ADVANCE PROGRAM

ISOM'25

IN COOPERATION WITH

The Japan Society of Applied Physics (JSAP)

SPIE

The Magnetics Society of Japan (MSJ)

The Institute of Electronics, Information and Communication Engineers (IEICE)

The Chemical Society of Japan

Information Processing Society of Japan

The Institute of Electrical Engineers of Japan

The Institute of Image Electronics Engineers of Japan

The Institute of Image Information and Television Engineers

The Japan Society for Precision Engineering

The Laser Society of Japan

International Symposium on

Imaging, Sensing, and Optical Memory 2025

LIGHT CUBE UTSUNOMIYA,

Utsunomiya, Tochigi, Japan

Oct. 19 - 22, 2025

SPONSORED BY

- The Optical Society of Japan (OSJ)

COSPONSORED BY

-Optoelectronics Industry and Technology Development Association (OITDA)

FINANCIALLY SUPPORTED BY

-Support Center for Advanced Telecommunications Technology Research, General Incorporated Foundation

-Nippon Sheet Glass Foundation for Materials Science and Engineering

-Konica Minolta Science and Technology Foundation

-The Takano Eiichi Optical Science Funds

-Utsunomiya Convention & Visitors Bureau

https://isom.jp/

ver.2025.8.26

Symposium Schedule

	Oct. 19, Sun	Oct. 20, Mon	
	Registration 15:00 – 17:20	Registration 8:00 – 13:00	
8:40			8:40
9:00		**Mo-A** Opening Remarks & Keynote	9:00
		Short Break	
10:00		**Mo-B** Display	10:00
		Break	
11:00		**Mo-C** Imaging for Measurement and Analysis	11:00
12:00			12:00
13:00		Lunch	13:00
14:00		**Mo-D** Digital Holography I	14:00
15:00		Break	15:00
16:00		**Mo-E** Optical Memory I	16:00
		Short Break	
17:00		**Mo-F** Information Processing and Microfabrication	17:00
18:00	Get Together (17:00 ~ 19:00)		18:00
19:00			19:00
20:00			20:00

	Oct. 21, Tue	Oct. 22, Wed	
	Registration 8:00 – 13:00	Registration 8:00 – 13:00	
8:40			8:40
9:00	**Tu-A** Optical Memory II	**We-A** **[Special Session]** Frontiers in Computational Imaging: Beyond Conventional Optics	9:00
10:00	Break		10:00
11:00	**Tu-B** Digital Holography II	Break **We-B** Materials, Components, and Devices	11:00
12:00	ISOM'26 Announcement & Photo		12:00
13:00	Lunch	Lunch	13:00
14:00	**Tu-C** Special Invited	**We-C** LiDAR	14:00
	Short Break	Short Break	
15:00	**Tu-D** Optical Structures for Imaging and Sensing	**We-PD** Post Deadline	15:00
		Short Break	
	Break	**Awards & Closing**	
16:00			16:00
17:00	**Tu-E** Poster Session		17:00
18:00	Break		18:00
19:00	Banquet (18:15 ~ 20:15)		19:00
20:00			20:00

WELCOME TO ISOM'25

WELCOME STATEMENT FROM THE ORGANIZING COMMITTEE CHAIRPERSON

The 35th ISOM (ISOM'25) will be held from Oct. 19 to Oct. 22, 2025, at LIGHT CUBE UTSUNOMIYA in Tochigi, Japan.

On behalf of the ISOM organizing committee, I am delighted to welcome all of you to the ISOM'25.

The previous symposium, held in Himeji, Hyogo, Japan, brought together 120 participants from Asia and Europe. A total of 89 papers were presented, including 15 invited talks and special lectures. Attendees enjoyed engaging in face-to-face discussions, exchanging ideas, and strengthening relationships through both technical sessions and social activities.

We believe that ISOM's activities have been highly fruitful, yielding significant achievements. Since the first ISOM in 1987, numerous papers have been presented and discussed in depth at the symposium, leading to new developments and applications in the field of optical memory. These contributions have not only driven innovation in optical memory technology but have also supported the economic growth of industries related to optical memory.

In 2017, ISOM broadened its scope to include a wider range of optical fields and applications, and subsequently changed its name to the *International Symposium on Imaging, Sensing, and Optical Memory*. The renewed ISOM now encompasses image sensing, medical and bio-optics, nano-photonics, information systems, holographic technologies, as well as optical memory. We believe this expansion will foster technological innovation and create new applications across all areas represented at the symposium.

I sincerely encourage all participants of ISOM'25 to actively engage in discussions on next-generation optical memory technologies and their novel applications.

Takanori Nomura
ISOM'25 Organizing Committee, Chairperson

INTRODUCTION

The 35th ISOM (ISOM'25) will be held from Oct. 19 to Oct. 22, 2025 at Utsunomiya.

The origin of ISOM is SOM (Symposium on Optical Memory), which was held firstly in 1985 in Tokyo as a Japanese domestic symposium. The first ISOM (International Symposium on Optical Memory) was held in 1987 also in Tokyo. Until 1994, ISOM and SOM were held alternately every other year, and since 1995, ISOM has been held every year. The total number of papers of the past symposiums has reached 3,912, and the total number of participants has reached 11,073.

