurate electro-optic (EO) coefficient for EO polymers using a transmission method, overcoming the limitations of the Teng and Man reflection ellipsometric method and enhancing reliability and accuracy in EO research.

10:10-10:20 Short Break

10:20-11:30 [Th2B] C2. Optical Components / Devices Room: ILC120

Presider:

K. Konno (Konica Minolta / Japan)

Th2B-01 (Invited)

(10:20) Dual-Comb Spectroscopy from the IR to the Deep Ultraviolet for Characterization of Laser Plasmas

R. J. Jones (The Univ. of Arizona / USA)

We utilize time-resolved dual-comb spectroscopy from the IR to the deep ultraviolet to measure evolving ionic, atomic, and molecular species within laser plasmas. Key parameters including atomic and molecular temperatures and electron densities are characterized.

Th2B-02

(10:45) Model for Optical Properties of NbTiN Thin Films Considering Quantum Corrections to Conductivity

S. Kern (Comenius Univ. / Slovakia), P. Neilinger (Comenius Univ. / Slovakia, Slovak Academy of Sciences / Slovakia), M. Baranek (Comenius Univ. / Slovakia), M. Kocsis, P. Makk, G. Fulop (Budapest Univ. of Technology and Economics / Hungary), and M. Grajcar (Comenius Univ. / Slovakia, Slovak Academy of Sciences / Slovakia)

The optical properties of disordered ultra-thin NbTiN films are studied by means of spectroscopic ellipsometry. Drude-Lorentz model modified by quantum corrections describes the obtained optical

conductivities well, including double plasmon behaviour and their transport properties.

Th2B-03

(11:00) Numerical Evaluation of Polarization-Structuring Computer Generated Holography with Radially Polarized Light

Y. Ogura and J. Tanida (Osaka Univ. / Japan)

We present computer generated holography with radially polarized light for generating polarization structured optical patterns. Numerical evaluation results show that the method is effective for generation and miniaturization of polarization-structured spots including z-polarization.

Th2B-04

(11:15) Angular Spectrum Approach to Optical Characterization of Thin Film Materials Using Transmission Spectroscopy

J. M. Bass (The Univ. of Arizona / USA), M. Ballester (Northwestern Univ. / USA), S. M. Fernandez (CIEMAT / Spain), A. K. Katsaggelos (Northwestern Univ. / USA), E. Marquez (Univ. of Cadiz / Spain), and F. Willomitzer (The Univ. of Arizona / USA)

Thin film transmission spectroscopy systems are useful for characterizing semiconductors, but often rely on rigid analytical models. We introduce a more versatile framework using angular spectrum diffraction, which allows for accurate characterization of inhomogenous materials.

11:30-13:00 Lunch

13:00-16:00 Poster Session Room: ILC141

ThP-01

Acceptance Angle Enlargement for a Side-Absorption Concentrated Photovoltaic System Using a Lens Array and a Light-Guide

A. Wei, Y. Hsu (National Central Univ. / Taiwan), and J. Sze (National Applied Research Laboratories / Taiwan)

A concentrator, comprising a lens array and a light-guide with V-grooves, is designed to enlarge the acceptance angle of a concentrated photovoltaic system. The optical performance and the fabrication tolerances of the design are analyzed.

ThP-02

Exploring Ghost Ray Tracing in a Massively Parallel Fast Ray Tracing within a Cloud Computing Environment

H. Ono (Nikon / Japan), S. Matsumura (EQN / Japan), and Z. Ushiyama (Tyco Optics / Japan)

Our cloud-based program facilitates rapid and comprehensive ghost optical path search in camera lens design, enabling effective countermeasures against ghosts prior to prototyping.

ThP-03 (Withdrawn)

ThP-04

Design of Optical Scanning System to Improve Vertical Sidewall Quality in Laser Beam Processing

G. Oh, H. Choi (Gyeongsang National Univ. / Korea), J. Ha, C. Kim (Korea Institute of Industrial Technology / Korea), Y. Kim, and K. Song (SNU Precision / Korea)

When processing microstructures using a laser beam processing system, vertical sidewall quality may deteriorate. In this paper, we design a novel optical scanning system for overcome these limitations.

ThP-05

Automated Collimation at the Vatican Advanced Technology Telescope (VATT)

S. A. Blomquist, H. Choi (The Univ. of Arizona / USA), P. Gabor (Vatican Observatory / USA), R. Crawford (Rincon Ranch Observatory / USA), and D. Kim (The Univ. of Arizona / USA)

The Vatican Advanced Technology Telescope (VATT) is a Gregorian telescope located in southeastern Arizona. This paper presents an overview and results from various algorithms to properly collimate the VATT and retain alignment on a night-to-night basis.

ThP-06

2.4 m × 3.3 m Twisting Heliostat Metrology for High Concentration Solar Fields

Y. Huang, R. Angel, H. Kang, H. Choi, M. Rademacher, H. Tailor, R. Su, and D. Kim (The Univ. of Arizona / USA)

This paper describes a novel metrology system for twisting heliostats targeting high concentration. The deflectometry method using a perforated screens achieved an accuracy of 0.1 mrad RMS slope error at 25 mm spatial resolution.

ThP-07

Correction of Fabrication Errors of Telescope Primary Lens by a Phase Plate

Z. Wang, N. Brar, Y. Wu, Y. Yun, E. Durazo, and T. D. Milster (The Univ. of Arizona / USA)

This presentation demonstrates the potential and methods of compensating fabrication errors of a MODE telescope. Phase error of primary lens is reduced by placing a custom phase plate in the secondary optics.

ThP-08

Design and Analysis of Dark Field Illumination Optics for VUV Objective Simulator

Y. Kim, B. Jeong, H. Choi, and D. Kim (The Univ. of Arizona / USA)

Due to high throughput and sensitivity of VUV based semiconductor defects inspection, TSOM technology became popular method to analyse the various defects. VUV objective based dark-field illumination optics is the core path of TSOM technology.

ThP-09

Exploring the Polarimetric Potential of the Giant Magellan Telescope

H. Tailor, R. M. Anche, G. G. Williams (The Univ. of Arizona / USA), J. J. Piotrowski (Observatories of the Carnegie Institute of Science / USA), and D. Kim (The Univ. of Arizona / USA)

Enhanced astronomical polarimetry with polarimetric optics in Giant Magellan Telescope's Commissioning Camera explores celestial asymmetries and magnetic fields. The GMT-Pol modification enables observing fainter targets, expanding scientific possibilities beyond current telescopes.

ThP-10

Fabrication, Testing, and Correction of Molded MODE Lens Telescope

N. Brar, Y. Kim, Z. Wang, Y. Zhang (The Univ. of Arizona / USA), A. Yi, Y. Cai (The Ohio State Univ. / USA), and T. D. Milster (The Univ. of Arizona / USA)

We have fabricated a multi-order diffractive objective lens for use in a telescope. Testing showed errors in fabrication, requiring correction by a grayscale CGH phase plate.

ThP-11

Requirements-Driven and Model-Based Trade Study of an Off-Axis Three Mirror System Constellation with SysML

M. Kirshner, E. Pearce, D. Gold, D. Kim, and E. Schafer (The Univ. of Arizona / USA)

This work advances automation of telescope trade studies and requirements verification by using Model-Based Systems Engineering and simulation methodologies to constrain the architectural design space for an off-axis three mirror system space domain awareness constellation.

ThP-12

Tolerance Analysis of Single Aperture Large Telescope for Universe Studies (SALTUS) Space Mission

O. Wu, H. Choi, M. Esparza, Y. Kim, Y. Takashima, D. Kim, and C. Walker (The Univ. of Arizona / USA)

This paper studies the tolerance of SALTUS that utilizes a 14-meter class inflatable primary. The adoption of an inflatable aperture leads to unusual optomechanical consideration. We evaluate tolerance and review the impact on the performance.

ThP-13

Off-Axis Three Mirror System with Integrated Primary and Tertiary Mirror

D. Gold, E. Pearce, E. Schafer, M. Kirshner, and D. Kim (The Univ. of Arizona / USA)

This paper introduces the design of an off-axis three-mirror system with integrated primary and tertiary mirrors. The compact form-factor reduces optical fabrication, testing, and alignment complexities, while simplifying the opto-mechanical structure.

ThP-14

Investigation of Graphene-MoS2 Composite or Hybrid Effect on Photovoltaic Performance of DSSCs

M. Hosseinnezhad and M Ghahari (Institute for Color Science and Technology / Iran)

Herein, DSSCs were fabricated using MoS2/graphene composite or hybrid, and to compare the results of DSSCs based on platinum. Under the same conditions, the DSSCs with MoS2/graphene composite illustrated better efficiency than MoS2/graphene hybrid.

ThP-15

Laser Polishing for Removal of Diamond Turning Marks on Polymethyl Methacrylate

N. Khatri (CSIR-Central Scientific Instruments Organisation / India, Academy of Scientific and Innovative Research / India, The Univ. of Arizona / USA), K. Manjunath (CSIR-Central Scientific Instruments Organisation / India, Academy of Scientific and Innovative Research / India), S. Singh (Thapar Institute of Engineering and Technology / India), W. Kang, and R. Liang (The Univ. of Arizona / USA)

Diamond Turning is quite popular for fabrication of nanometric surface finish, but dynamic instabilities results in residual turning marks. In this work, CO2 laser polishing is proposed to remove residual tool marks in PMMA for optical components.

ThP-16

Dispersive Properties of Radial Gradient Index Materials

A. Li and N. Carlie (Edmund Optics / USA)

Dispersive properties of radial gradient index (GRIN) materials are derived. GRIN Abbe numbers and partial dispersions are discussed. A method to evaluate and choose materials based on a glass map is proposed.

ThP-17

Photovoltaic-Thermal Side-Absorption Concentrated Module with Micro-Structures as Wavelength-Division Component for a Hybrid-Collecting Reflection Solar System

J. R. Sze (National Applied Research Laboratories / Taiwan) and A. C. Wei (National Central Univ. / Taiwan)

A photovoltaic-thermal side-absorption concentrated module (PT-SACM) for photovoltaic-thermal hybrid applications is carried out. In order to meet the requirements of wavelength division and thinner volume, the proposed module consists of micro-structures and a planar light-guide.

ThP-18

Design, Fabrication, and Testing of a Grayscale Computer-Generated Hologram

Y. Wu and T. D. Milster (The Univ. of Arizona / USA)

This paper presents the design and fabrication of a laser beam array generator holographic diffractive element using grayscale photolithography and etched into fused silica for a high-power application.

ThP-19

Polymer Assisted Laser Etching of Dielectric Materials Based Optical Diffusers

S. Devinder, S. Pandey, S. Joseph, and J. Joseph (Indian Institute of Technology Delhi / India)

In optical applications, diffusers play a crucial role, typically created by grinding transparent materials. We innovate by substituting grinding with laser engraving, a faster and automated method. Overcoming challenges with transparent substrates, we introduce a polymer coating to induce local heating, facilitating precise material etching.

ThP-20

Rotating Diffuser for Speckle Modulation in Spectrally-Encoded Line Illumination Reflectance Confocal Microscopy

M. Sugimura, K. Marcelino, R. Romero, J. Zhao, Y. Kim, A. Nessaee, K. Kim, D. Stratton, C. Curiel-Lewandrowski (The Univ. of Arizona / USA), J. Garfinkel, and G. Rubinstein (ArgosMD / USA)

The use of superluminescent diode (sLED) in Portable Confocal Microscopy (PCM) improved the signal-to-noise ratio and imaging speed but introduced speckle noise. The adoption of a rotating diffuser reduced the speckle without compromising resolution.

ThP-21

High-Resolution, Full-Freedom Spectral Tunable Light Source for Skin Discrimination

Y. Sun and R. Liang (The Univ. of Arizona / USA)

We proposed and built a high-resolution, full-freedom spectral tunable light source (Spec-TLS) to enhance color contrast of two distinct objects using optimal illumination. Simulation and experimental

results have demonstrated the performance of our Spec-TLS and improved color contrast enhancements on skin and other objects.

ThP-22

Optical Fabrication Properties of Poly(S2-TIC-Cl2): Sulfur Copolymers

B. Jeong, K. Kim (The Univ. of Arizona / USA), Y. Kim, and M. Bog (Y&DK / Korea)

This paper proposed the brittle ductile mode fabrication properties of the sulfur copolymer material. We optimized machining variables to achieve the surface roughness below 6nm after the diamond turning process.

ThP-23

Simulation Development of Autonomous Polishing Robots for Large Optics

C. C. Scoggins, V. S. Negi, K. Derby, M. A. Duque, H. Kang, and H. Choi (The Univ. of Arizona / USA)

We are developing autonomous polishing robots designed to work in tandem to vastly reduce polishing time of large optics. We develop simulations to analyze the movement and polishing capability of our design.