The purpose of the symposium was to provide a forum for information exchange on a broad range of topics covering science and technology in optical memory and its related fields. However, information explosion in the internet and cloud service has been enforcing optical memory to change from that for consumer storage to that for enterprise storage. Many colleagues of us have been seeking for new frontiers of optical memory technologies. Considering this situation, the scopes of ISOM are continuously updated and have been reorganized in 2016. To further highlight them, the official name of ISOM was changed from "International Symposium on Optical Memory" to "International Symposium on Imaging, Sensing, and Optical Memory" in 2017. Presentations related to the new scopes as well as the conventional ones would be strongly encouraged.

In ISOM'25, along this direction, it will be very much expected to discuss the current status of optical memory, imaging, sensing, and other related technologies. In recent years, there has been a significant increase in presentations on topics other than optical memory, and lots of papers have been submitted in this ISOM.

As the COVID-19 pandemic has calmed down, we are now able to hold face-to-face events. Therefore, this ISOM will be held as a face-to-face event, in principle, with the exception of some invited speakers. We appreciate your participation as presenters and audience, and we are looking forward to seeing you in Utusnomiya.

SCOPE OF THE SYMPOSIUM

ISOM'25 will provide opportunities to discuss the current status of Optical Memory, Imaging, Sensing, and Other Related Technologies.

The scope of ISOM'25 includes the above research fields and provides a platform to exchange the latest advances and ideas, as well as to encourage scientific interaction and collaboration.

Topics to be covered in this symposium include, but are not limited to:

1. Optical Memory
- Holographic Memory
- Optical Disk
- Media and Material Science
- Archival Memory
- Photonic Circuit Storage
- Others

2. Imaging
- Digital Holography
- Computational Imaging
- Display
- Medical and Biological Imaging
- Scattering and Fluctuation Imaging
- Adaptive Optics
- Others

3. Sensing
- LiDAR
- Three-dimensional Sensing
- Human-centered Sensing
- Environmental and Infrastructure Sensing
- Quantum Sensing
- Others

4. Other Related Technologies
- Materials, Components, and Devices
- Nanophotonics, Metamaterials, and Plasmonics
- Optical Neural Networks
- Optical Information and System Design
- System Integration and Miniaturization
- Others

REGISTRATION

All participants (including speakers) are requested to register, and are encouraged to register in advance (by Oct. 2, 2025) in order to receive the early registration discount.

I. Registration Fees

The symposium registration information and forms can be obtained from ISOM'25 website (https://isom.jp/). If you have any questions, please contact ISOM'25 secretariat.

Conference Registration		
Type	Advance Rate Before / On Oct. 2, 2025	Standard Rate After Oct. 2, 2025
Regular	JPY 65,000	JPY 75,000
Student & Retiree	JPY 20,000	JPY 25,000
Banquet		
Type	Before / On Oct. 14, 2025	
Regular	JPY 7,000	*
Student & Retiree	JPY 5,000	*

*If you'd like to attend the banquet, please register by Oct.14.

The registration fee for the symposium includes admission to all the technical sessions and an online Technical Digest. The information to join the online symposium will be informed those who paid the participation fee, later. Students are asked for showing their ID cards.

II. Registration and Payment

Those who wish to attend ISOM'25 will be able to register on the web (https://isom.jp/) after about August 2025. The deadline for advance registration is Oct. 2, 2025 24:00 (JST). After that, registrations will be charged the standard rate.

Onsite Registration will start at 15:00 on Oct. 19 at the 3rd floor of "LIGHT CUBE UTSNOMIYA". You can register using the PC at the Registration Desk.

Payment should be made in Japanese Yen by credit cards (VISA and Master Card) payable to ISOM'25. No cash will be accepted.

III. Registration Cancellation Policy

As a rule, no refunds of the registration fee will be made for any reasons whatever. Even in the event of registrant unable to attend the symposium, they will be able to download the online Technical Digest.

INSTRUCTION FOR SPEAKERS

ORAL PRESENTATION

► Time assigned for

Type	Total	Presentation	Discussion
Keynote	35 min.	30 min.	5 min.
Special Invited	30 min.	25 min.	5 min.
Invited	25 min.	20 min.	5 min.
Contributed	20 min.	15 min.	5 min.

► For onsite presentations, the conference room will be equipped with a projector, a PC, a podium microphone, and a screen.

► All speakers can use either their own PC or the PC provided in the conference room. Onsite speakers are requested to confirm the connection with the projector in advance, while online invited speakers should confirm the connection with the web system beforehand. If onsite speakers do not use their own PC, they are asked to upload their presentation materials to the podium PC before the beginning of the session.

► All online invited speakers should log into the web system before the beginning of the session and make their presentations online.

► We recommend that all speakers use a font size at least 16 points in their presentation materials. The audience expects well-prepared presentations with clearly visible figures and captions, as well as strong conclusions.

POSTER PRESENTATION

► All authors making a poster presentation should prepare a one-page poster in PDF format for online participants. The file should be uploaded to the ISOM'25 website by Oct. 10, 2025.

► Authors should bring their poster and display it on the designated board during the poster session. The board can hold a poster up to A0 size that is vertically long. Presenters should stay near their poster during the poster session at least during the indicated core time. You may visit other posters outside of the core time, but please remain at your poster as much as possible.

► Please refer to the ISOM website for details on the presentation.

POST-DEADLINE PAPERS

A limited number of papers will be accepted for presenting significant results obtained after the deadline. An author needs to fill in the paper submission form, including a 50-word abstract, and submit a 2-page summary (PDF file) following the “Instructions for Process of Submission” on the ISOM website (https://isom.jp/).

The ISOM web submission system does not accept any PDF files that include 2-byte characters (for example, Japanese, Chinese, and Korean characters). Local fonts should be removed from the text body and figures before submission.