ThP-24

Germanium-Germanium Oxide Narrow-Band-Pass Filter for SWIR Applications

S. Chen, L. Wu, and C. Wu (National Central Univ. / Taiwan)

Leveraging the attributes of germanium/germanium oxide thin films, HiPIMS apparatus was employed to generate high/low refractive index thin films, while concurrently minimizing coating time via the application of low-thickness NBPF filter for SWIR Applications.

ThP-25

Optical Metrology of Thin Films from Interference of Interface Waves

K. Qin and A. Gao (Advanced Micro Optics Instrument / China)

A new metrology of thin films with a few microns' side length is proposed. The optical and geometrical parameters of thin films with sub-wavelength thickness can be extracted from the interference of surface plasmon waves.

ThP-26

A DMD-Based MWIR Single-Pixel Microscope Camera

T. Chung and H. Lin (National Central Univ. / Taiwan)

By reducing the cover glass thickness of a commercially available DMD, a MWIR single pixel microscope camera is realized. The MWIR image and corresponding temperature of a bare LED chip can then be obtained.

ThP-27

In Vivo Investigation of Mechanical Stress in Mice Skin via a Polarimetry Imaging System

S. Chen and C. Line (National Central Univ. / Taiwan)

Recent research shows that elongation of mice skin with appropriate tensile stress can stimulate hair follicle regeneration. A polarimetry imaging system was deployed to in vivo measure the stress required for hair regeneration.

ThP-28

Development of Optimized Illumination for Near-Infrared Fourier Ptychography Microscopy

G. Oh (Gyeongsang National Univ. / Korea)

For near-infrared Fourier Ptychography Microscopy, a camera capable of detecting near-infrared rays is essential. Illumination overlapping is improved to bypass pixel aliasing occurring in a large pixel size of a camera that detects near-infrared rays.

ThP-29

Inverted Signal Frequency Detection Method for Self-Coupling Laser Sensor Arrays by Modulation Frequency Difference

D. Sato and N. Tsuda (Aichi Institute of Technology / Japan)

In this study, we present a theoretical self-coupling laser sensor array system for inverted signal frequency detection, as well as the distance and velocity measurement results obtained by using this system.

ThP-30

Visualization of Sound Pressure Distribution in Water Using Self-Coupling Laser Hydrophone

K. Fukuyama, N. Tsuda, and D. Mizushima (Aichi Institute of Technology / Japan)

We previously fabricated a new type of hydrophone, a laser hydrophone, using the self-coupling effect of a semiconductor laser. In this study, we present an underwater sound pressure distribution measured using this laser hydrophone.

ThP-31

Automated Analysis of Scattering-Based Light Sheet Microscopy Images of Anal Tissues

Y. Kim, J. Zhao, A. Nessaee (The Univ. of Arizona / USA), B. Liang, M. Khan, E. Yang (Stanford Univ. / USA), and D. Kang (The Univ. of Arizona / USA)

Scattering-based light sheet microscopy (sLSM) has the potential to visualize cellular morphologic changes associated with anal squamous intraepithelial lesions. We developed an algorithm that automatically analyzes sLSM images based on image intensity.

ThP-32

Deconvolution of In Vivo Cross-Polarized Microscopy Images of Individual Melanocytic Cells

R. Romero, Y. Kim, J. Zhao, D. Stratton, M. Sugimura, K. Marcelino, C. Curiel-Lewandrowski, and D. Kang (The Univ. of Arizona / USA)

Cross-polarized microscopy is capable of imaging individual pigmented cells in vivo. We developed a modified deconvolution method to improve image sharpness for melanocytic cells with minimal artifacts.

ThP-33

Differential Interference Contrast Microscope Using a Polarization Camera

Y. Otani, W. Takano, J. Onaka, N. Hagen, and M. Matsuda (Utsunomiya Univ. / Japan)

A quantitative differential interference contrast microscope is proposed for observing phase and amplitude of a transparent sample without any staining. Phase gradients of shearing area can be analyzed by a polarization camera. It is succeeded to analyze video quantitative phase and to reconstruct 3D images from multiple images.

ThP-34

Mueller Matrix Polarimetry in the Near-Field Region

S. Ohkubo (National Institute of Technology Numazu College / Japan)

This paper describes the development of a near-field Mueller matrix polarization microscope capable of measuring various polarization properties at once, and obtaining Mueller matrix image in the nano region using that equipment.

ThP-35 (Withdrawn)

ThP-36

Stain-Free Biomedical Imaging Using Ultraviolet Fourier Ptychography Microscopy

R. You and R. Liang (The Univ. of Arizona / USA)

We demonstrate a novel implementation of Fourier ptychography microscopy (FPM) that leverages ultraviolet (UV) light, UV-FPM, to perform high-throughput, stain-free biomedical imaging by successfully capturing high-throughput with strong contrast cervical cells and oral cells images.

ThP-37

A White-Light Spectrum Generator for Multi-Channel Illuminator by Using Artificial Neural Network

Y. Chen, K. Huang, H. Chung, and Y. Cheng (National Central Univ. / Taiwan)

This study utilizes genetic algorithms to generate a white-light spectrum database with different color temperatures for a 14-channel LED illuminator. Subsequently, a neural network is trained to establish a white-light spectrum generator.

ThP-38

Optical Design and Granularity in Heterogeneous Array Cameras

Z. Dong (The Univ. of Arizona / USA)

This paper presents an array camera system integrating multiple lenses and sensors for 288-megapixel resolution, enhancing image quality and versatility in applications ranging from sports analytics to surveillance, powered by advanced computational algorithms and microcomputers.

ThP-39

Numerical Simulations on Image Recognition by Self-Referential Holographic Deep Neural Network with Electronic Output Layer

R. Tomioka, T. Takatsu, and M. Takabayashi (Kyushu Institute of Technology / Japan)

We numerically demonstrate a 4-class image recognition task using a self-referential holographic deep neural network (SR-HDNN) and verify the effectiveness of the use of electronic processing as the final layer.

ThP-40

Numerical Analysis on Contributions of Individual Layers in Self-Referential Holographic Deep Neural Network

T. Takatsu, R. Tomioka, and M. Takabayashi (Kyushu Institute of Technology / Japan)

We have investigated the contribution of the training pattern at each layer to the overall result of an image recognition task in a self-referential holographic deep neural network (SR-HDNN).

ThP-41

Modeling Non-Local Aberration Correction of Spaceplates

T. D. Milster (The Univ. of Arizona / USA), Y. Shao (Stanford Univ. / USA), Z. Wang, Y. Kim (The Univ. of Arizona / USA), R. Lupoiu, and J. Fan (Stanford Univ. / USA)

The two-dimensional spot characteristics of an optical system containing a spaceplate that deviates rays as a non-local function of angle of incidence onto the plate are discussed.

ThP-42

Spaceborne Optical Frequency Comb Based on a Figure-8 Mode-Locked Fiber Laser for Highly-Stable Microwave Generation System

Y. Takeuchi, T. Yamada, Y. Tanaka, N. Takagi, T. Kurihara, and M. Musha (The Univ. of Electro-Communications / Japan)

We present the performance of our spaceborne optical frequency comb based on an all-polarization-maintaining figure-8 mode-locked fiber laser, repetition frequency of which is phase-locked to the microwave frequency reference for over 48 hours.

ThPDP-43

High-Response KTN Crystal Devices at Phase Transition Temperature for Longitudinal and Holographic Electro-Optic Modulation

H. Sakai, T. Watanabe, and H. Tanaka (Hamamatsu Photonics / Japan)

This study presents switching electro-optic devices based on the Kerr effect in KTN crystals, which exhibit a relative dielectric constant exceeding 10,000. The frequency dependence of the measured capacitance demonstrates stability up to the cutoff frequency.

ThPDP-44

Silicon Backplane Development Utilizing Frame Buffer Pixel Circuit for Polarization-Independent Liquid Crystal on Silicon Phase Modulator

Q. Zhang, I. Zachmann, L. Ji, and C. Mao (The Ohio State Univ./ USA)

We developed a polarization-independent liquid crystal on silicon (PI-LCoS) phase modulator with a thin-film quarter-wave plate (QWP) and a novel pixel circuit-based silicon backplane, enhancing performance in wavelength selective switches (WSS), adaptive optics, and holographic applications.

16:00-16:30 Coffee Break

16:30-17:30 [Th1B] C1. Optical Design/Simulation/Fabrication Room: ILC120

Presiders:

T. Kashiwao (Kindai Univ. / Japan)
N. Hagen (Utsunomiya Univ. / Japan)

Th1B-01

(16:30) Wide-Range and Accurate Temperature Sensing with Micro-Lens-Array

A. Sasaki (Keio Univ. / Japan, ANAX Optics / Japan), O. Kirino (ANAX Optics / Japan), A. Beaucamp (Keio Univ. / Japan, ANAX Optics / Japan), and K. Tatsumi (Kyoto Univ. / Japan)

A multi-focal depth (10-80 mm) micro-lens-array is designed for use as objective lens in a remote temperature measurement system. System performance is evaluated by ray tracing simulation and experiment, comparing favourably against an aspheric system.

Th1B-02

(16:45) Multifocal Array Camera System Design

S. Zhu, Z. Dong, G. Hageman, J. Sasian, and D. Brady (The Univ. of Arizona / USA)

This paper presents a multifocal array camera system design with fixed-focus lenses that eliminates the need for active focus. A shallow working distance and tight manufacturing tolerances enable compact narrow field f/2.8 microcameras.

Th1B-03

(17:00) Straylight Analysis of a MODE Lens Telescope

Y. Kim, Z. Wang, N. Brar, and T. D. Milster (The Univ. of Arizona / USA)

The straylight analysis of multi-order diffraction engineered (MODE) lens telescope is an essential step in the evaluation of the telescope. Straylight of MODE telescope can be minimized to prevent unwanted photons from reaching the detectors.

Th1B-04

(17:15) Development of a Low-Cost Production Technology for High-Performance Space Telescopes

O. Kirino (KIYOHARA Optics / Japan, Crystal Optics / Japan), H. Shinonaga, K. Kiyohara (KIYOHARA Optics / Japan), and H. Nakagawa (Crystal Optics / Japan)

As a low-cost production technology for high-performance space telescopes, we propose a new production method to minimize the transmitted wavefront error, which represents the telescope's performance, by corrective polishing only of the secondary mirror.

17:30-18:00 Break

18:00- Banquet
(at Bear Down Gym)

July 12, 2024 (Friday)

9:00-10:25 [F1C] C1. Optical Design/Simulation/Fabrication Room: ILC120

Presiders:

T. Yamanashi (Theta Optical / USA)
C. Liang (National Central Univ. / Taiwan)

F1C-01 (Invited)

(9:00) Is Less More? Compact Imaging Systems with Freeform Optics and Metasurfaces

D. K. Nikolov, J. P. Rolland, and A. Bauer (Univ. of Rochester / USA)

"Less is more" is an appealing approach for the design of compact imaging systems. We explore the fundamental limitations of this philosophy through the lens of recent advancements in freeform optics, metasurfaces, and metaforms.

F1C-02

(9:25) Developing a Reconstruction Algorithm Using a Pseudo-Inverse Operator for 3D Birefringence from Tomographic Polarimetry

M. Seigo (The Univ. of Arizona / USA, Nalux / Japan), H. Fukui, S. Kawano (Nalux / Japan), and M. Kpinski (The Univ. of Arizona / USA)

A method using a pseudo-inverse operator is proposed for reconstructing original 3D ellipsoids from multiple cross-sectional 2D ellipsoids. This mathematical framework is developed to design a tomographic reconstruction for 3D birefringence distribution of injection-molded lenses.

F1C-03

(9:40) All-reflective, Unobscured, Freeform Microscope Fabrication and Testing

W. Kang, T. Peterson, H. Ma, D. Wang, and R. Liang (The Univ. of Arizona / USA)

An all-reflective, unobscured, freeform mirror microscope has been designed and fabricated. It overcomes the dispersion suffered by microscopes with refractive lenses, eliminates the need for active alignment, and supports wide-spectrum biological imaging from ultraviolet to infrared.

F1C-04

(9:55) Design of a Multi-Functional Fundus Imaging Device with Integrated Display and Eye-Tracking Capabilities

Y. Lu and H. Hua (The Univ. of Arizona / USA)

The paper introduces a stock element fundus imaging device capable of image capture, display, and eye-tracking, using beam splitters for optical path division and near-infrared illumination for eye-tracking.

F1C-05

(10:10) Fabrication and Performance of a Wavefront Coding Element for Presbyopia

B. A. Cvarch (The Univ. of Arizona / USA), E. Acosta (Univ. of Santiago de Compostela / Spain), E. G. Amador (Polytechnic Univ. of Tulancingo / Mexico), J. Arines (Univ. of Santiago de Compostela / Spain), Y. Kim, S. Park, M. Bog (Y&DK / Korea), and D. Kim (The Univ. of Arizona / USA)

This study presents a novel wavefront coding design based on non-symmetric phases for extending the range of clear vision of intraocular lenses. The design was verified through simulation and manufactured using single point diamond turning.