The submission deadline is Sep. 1, 2025 Among the accepted post-deadline papers, selected ones will be presented as oral presentations in the final session. Other accepted post-deadline papers will be presented in the poster session. Authors will be notified whether their papers are accepted or not by mid September 2025.

- Time assigned for:

Type	Total	Presentation	Discussion
Post deadline	15 min.	12 min.	3 min.

FINANCIAL SUPPORT

For students participating in ISOM’25, financial support may be available for those who meet the following criteria. However, the amount of support will vary between those from the host country and those from other countries, taking travel expenses into consideration.

Part of the support for students from outside the host country will be funded by the Takano Eiichi Optical Science Funds.

Criteria for Financial Support:

1. Must be a full-time student.
2. Must be the first author and the presenter.
3. The student's supervisor must approve the application.

Due to a limited budget, not all applications will be approved. The ISOM Steering Committee will review the applications. Among the applications deemed appropriate, support will be provided on a first-come, first-served basis.

If you wish to apply for financial support, please fill out the application form that will be announced later and submit it.

DEMO PRESENTATION IN POSTER SESSION

The Demo Presentation is a special poster presentation with a technical demonstration and will be held during the poster session. The technical demonstration will take place repeatedly upon request by participants. This presentation method is unique, direct and appealing to the participants.

Technical Demonstration: Tu-E-01

Proposal of Table-Top-Screen-Type Volume Holographic Combiner

Taiyo Kikuchi, Daisuke Barada

Utsunomiya University (Japan)

PUBLICATION OF SYMPOSIUM PAPERS

Online Technical Digest includes invited papers, accepted contributed papers, and limited numbers of post deadline papers. It will be available from Oct. 11 to Oct. 22, 2025. If you complete the payment, you will be informed of the website of the online Technical Digest on Oct. 11, 2025 and able to download it in advance.

The conference papers will be published in October 2026 as a special issue of the OPTICAL REVIEW, which is the English-language journal of the Optical Society of Japan (OSJ). The authors who will have, by themselves, presented papers at ISOM'25 will be allowed to submit their papers for publication in this special issue. The authors of invited and contributed (including post-deadline) papers are encouraged to submit Progress Reviews and Regular Papers, respectively.

The instructions for preparation of manuscript for the special issue will be sent via e-mail after the conference. The deadline for submission of manuscripts is Feb. 28, 2026. Submitted papers will be reviewed based on the OPTICAL REVIEW standard.

SPECIAL PROGRAMS

Get Together Reception

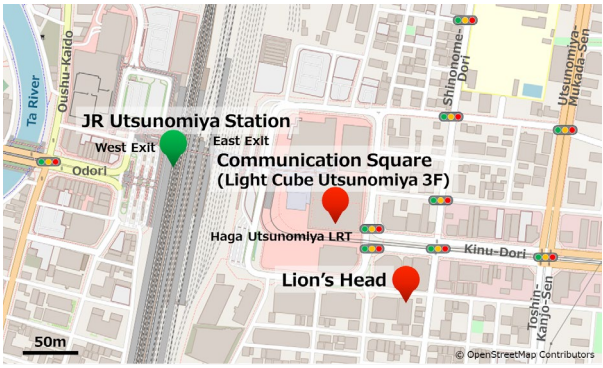
- Date & Time: Sunday, Oct. 19, 17:00-19:00
- Venue: Lion's Head - East Exit Branch
  (A 5-minute walk from JR Utsunomiya Station)
- Participation Fee: Free of charge

All attendees, including their spouses, are cordially invited to the Get Together Reception.

Banquet Reception

- Date & Time: Tuesday, Oct. 21, 18:15-20:15
- Venue: Communication Square
  (Light Cube Utsunomiya 3F)
  (A 2-minute walk from JR Utsunomiya Station)
- Participation Fee (per person):
  - General: JPY 7,000
  - Students & Retirees: JPY 5,000

Kindly note that the fee for the Banquet Reception is not covered by the conference registration fee. Attendees are welcome to bring their spouses. Applications for the Banquet Reception, including your spouse, must be submitted online by Oct. 14.



ISOM'25 Secretariat

Mitsuhiro Kimura (Secretary)

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- Add: c/o Adthree Publishing Co., Ltd.
  3F Sunrise Build II, 5-20 Shinogawamachi,
  Shinjuku-ku, Tokyo 162-0814 Japan

ATTENTION

It is not allowed to take photos and videos of any presentation materials in ISOM'25.

No Photo

No Video

No Recorder

GENERAL INFORMATION

I. Official Language

The official language of ISOM'25 is English.

II. Message Boards

Official Information Board and Message Board will be located near the Registration Desk. Messages will be accepted at the Registration Desk during registration hours from Monday through Wednesday and will be posted on the Message Board. Please check the Message Board daily for any messages addressed to you.

III. Lunches

A map of nearby lunch spots around Light Cube Utsunomiya will be available at the Registration Desk.

IV. Others

To receive further announcements and updates on ISOM'25, please visit the ISOM website: **https://isom.jp/**.

Information of Utsunomiya City

Utsunomiya City offers a variety of attractive sightseeing spots, including Futaarayama Shrine, the Oya History Museum—housed in a former stone quarry—and Utsunomiya Castle Ruins Park. The city is also renowned for its delicious gyoza, which can be enjoyed at numerous restaurants throughout the area. Conveniently located near Nikko, a UNESCO World Heritage Site, Utsunomiya serves as a great base for exploring the region.