9:00-10:25 [F3C] C3. Optical Systems Room: ILC140

Presiders:

S. Manuel (Lawrence Livermore National Laboratory / USA)
F. Willomitzer (The Univ. of Arizona / USA)

F3C-01 (Invited)

(9:00) Self-Referential Holography Meets AI Technologies

M. Takabayashi (Kyushu Institute of Technology / Japan)

Recent progresses on AI-enhanced optical data storage based on self-referential holography (SRH), self-referential holographic data storage (SR-HDS), and optoelectronic neural network hardware based on SRH, self-referential holographic deep neural network (SR-HDNN), are introduced.

F3C-02

(9:25) Mitigating Strong Turbulence Effects in Free-Space Optical Communications with Wavelength Diversity as a Cost-Effective Alternative to Adaptive Optics

V. Nafria and I. B. Djordjevic (The Univ. of Arizona / USA)

We demonstrate that the C+L-bands-based wavelength diversity scheme outperforms the corresponding adaptive optics scheme operated in an LDPC-coded 1.5□km long free-space optical low probability of intercept (LPI) communication link in strong atmospheric turbulence regime.

F3C-03

(9:40) Diffractive Beam Steering for Time-of-Flight Lidar by MEMS Spatial Light Modulators

R. Shrestha, L. A. McKenna, Y. Zhang, E. R. Varghese, X. Deng, J. C. Chamg, Y. Kaneda, and Y. Takashima (The Univ. of Arizona / USA)

A diffractive beam steering by MEMS spatial light modulator enables a new lidar optical architecture that hybridizes point-and-shoot lidar for a long-range and a flash lidar for wide field-of-view and short-range while employing solid-state components.

F3C-04

(9:55) Model-Based Three-Dimensional Digital Image Vibration Measurement Method Using Stereo High-Speed Cameras

W. Qin, K. Shimasaki, F. Wang, S. Hu, and I. Ishii (Hiroshima Univ. / Japan)

By introducing three-dimensional model, a three-dimensional vibration measurement method based on digital image correlation using stereo high-speed cameras is proposed to overcome the problems of conventional methods. An experiment using a speaker verified its effectiveness.

F3C-05

(10:10) Polarimetry with a Flexible Fiber Bundle Enabled by a Pixelated Polarizer

N. Lima and T. W. Sawyer (The Univ. of Arizona / USA)

Spatially resolved polarimetric information is measured through a flexible coherent imaging fiber bundle. The use of a pixelated polarizer enables this novel work.

10:25-10:35 Short Break

10:35-11:45 [F1D] C1. Optical Design/Simulation/Fabrication Room: ILC120

Presiders:

Y. Kim (The Univ. of Arizona / USA)

O. Kirino (Crystal Optics / Japan)

F1D-01 (Invited)

(10:35) Industrial Wavefront Metrology toward 100% Inspection

C. Liang (National Central Univ. / Taiwan), B. Peng, and G. Lin (Tacoptics / Taiwan)

In response to the transition from per-cavity to per-lens testing, an automatic wavefront metrology system is developed. It meets high-volume optical testing needs by simultaneously measuring surface centration and aspheric wavefront profile without optical null.

F1D-02

(11:00) Large Shift Diffractive Chromatic Objective for Chromatic Confocal Microscopy

R. Liang, J. Chen, S. Li, W. Kang, and S. Guan (The Univ. of Arizona / USA)

We designed and manufactured a new objective using diffractive optical elements to achieve the long chromatic shift. This chromatic microscope allows for the simultaneous capture of images within large depth, while maintaining the lateral resolution of 780nm.

F1D-03

(11:15) Design of the Hyperchromatic Objective

S. Li, W. Kang, J. Chen, and R. Liang (The Univ. of Arizona / USA)

Chromatic confocal microscopy eliminates mechanical axial scanning to simplify the system and enhance measurement efficiency. We design a custom chromatic confocal objective to introduce large longitudinal chromatic aberration in Zemax.

F1D-04

(11:30) Through-Focus Scanning Intensity Profile Simulation for Semiconductor Inspection System Development

B. Jeong, H. Choi, Y. Kim, and D. Kim (The Univ. of Arizona / USA)

This paper presented through-focus re-irradiation simulation to detect the scattering from the semiconductor structure. The wave propagation of the infinitesimal structure is an essential process in semiconductor inspection in through-focus scanning optical microscopy (TSOM) system.

10:35-11:30 [F3D] C3. Optical Systems Room: ILC140

Presiders:

M. Hanft (Carl Zeiss / Germany)
M. Kupinsky (The Univ. of Arizona / USA)

F3D-01 (Invited)

(10:35) Slimming Optical Systems and Boosting Performance with Differentiable Imaging

N. Chen (The Univ. of Arizona / USA)

Computational imaging necessitates a harmony between physical encoding and computational decoding, often leading to the need for additional hardware or measurements that can compromise imaging performance. Our research suggest that differentiable imaging offers an effective approach to navigate these challenges across multiple imaging systems.

F3D-02

(11:00) Radial Distortion Measurement Using Retinal Images of a Tunable Eye Model

Y. Guan, J. Schwiegerling, T. W. Sawyer, and F. Willomitzer (The Univ. of Arizona / USA)

We demonstrate a first-generation system to measure the distortion value in the retinal images of an eye model with the presence of various degrees of ametropia. Our system can be used to examine the relation between lens-induced distortion and myopia progression in future research studies.

F3D-03

(11:15) Three-Dimensional Object Tracking Using Waveguide Digital Holographic Microscopy

A. Tabuchi, K. Hayashi, M. Faheem, Y. Murai, Y. Kikuchi, and E. Watanabe (The Univ. of Electro-Communications / Japan)

The Digital Holographic Microscope is a potent tool for bioimaging. We developed an ultra-compact Waveguide Digital Holographic Microscope and quantitatively evaluated its specifications. We also demonstrated object imaging and tracking in three-dimensional space.

F3D-04 (Withdrawn)

11:45-13:15 Lunch

13:40-14:25 [F2C] C2. Optical Components / Devices Room: ILC120

Presiders:

A. Tabuchi (The Univ. of Electro-Communications / Japan)
J. Jones (The Univ. of Arizona / USA)

F2C-01 (Withdrawn)

F2C-02

(13:40) Real-Time 3D Objects Generation by MEMS Phase Light Modulator Based on Camera Input for ADAS Applications

Y. Zhang (The Univ. of Arizona / USA)

A newly available MEMS Phase Light Modulator and accelerated CGH calculation enables real-time generation of 3D point cloud and line objects rendered from camera input.

F2C-03

(13:55) Towards Fast and High-Resolution Adaptive Optics Using Phase Light Modulators

J. M. Bass, J. Y. Chen, G. M. Nero, T. L. Koch, Y. Kaneda, I. B. Djordjevic, F. Willomitzer, and Y. Takashima (The Univ. of Arizona / USA)

Adaptive optics systems traditionally use deformable mirrors with key resolution and speed limitations. We demonstrate first steps toward a high-resolution adaptive optics system using a recent Texas Instruments Phase Light Modulator capable of kHz speeds.

F2C-04

(14:10) Improving Efficiency of Reflective MEMS Spatial Light Modulators for Infrared Applications by Engineering Cover Glasses

E. R. Varghese, X. Deng, Y. Kaneda, and Y. Takashima (The Univ. of Arizona / USA)

Mismatch of wavelength to anti-reflective (AR) coating decreases throughput of MEMS spatial light modulators due to reflective loss of cover glasses. Removing single side of AR coatings recovers throughput with p-polarization illumination at a large angle of incidence.

13:15-14:25 [F4C] C4. New Technologies Room: ILC140

Presider:

K. Komuro (Nikon Research Corporation of America / USA)

F4C-01 (Invited)

(13:15) Computational 3D Video Microscopy with Multi-Camera Arrays

R. Horstmeyer (Duke Univ. / USA)

This talk describes our recent work with multi-camera array imaging platforms, which provide novel high-speed, high-resolution, large area 3D mesoscopic imaging capabilities at multi-gigapixels-per-second.

F4C-02

(13:40) Fundamental Properties of Beam-Splitters in Classical and Quantum Optics

M. Mansuripur and E. Wright (The Univ. of Arizona / USA)

We examine a pair of (nearly) single-mode wave-packets in the number-states $|n1\rangle$ and $|n2\rangle$ that simultaneously arrive at a beam-splitter's input ports, and find the distribution of photon-number states at the output ports using an argument inspired by Feynman's scattering analysis of indistinguishable Bose particles.

F4C-03

(13:55) Enhanced Surface Second Harmonic Generation from Resonant Silicon Nano-Structures

K. Ueda, S. Hirayama (The Univ. of Tokyo / Japan), R. Fujimura (Utsunomiya Univ. / Japan), and T. Shimura (The Univ. of Tokyo / Japan)

It is shown that surface SHG can be enhanced by array of silicon nanostructures numerically. Huge enhancement up to the order of 105 is realized when the Mie resonance and Bloch resonance occurs simultaneously.

F4C-04

(14:10) Towards Synthetic Wavelength Imaging through Multi-Mode Fibers

S. Forschner, P. Cornwall (The Univ. of Arizona / USA), M. Ballester (Northwestern Univ. / USA), M. M. Balaji (Southern Methodist Univ. / USA), J. Czarske (The Univ. of Arizona / USA, Dresden Univ. of Technology / Germany), and F. Willomitzer (The Univ. of Arizona / USA)

This work exploits synthetic wavelength imaging to circumvent scattering artifacts and measure phase fronts emerging from multi-mode fibers. These fibers behave as single-mode fibers at synthetic wavelengths, enabling the possibility to acquire unspeckled wavefronts and range information.

14:25-14:35 Short Break

14:35-15:30 [F2D] C2. Optical Components / Devices Room: ILC120

Presider:

R. Liang (The Univ. of Arizona / USA)

F2D-01 (Invited)

(14:35) Kyocera Low Thermal Expansion Ceramic : Fine-Cordierite for Space Optics

K. Ho, M. Kamiura, S. Iwashita, K. Ishiyama, and K. Kitanaka (Kyocera / Japan)

"Fine-Cordierite" is suitable for space optics as optical mirror substrates and structural components. Its primary feature is zero expansion at room temperature, which contributes to the improvement of optical performance in your system.

F2D-02

(15:00) Linear Wavenumber Sweeping in External Cavity Laser Diode Based on an Acousto-Optic Technique

T. Suzuki, X. Ji, S. Choi, and O. Sasaki (Niigata Univ. / Japan)

Novel swept source configured by an external cavity laser diode is described. An acousto-optic technique enables linear wavenumber sweep with a simple configuration. Experimental results confirm the wavelength range of 120 nm at 1310 nm.

F2D-03

(15:15) Polibot: Concept and Early Prototypes for an Autonomous Mirror Polishing Robot to Accelerate the Fabrication of Large Reflective Optics

K. Z. Derby, M. Duque, C. Scoggins, H. Kang, V. S. Negi, C. Lee, and H. Choi (The Univ. of Arizona / USA)

We propose a novel method to accelerate the mirror polishing process using multiple autonomous polishing robots called “Polibots”. These are guided by an overhead camera which can then be used for in-situ metrology using deflectometry.

14:35-15:30 [F4D] C4. New Technologies Room: ILC140

Presider:

R. Horstmeyer (Duke Univ. / USA)

F4D-01 (Invited)

(14:35) Recent Progress of Computational Optical Scanning Holography

N. Yoneda and O. Matoba (Kobe Univ. / Japan)

Computational optical scanning holography (COSH), one of single-pixel holography techniques, have been applied to various applications such as phase, polarization, and scattering imaging so far. Recent progress of COSH is reviewed in this presentation.

F4D-02

(15:00) Progress on Demonstration of a MODE-Lens Telescope

T. D. Milster, N. Brar, Y. Kim, H. Choi, M. Esparza, D. Kim (The Univ. of Arizona / USA), A. Yi, Y. Cai (The Ohio State Univ. / USA), G. H. Kim (Hanbat National Univ. / Korea), and D. Apai (The Univ. of Arizona / USA)

A multiple-order-diffractive engineered (MODE) surface lens telescope is being developed for eventual use in space. This presentation provides the current status of the project.

F4D-03

(15:15) Coherence-Based Lensless Imaging and Telescopy

A. P. Jillella (The Univ. of Arizona / USA, Advanced Semiconductor Materials Lithography / USA) and T. D. Milster (The Univ. of Arizona / USA)

We propose a coherence-based lensless imaging method using an X-aperture that creates a diffraction pattern used to measure the mutual coherence function of an extended object. Multiple measurements are used to reconstruct the object.