Discover Utsunomiya
https://discover-utsunomiya.com/

Nikko Official Guide
https://www.visitnikko.jp/en/

Brochures with information about sightseeing in Utsunomiya are available at the Registration Desk or on the following website.

Travel Brochure Download
https://www.utsunomiya-cvb.org/pamphlet/

TECHNICAL PROGRAM

Oct. 19, 2025 (Sunday)

17:00 **Get Together**

Oct. 20, 2025 (Monday)

Mo-A: Opening Remarks & Keynote

Presider: Takayuki Shima (AIST, Japan)

Opening Remarks

8:40
Takanori Nomura (Wakayama Univercity, Japan)
Yuichi Nakamura (Toyohashi University of Technology, Japan)

Mo-A-01 **Keynote**
8:55 **Pb optical data storage and beyond**

Min Gu

University of Shanghai for Science and Technology (P.R.China)

Although big data centres that use electronic or magnetic recording media have emerged as a technology platform for storing a vast amount of data, this technology is not a sustainable solution for the digital future because a big data centre storing Petabyte data information needs huge space and consumes a significant amount of energy. However, 70%-90% of the generated data are cold data which do not need a frequent access and would not require energy for achieving. The optical data storage technology, though it has its distinguished feature of low energy consumption, has not been competitive due to the fundamental physical limit called Abbe's law discovered by a German physicist, Ernst Abbe, in 1873. Abbe's barrier means that the size of the information bits is approximately 300 nm, for example, in a blue-ray disk, resulting in the capacity cap of tens of Gigabytes for each disk. In 2013, researchers show Abbe's barrier can be broken with the development of optical beam nanolithography. Therefore, the information bit size can be remarkably reduced to 9 nm, which means that the potential capacity of an optical disk could be as high as Petabytes.

9:30 - 9:35 Short Break

Mo-B: Display

Presider: Yuichi Nakamura (Toyohashi University of Technology, Japan)

Mo-B-01 **Invited**

9:35 **Design and fabrication of freeform holographic optical elements**

Rengmao Wu

Zhejiang University (P.R.China)

Holographic optical elements (HOEs) can be broadly divided into photopolymer HOEs (PPHOEs) and liquid-crystal HOEs (LCHOEs). In order to enhance the degrees of freedom of phase modulation, we employ freeform wavefronts to fabricate photopolymer HOEs and liquid-crystal POEs, which yields high-performance freeform photopolymer HOEs and freeform liquid-crystal POEs.

Mo-B-02

10:00 **Naked-Eye Stereoscopic Viewing of Dual-Projected Images Using a Reflective Volume Holographic Element**

Tomoyo Ota, Daisuke Barada

Utsunomiya University (Japan)

In this study, an AR display that enables naked-eye stereoscopic viewing from multiple viewpoints is investigated. It is expected to be used to view virtual objects from different viewpoints and to allow multiple people to view 3-D images. Multiple images are diffracted independently by a hologram for stereopsis.

10:20 - 10:40 Break

Mo-C: Imaging for Measurement and Analysis

Presiders: Ryushi Fujimura (Utsunomiya University, Japan)
Shuhei Yoshida (Kindai University, Japan)

Mo-C-01 **Invited**

10:40 **Polarizing multiplexing imaging and further**

Ki-Nam Joo[1], Seongwook Jang[1], Luke D. Mayer[2], Daewook Kim[2]

[1]Chosun University (Korea), [2]University of Arizona (U.S.A.)

In this presentation, various polarization multiplexed optical systems are introduced. With the aid of a polarization camera, four kinds of polarized images can be simultaneously obtained,

and it is used for snapshot measurements. Shearing interferometry, rotation measurement of an object and 2D wavelength mapping techniques are explained and experimentally verified.

Mo-C-02

11:05 Passive mode measurement for incoherent quantum-inspired super-resolution imaging

Qiushuang Lian, Qiaofeng Tan, Liangcai Cao

Tsinghua Univ. (P.R.China)

We propose a passive super-resolution imaging method using hologram-based spatial mode measurement. Inspired by quantum spatial demultiplexing, our approach enables sub-Rayleigh localization of incoherent sources without active illumination. Experiments demonstrate accurate reconstruction of point pairs, showing potential for non-invasive imaging in challenging environments.

Mo-C-03

11:25 Arrayed Digitally Directed Beams for Optical Inspection

Hiroshi Ohno

Toshiba Corp. (Japan)

An array of digitally directed beams capable of instantaneously controlling their direction at every point within a wide field of view, is proposed for the inspection of microscale defects in manufacturing processes. Bundles of arrayed beams, with directionality color-encoded, have been shown to effectively capture microscale ridges with high clarity.

Mo-C-04

11:45 Estimating Locations from SNS Images Using Shizuoka Prefecture's 3D Point Cloud Data

Takahito Umehara, Masaki Shiozaki, Masaki Nagata

Shizuoka University (Japan)

We geolocate social-media disaster images by matching them to virtual views rendered from a Cesium digital twin built with Shizuoka Prefecture 3D point clouds. A triplet-trained LPIPS feature extractor indexed with FAISS achieves 700× faster retrieval than exhaustive LPIPS while maintaining comparable accuracy.

12:05 - 13:35 Lunch

Mo-D: Digital Holography I

Presiders: Tetsuhiko Muroi (NHK, Japan)
Hiroshi Ohno (Toshiba Corporation, Japan)

Mo-D-01

13:35 **Volumetric beam shaping for holographic laser processing**

Nami Kuroo, Yoshio Hayasaki

Utsunomiya University (Japan)

Design framework for volumetric beam shaping enables three-dimensional control of laser beams. Holographic beam shaping is implemented by displaying a computer-generated hologram (CGH) on a spatial light modulator (SLM). Holographic laser processing using this framework improved functionality while meeting industry demands for quality and throughput.

Mo-D-02

13:55 **Observation of liquid drying process using digital holography with linear imaging sensor**

Yuma Sato, Yoshio Hayasaki

Utsunomiya University (Japan)

In this study, digital holography is realized using a linear sensor to measure the height of objects moving in a straight line. A one-dimensional Fourier transform method is applied. This DH system can measure objects moving at a high speed. We have named this method “linear digital holography.”

Mo-D-03

14:15 **Simultaneous recording of audible and ultrasound fields by parallel phase-shifting digital holography**

Daiki Ishii[1], Sudheesh K Rajput[1], Kenzo Nishio[1], Hou Natsu[2], Osamu Matoba[3], Yasuhiro Awatsuji[1]

[1]Kyoto Institute of Technology , [2]National Institute of Advanced Industrial Science and Technology, [3]Kobe University (Japan)

Simultaneous recording of audible and ultrasonic fields was experimentally demonstrated using parallel phase-shift digital holography (PPSDH). A PPSDH system with a high-speed polarization camera was constructed to record both sound fields simultaneously. The frequencies of the 15 kHz and 40 kHz sound fields emanating from individual speakers were clearly reconstructed.

Mo-D-04

14:35 **3D Tracking of Multiple Microorganisms Using Twin Images in FIWI-Based Digital Holography**

Chihiro Sato, Kousuke Nakao, Maryam Faheem, Rintaro Horimizu, Ayaka Tabuchi, Eriko Watanabe

The University of Electro-Communications (Japan)

A compact digital holographic microscopy system using a functionally integrated waveguide illuminator realizes two adjacent light sources for depth-resolved tracking. This configuration enables geometric estimation of three-dimensional (3D) positions from interference patterns without reconstruction. Combined with deep learning-based detection, the method achieves accurate, efficient 3D tracking of multiple objects.

14:55 - 15:15 Break

Mo-E: Optical Memory I

Presiders: Satoru Higashino (Sony Storage Media Solutions, Japan)
Daisuke Barada (Utsunomiya University, Japan)

Mo-E-01

15:15 **Detection of Intensity-Phase-Modulated Multilevel Signals Using a Designed Phase Mask**

Takuya Nonaka, Ryushi Fujimura

Utsunomiya University (Japan)

We detected and evaluated intensity-phase modulated multilevel signals using a newly designed phase mask in holographic data storage. By adding phase signals to the non-signal areas of a conventional designed mask, the recording density was improved while preserving the crosstalk noise suppression concept.

Mo-E-02

15:35 **Information Storage Based on Polarization Holographic Modulation of Light Field Amplitude, Phase, and Polarization**

Xueyan Chen, Hongjie Liu, Shujun Zheng, Jinyu Wang, Ruixian Chen, Lin Peng, Ruying Xiong, Xu Zheng, Dakui Lin, Xiao Lin, Yi Yang, Xiaodi Tan

Fujian Normal University (P.R.China)

This work achieves dual-channel storage via orthogonal linear polarization's faithful reconstruction and null reconstruction in polarization holography. Moreover, deep learning is utilized to reconstruct stored data, and the recovery performance of amplitude/phase information under varying diffraction distances is thoroughly analyzed.

Mo-E-03

15:55 **Three-dimensional Modulated Holographic Data Storage by Amplitude, Phase and Polarization**

Shenghui Ke, Shujun Zheng, Yongkun Lin, Hongjie Liu, Luyi Xie, Xueyan Chen, Junhui Wu, Jingjun Huang, Yi Yang, Xiao Lin, Xiaodi Tan

Fujian Normal University (P.R.China)

By using orthogonal circularly polarized dual channels to achieve three-dimensional holographic data storage by the amplitude, phase and polarization of light under paraxial approximation conditions. The experimental results show that when decoding the recorded multi-dimensional holograms, the amplitudes and phase BRE of both are less than or equal to 0.5%.

Mo-E-04

16:15 **Effect of Diffusion Barrier Layer in Multilayer Recording Media for Magnetic Hologram Memory**

Misako Okamoto, Sumiko Bharti Singh Chauhan, Yuichi Nakamura, Pang Boey Lim

Toyohashi University of Technology (Japan)

In multilayer recording media for magnetic hologram memory, Ga diffusion from the heat dissipation layers that are inserted to suppress the effect of heat diffusion, may decrease the Faraday rotation angle. In this study, we investigated the effect of diffusion barrier layers on the design and properties of multilayer media.

16:35 - 16:40 Short Break

Mo-F: Information Processing and Microfabrication

Presider: Koichi Iiyama (Kanazawa University, Japan)

Mo-F-01 **Invited**

16:40 **Recent Progress of Silicon Photonics for Quantum Information and Communication Technologies**

Nobuyuki Matsuda

Tohoku Univ. (Japan)

Research and development in quantum computing and communication are heating up. I will discuss the recent progress of quantum information processing devices based on silicon photonics, as well as future prospects in the field.