15:30-16:00 Coffee Break

16:00-18:00 Special Session Room: ILC120

Presider:

Y. Takashima (The Univ. of Arizona / USA)

FSS-01 (Invited)

(16:00) The quest for a harmonious blend of bits and atoms

H. Hua (The Univ. of Arizona / USA)

In this talk, I will give a brief overview of the OASIS project which aims to establish a regional ecosystem focusing on optics for autonomous services and intelligent systems. I will then review the recent progress, challenges, and opportunities for developing virtual and augmented reality displays for improved visual comfort.

FSS-02 (Invited)

(16:20) Camera Modules for Ubiquitous Imaging

F. Willomitzer *(The Univ. of Arizona / USA)*

Integrated processing units combining camera modules, coded illumination and wavefront imaging enable a novel form of standardized imaging system for autonomous systems. Standardized visual processing units are essential for sustainable development of such systems.

FSS-03 (Invited)

(16:40) Diffractive Information Processing and Computational Imaging

A. Ozcan (Univ. of California Los Angeles / USA)

I will discuss diffractive optical networks designed by deep learning to all-optically implement various complex functions as the input light diffracts through spatially-engineered surfaces.

FSS-04 (Invited)

(17:00) Advancements in Deflectometric Optical Testing for Industrial Precision

H. Choi, H. Kang, Y. Huang, and D. Kim (The Univ. of Arizona / USA)

In industrial inspection and testing, diverse specifications and metrology precision are crucial. Deflectometry, a renowned non-null optical test, adapts system layouts to fulfill varied testing needs. We've developed deflectometry systems to address diverse industrial applications. This paper outlines multiple deflectometry systems and their testing outcomes.

FSS-05 (Invited)

(17:20) Use of Computer Generated Holograms for Aligning Optical Systems

J. Burge (Arizona Optical Metrology / USA)

The application of interferometry with Computer Generated Holograms is well known for measuring precision optical surfaces. The accuracy and flexibility of this method also enables efficient alignment and calibration of complex optical systems.

(17:40) Free Discussion

All the speakers sit in front of the audiences and have a free discussion on what would happen within 5-10 years of time span, and how to make the OASIS concept happen.

18:00-18:30 Closing Session Room: ILC120

Presider:

H. Kawano (Mitsubishi Electric / Japan)

Best Paper Award

J. Sasián (The Univ. of Arizona / USA)
Y. Kawata (Shizuoka Univ. / Japan)
D. Kim (The Univ. of Arizona / USA)
H. Kawano (Mitsubishi Electric / Japan)

Closing Remarks

Y. Takashima (The Univ. of Arizona / USA)
M. Hasegawa (Canon / Japan)

INSTRUCTIONS FOR SPEAKERS

All speakers are required to register for participation in ODF'24. English will be used for all presentations and printed materials.

(Oral presentation)

Oral session will be held in “ILC120 (Integrated Learning Center 120)” or “ILC140 (Integrated Learning Center 140)”. The presentation time will be 40 minutes for plenary session (including 5 minutes discussion), 25 minutes for invited papers (including 5 minutes discussion) and 15 minutes for contributed papers (including 3 minutes discussion). The format of the special session is as follows. First, speakers present their topic for 20 minutes as a short presentation (including 5 minutes discussion). After the presentation, all the speakers sit in front of the audience, and have a free discussion for 20 minutes. The total time will be 120minutes for special session. An attention bell will be given three times as in the table below. A PC-based data projector is available.

Speakers are asked to bring their presentation files with their own USB thumb drive. It is the presenter's responsibility to copy your presentation file as soon as possible in each session room at any break in advance to the session of your presentation. The file must be compatible with Microsoft PowerPoint or Adobe Acrobat on Microsoft Windows indicated above. Your presentation file will be surely deleted after the session.

(1) Presentation time

	Presentation	Discussion	Total
Plenary Session	35min.	5min.	40min.
Invited Papers	20min.	5min.	25min.
Contributed Papers	12min.	3min.	15min.
Short Presentation for Special Session	15min.	5min.	20min.

(2) Attention bell

	1st bell	2nd bell (End of Speech)	3rd bell (End of Discussion)
Plenary Session	30min.	35min.	40min.
Invited Papers	15min.	20min.	25min.
Contributed Papers	10min.	12min.	15min.
Short Presentation for Special Session	12min	15min	20min

(Poster presentation)

Poster session will be held in “ILC141 (Integrated Learning Center 141)” on Thursday, 11 July.

	Time
Poster Session	Preparation: By 13:00 on July 11 Presentation: 13:00-16:00 on July 11 Removal: By 13:00 on July 12

Poster boards will be around 1.22 m high and 2.41 m wide boards. Two authors will share one side of the board. The two A0 portraits (841 x 1189 mm) can be placed side by side on the board. Poster should have minimum font size for text of 18 pt. Text and graphics should be readable from at least one meter.

Authors must remain in the vicinity of the bulletin board during the specified time slot to answer questions in Englis. The specified time slot for authors with odd-numbered poster (ThP-01, ThP-03, …) is from 13:00 to 14:30 (90 minutes). The specified time slot for authors with even-numbered poster (ThP-02, ThP-04, …) is from 14:30 to 16:00 (90 minutes). Authors are required to remove all the materials on the bulletin board by 13:00 on July 12th.

To start the session on time each author must complete the preparation 15minutes before. Poster numbers will be displayed on the upper left side on the bulletin board.

BEST PAPER AWARD

The best paper among the contributed papers will be awarded through the examination by the program committee at the end of the conference. There are four types of awards available:

- Best Paper Award
- Best Poster Award
- Student Paper Award
- Student Poster Award

POST-DEADLINE PAPERS

Post-deadline papers will be accepted for presentation in poster sessions. The latest and most significant results obtained after the regular deadline are most welcome.

35-word Abstract: The 35-word abstract should be a brief summary of the work. If the submission is accepted for presentation, this 35-word abstract will be included in the Advanced Program.

2-page Summary (up to 2 pages maximum): The author must include all text, including the 35-word abstract, title, authors, equations, tables, photographs, drawings, figures, and references. The text should be typed single-spaced. Refrain from using asterisks, job descriptions, or footnotes.

Page Format: A4, 8.27 in. × 11.69 in. paper (210 mm by 297 mm) with 1-inch margins (2.54 cm) on all sides

Accepted 2-page summaries will be disclosed on the first day of the conference.

Please submit your 35-word Abstract & 2-page on the website.

https://reg-cloud.com/odf24abstract/Entry/login.aspx

For the layout of manuscript, please see the Guidelines on the ODF'24 website.

http://www.odf.jp/submission.html

The deadline for submission of post-deadline papers is on May 25, 2024.