Mo-F-02 **Invited**

17:05 **Computer-Generated Holography for Laser Microfabrication**

Satoshi Hasegawa

Utsunomiya Univ. (Japan)

We demonstrate holographic laser microfabrication using computer-generated holograms displayed on a spatial light modulator. Applications include high-speed periodic structuring via pulse-to-pulse beam modulation, microscopic QR code fabrication using multi-spot beams, and selective ITO film delamination with line beams. The results highlight precision, versatility, and industrial relevance in microfabrication processes.

Mo-F-03

17:30 **U-Net-based modeling and initial evaluation of input-output mapping in a multimode fiber**

Nanami Yoshida, Kanami Ikeda, Sota Ogawa, Osanori Koyama, Makoto Yamada

Osaka Metropolitan University (Japan)

We employed U-Net to model the input-output mapping of a multimode fiber by training two models: Image-to-Speckle and Speckle-to-Image. The Speckle-to-Image model successfully reconstructed images from both experimentally acquired and model-generated speckle patterns, demonstrating that two models effectively learn the mapping.

Oct. 21, 2025 (Tuesday)

Tu-A: Optical Memory II

Presider: Kimihiro Saito (Kindai University Technical College, Japan)

Tu-A-01 **Invited**
8:40 **Non-Volatile Optical Memory via Avalanche-Induced Trapping in Standard Silicon Photonics**

Yuan Yuan[1], Yiwei Peng[2], Stan Cheung[3], Wayne Sorin[2], Sean Hooten[2], Zhihong Huang[2], Di Liang[4], Marco Fiorentino[2], Raymond Beausoleil[2]

[1]Northeastern University, [2]Hewlett Packard Enterprise, [3]North Carolina State University, [4]University of Michigan (U.S.A.)

We have demonstrated a novel class of all-silicon optical memory devices that can be fabricated directly using standard silicon photonics foundry processes. By leveraging the photon avalanche-induced trapping effect, these devices achieve non-volatile wavelength shifting, enabling persistent optical information storage.

Tu-A-02 **Invited**
9:05 **Single-Shot Phase Detection in Holographic Data Storage Using a Hartmann Mask**

Ryushi Fujimura, Hayato Otsuka

Utsunomiya Univ. (Japan)

We propose a single-shot phase detection method using a Hartmann mask for holographic data storage. By employing differential phase encoding, this approach achieves robust signal retrieval and significantly enhances data transfer rate over conventional techniques based on inter-pixel crosstalk, while maintaining high storage density.

Tu-A-03 **Invited**
9:30 **Multiplexing Holographic Data Storage by Polarization**

Xiaodi Tan, Shujun Zheng, Xianmiao Xu, Shenghui Ke, Junhui Wu, Yi Yang, Xiao Lin, Yuhong Ren

Fujian Normal University (P.R.China)

This paper reviewed the multiplexing method to increase the density of holographic data storage by polarization technology, which was based on the tensor theory. The orthogonal/non-correlated

coding multiplexing strategies for reference light were introduced. These strategies have promoted the development of amplitude, phase and polarization coding multiplexing technologies.

9:55 - 10:15 Break

Tu-B: Digital Holography II

Presiders: Shuhei Yoshida (Kindai University, Japan)
Daisuke Barada (Utsunomiya University, Japan)

Tu-B-01

10:15 **Three-Dimensional and Extended Depth-of-Field Imaging Using Incoherent Digital Holography Configuration**

Yuki Ono[1], Teruyoshi Nobukawa[2], Shunichi Sato[1], Tetsuhiko Muroi[2], Takayuki Hamamoto[1]

[1]Tokyo University of Science, [2]Japan Broadcasting Corporation (NHK) (Japan)

We propose three-dimensional (3D) and extended depth-of-field (EDOF) imaging using an incoherent digital holography configuration. By applying wavefront coding to the SLM, we discovered the potential for optical switching between 3D and EDOF imaging. The principle of the proposed system was validated by capturing a 3D object.

Tu-B-02

10:35 **Effect of Annular-polarizer Aperture Diameter on Noise Reduction in Incoherent Digital Holography**

Mao Takahashi[1], Teruyoshi Nobukawa[1], Ryohei Hokari[2], Genki Kuwano[2], Kazuma Kurihara[2], Kei Hagiwara[1], Tetsuhiko Muroi[1]

[1]NHK STRL, [2]AIST (Japan)

We present an annular polarizer that reduces random noise in reconstructed images in incoherent digital holography. The aperture diameter, which depends on the optical setup, affects the reconstructed image quality. Although this factor has not been studied, we investigate the influence of aperture diameter on noise reduction in this study.

Tu-B-03

10:55 **Experimental Verification of a Preprocessing Method for Distance Estimation in Incoherent Digital Holography Using a Convolutional Neural Network Trained with Simulated Data**

Shion Arai[1], Teruyoshi Nobukawa[2], Yasunobu Akiyama[1], Tetsuhiko Muroi[2]

[1]Tokai University, [2]Japan Broadcasting Corporation (NHK) (Japan)

We experimentally investigated the effectiveness of our proposed preprocessing method for deep-learning-based distance estimation in incoherent digital holography (IDH). Datasets were created using IDH simulator, through which a convolutional neural network was trained. By employing the trained network using the simulator, we experimentally demonstrated the effectiveness of our proposed method.

Tu-B-04

11:15 **CNN-Enhanced Super-resolution Complex Amplitude Measurement based on Free-Space Propagation and Virtual Phase Conjugation**

Ippo Matsushita, Atsushi Okamoto

Hokkaido University (Japan)

This study proposes a CNN-based method for high-quality super-resolution complex amplitude measurement using virtual phase conjugation. Our approach processes statistical features from multiple decoded frames (N=30) with a CNN. It achieves significantly improved image quality (PSNR/SSIM) and enables faster measurements by requiring fewer frames than conventional averaging.

Tu-B-05

11:35 **CNN-Based Compensation for Optical Element Misalignment and Non-uniform Reference Beam Phase in Holographic Diversity Interferometry**

Naoki Yamamoto, Atsushi Okamoto

Hokkaido University (Japan)

This study proposes a CNN-based compensation method for 2ch-HDI optical complex amplitude measurement. The method improves PSNR for both intensity and phase images but results in the loss of high-frequency components. Future work aims to enhance accuracy using advanced architectures.

11:55 - 12:10 ISOM'26 Announcement & Photo

12:10 - 13:40 Lunch

Tu-C: Special Invited

Presider: Takayuki Shima (AIST, Japan)

Tu-C-01 **Special Invited**

13:40 **Multipole and Toroidal Engineering on Silicon Metasurfaces**

Junichi Takahara

The University of Osaka (Japan)

In recent years, practical applications of all-dielectric metasurfaces have been progressing. In this talk, I will talk about our studies on Silicon metasurfaces from the viewpoint of Mie-tronics. Huygens metasurfaces with degenerate multipoles or toroidal modes can be used to enhance light-matter interactions and have diverse applications.

14:10 - 14:15 Short Break

Tu-D: Optical Structures for Imaging and Sensing

Presider: No-Cheol Park (Yonsei University, Korea)

Tu-D-01 **Invited**

14:15 **Color-dispersive Metalens for High-sensitivity, Multicolor Imaging**

Masashi Miyata

NTT Device Technology Laboratories (Japan)

This presentation will introduce optical metasurfaces (or meta-optics) that improve the sensitivity of color imaging. Specifically, I will show how meta-optics effectively classify colors and how they enable us to create high-sensitivity, multicolor-imaging devices.

Tu-D-02 **Invited**

14:40 **The challenge of volume holographic light guide in AR/MR glasses**

Ching-Cherng Sun[1], Chi Sun[2], Wen-Kai Lin[3], Shiuan Huei Lin[2], Wei-Chia Su[4], Yeh-Wei Yu[1], Tsung-Hsun Yang[1]

[1]National Central University, [2]National Yang Ming Chiao Tung University, [3]Feng Chia University, [4]National Changhua University of Education (R.O.C.)

In this talk, we will explore the challenges of VHOE glasses for AR/MR glasses in detail and discuss potential strategies to overcome them.

Tu-D-03

15:05 **Colorimetric hydrogen gas sensing via birefringence in lossy-metal/dielectric/lossy-metal structure**

Yuusuke Takashima, Hyuga Miyatake, Kentaro

Nagamatsu, Masanobu Haraguchi, Yoshiki Naoi

Tokushima University (Japan)

Highly sensitive colorimetric hydrogen sensor was demonstrated using the wide color tunability of the lossy-metal/dielectric/lossy-metal subwavelength grating (SWG) structure. The plasmonic resonance of the fabricated sample induced optical birefringence and provided abrupt color change of the reflected light for the hydrogenation of metal SWG.

15:25 - 15:45 Break

Tu-E: Poster Session

Presiders: Koichi Iiyama (Kanazawa University, Japan)
Tetsuhiko Muroi (NHK, Japan)
Takayuki Shima (AIST, Japan)

15:45 - 17:45

Core time for the odd Tu-E numbers: 15:45 - 16:45
Core time for the even Tu-E numbers: 16:45 - 17:45

Tu-E-01 **Demo Presentation**

Proposal of Table-Top-Screen-Type Volume Holographic Combiner

Taiyo Kikuchi, Daisuke Barada

Utsunomiya University (Japan)

In this study, we propose a table-top-screen-type volume holographic combiner that allows similar reproduced images to be observed from any angle by adopting a shift multiple exposure method.

Tu-E-02

Batch Reading and Decoding of SQAM Signals based on deep learning technique for Holographic Data Storage

Satoshi Honma[1], Jialin Zhang[2], Hironori Ito[1]

[1]Yamanashi University (Japan), [2]Hangzhou Dianzi University (P.R.China),

A recording of spatial quadrature amplitude modulated (SQAM) signals in holographic memory has been studied. The batch reading and decoding (BRD) simplifies optical setup using memory system as interferometer for phase detection. This study proposes a deep learning approach to directly decode SQAM signals, reducing processing complexity and signal distortion.

Tu-E-03

Evaluation of magnetization patterns from the observed images at different focal heights of a scanning magneto-optical microscope

Tsubasa Ebihara, Yuya Suzuki, Ryota Komiya, Yuichi Nakamura, Pang Boey Lim

Toyohashi University of Technology (Japan)

This study investigated the relation among the shape of magnetic fringe, Faraday rotation angle distribution, and observation conditions of magneto-optical microscope to evaluate 3D-magnetization distribution. Results showed observed Faraday rotation angle distribution was affected by the relation between focused laser transmission region shape and magnetic fringe geometry.

Tu-E-04

Phase Signal Detection Using Inter-Page Crosstalk Noise in Holographic Data Storage Systems

Itsuki Ino, Ryushi Fujimura

Utsunomiya Univ. (Japan)

We developed a detection method that utilizes inter-page crosstalk noise arising in angular multiplexing of holographic data storage systems. Simulation-based comparison shows improved recording density over conventional binary methods, demonstrating the feasibility of using crosstalk noise as a signal source in high-density holographic data storage.