Review result will be noticed by June 15, 2024. As well as the regular submission, the copyright of the article published in the ODF'24 Technical Digest is to be transferred to the Optical Society of Japan (OSJ). The authors are required to agree to the copyright transfer when the 35-word abstract and the 2-page manuscripts are submitted.

For inquiries, please contact ODF'24 Secretariat:

odf24@pacmice.jp

ODF'24 SPECIAL ISSUE OF OPTICAL REVIEW

The special issue of OPTICAL REVIEW, the journal of the Optical Society of Japan, for the 14th International Conference on Optics-Photonics Design & Fabrication "ODF'24, Tucson" will be published in July 2025. All contributors of ODF'24 are strongly encouraged to submit their original papers for this special issue. Submissions from invited speakers are also welcome.

Submissions will be accepted from July 13th, 2024 to September 30th, 2024. Please check the website for the application form.

Please note that all the submitted papers must be at least 4 pages in length and will be accepted based on the editorial policy of OPTICAL REVIEW.

The following is the submission site of Springer, the publishing company.
http://www.editorialmanager.com/opre/default.aspx

If you need further information, please contact Hiroyuki Kawano at the address below:

Topical Editor, ODF'24 Special Issue: Dr. Hiroyuki Kawano
Mitsubishi Electric Corp.
E-mail: or_special_issue@odf.jp

REGISTRATION

- **Registration Fee (USD)**

The registration fee includes admission to technical sessions and online Technical Digest. As for the person who paid the registration fee, the reception fee is free except for students. Students may attend the reception for an additional fee.

Type	Before / on Jun. 9th, 2024**	After Jun. 9th, 2024**
Member*	USD 550	USD 600
Non-Member	USD 600	USD 650
Student	USD 100	USD 100
Invited	USD 300	USD 300
Reception For Student	USD 100	USD 100

[*] Member of sponsor and cooperative society
[**] Time in Arizona (GMT -7, MST)

- **Registration**

Participants in ODF'24 are required to register on the registration page. The deadline for advanced registration is June 9th, 2024.

Online registration: http://www.odf.jp/registration.html

- **Cancellation Policy**

There will be no refunds for the registration fee.

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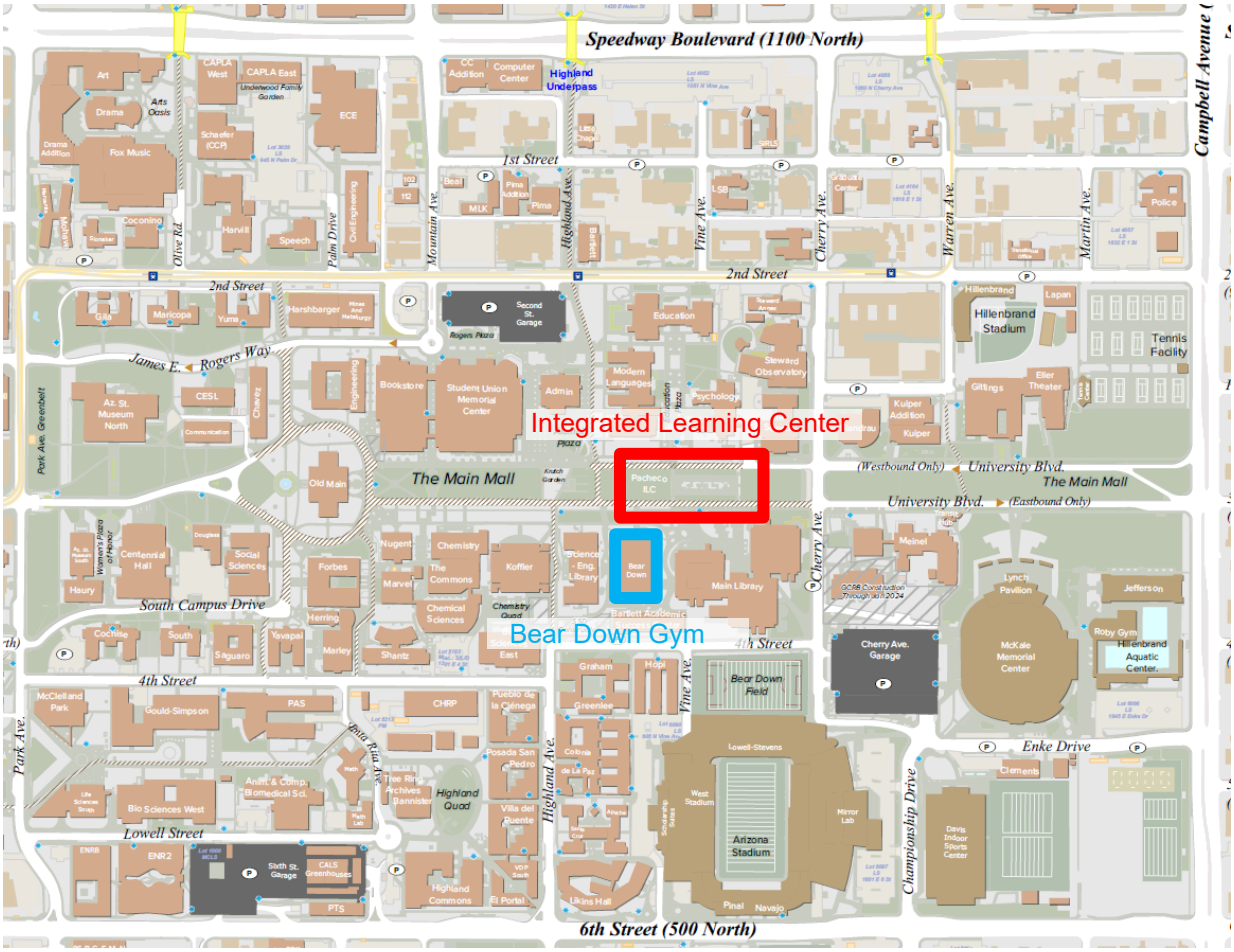
CONFERENCE SITE

ODF'24, Tucson, will be held at The University of Arizona, Tucson, Arizona, U.S.A.
Access: https://www.arizona.edu/

CAMPUS MAP



FLOOR MAP (Integrated Learning Center)

Deadlines

Post Deadline Papers:	May 25, 2024
Discount Registration:	June 9, 2024
On-site Registration：	July 10-July 12, 2024

For information mail

About Post-deadline papers, Registration, and Best paper award:

odf24@pacmice.jp

ODF'24 special issue of optical review:

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