Tu-E-05

High Density OFDM with ISI Cancellation for Optical Disc Systems

Kimihiro Saito

Kindai Univ. Tech. College (Japan)

As an improvement to the recording and playback of OFDM signals on optical discs, FTN and more advanced adaptive filters for IQ signals between blocks were used to reduce the block length, demonstrating the possibility of achieving a recording density of more than 1.6 times the BDXLTM ratio.

Tu-E-06

Pump and Probe Interferometric Imaging of Laser-generated Phenomena

Kei Ogata, Yoshio Haysasaki

Utsunomiya University (Japan)

Femtosecond laser was used for observation by pump-probe interferometric imaging. We were able to observe processing phenomena including ultrasonic waves while changing the delay time.

Tu-E-07

Depth-Perceivable 3D Image Reconstruction from CGH Using All-Holographic Optical Systems

Fuga Suzuki[1], Taichi Wakaume[1], Toshihiro Kasezawa[2], Hideyoshi Horimai[2,3], Yuichi Nakamura[1]

[1]Toyohashi University of Technology, [2]EGARIM Co., Ltd, [3]HOLOMEDIA LLC (Japan)

We demonstrate a near-eye 3D image display system using only holographic optical elements, replacing conventional lenses and PBSs with Egarim-PBS films. Interference fringes generated by CGH are displayed on F-LCOS to reconstruct depth-perceivable images. Clear 3D images at multiple depths were successfully reconstructed, confirming system effectiveness and compactness.

Tu-E-08

Statistical Analysis and Trajectory Visualization of Water Droplets using Holographic Particle Tracking Velocimetry

Dai Nakai, Fumiya Iwatani, Yohsuke Tanaka

Kyoto Institute of Technology (Japan)

This study demonstrates the application of the ParticleHolography.jl library for measuring water droplet trajectories. A novel trajectory smoothing algorithm is also applied to enhance trajectory estimation accuracy against outliers. The framework successfully visualizes droplet paths, showing excellent agreement with theoretical terminal velocity.

Tu-E-09

Denoising Experimentally Acquired Digital Holograms Using Deep Neural Network Trained on Numerically Acquired Holograms

Ryo Esaki, Masanori Takabayashi

Kyushu Institute of Technology (Japan)

Digital holography enables reconstruction of the complex amplitude of light; however, it is susceptible to noise during acquisition. To

address this, we propose a deep learning method trained on numerically generated ideal holograms that replicate experimental conditions. This approach improves reconstruction quality without requiring an ideal optical setup.

Tu-E-10

Accurate Digital Holographic Omnidirectional 3D Measurement Using Inscribed Surface Extraction And Iterative Closest Point Method

Yuto Shimizu, Nobukazu Yo

Tottori Univ. (Japan)

We proposed a high-accuracy digital holographic omnidirectional 3D measurement method by integrating left and right contour information using the ICP algorithm. The alpha shape mesh model enabled precise extraction of the inscribed surface and accurate reconstruction of the object's 3D shape.

Tu-E-11

Investigation of Optical Diffraction Tomography using Non-uniform Fast Fourier Transform

Naoki Okada, Shuhei Yoshida

Kindai Univ. (Japan)

This study aims to establish a method for quantitative evaluation of 3D refractive index distribution by obtaining information on the optical axis component using optical diffraction tomography (ODT), which combines DH technology with tomography technology.

Tu-E-12

Generation of Hadamard mask patten light using two-dimensional fiber array for single-pixel imaging

Yuta Goto, Kouichi Nitta

Kobe University (Japan)

We proposed a method to generate the Hadamard mask pattern using the 2D fiber array to achieve high-speed, high-SNR-tolerant SPI. We confirmed through numerical analysis that SPI using the 2D fiber array can achieve the same SNR tolerance as SPI using the normal Hadamard mask pattern.

Tu-E-13

Reciprocal modulation imaging for non-interferometric holography

Ying Li, Mengran M Zhao, Liangcai L Cao

Tsinghua University (P.R.China)

Holography is a powerful technique for quantitative phase imaging. Reference-assisted holography suffers from complex optical configurations, while reference-free holography requires prior knowledge or multiple diversity images. This paper proposes a method termed reciprocal modulation imaging (RMI), achieving non-interferometric holography with rich advantages. Results demonstrate its advantages and universality.

Tu-E-14

Investigation of single-pixel holographic interferometry

Yuma Sano, Shuhei Yoshida

Kindai Univ. (Japan)

Imaging with a single-pixel detector is called SPI (single-pixel imaging) and has many advantages, such as high sensitivity and noise tolerance. This study aims to establish an interferometer and a measurement method to obtain information of objects in the optical path in SPI with the application of DH (digital holography).

Tu-E-15

Mask optimization for inverse lithography based on the level-set method

Yixin Yang, Liangcai Cao

Tsinghua University (P.R.China)

As integrated circuits scale down, resolution enhancement becomes critical. Inverse lithography technology (ILT) is extensively used for optical proximity correction. ILT faces efficiency and mask manufacturability challenges. This paper proposes a level-set-based ILT approach for mask optimization. Results demonstrate improved pattern fidelity and computational efficiency, showing promise for semiconductor manufacturing.

Tu-E-16

Point Cloud Production for Volumetric Displays Using 3D Gaussian Splatting

Togo Endo, Kota Kumagai, Yoshio Hayasaki

Utsunomiya University (Japan)

We propose a method to optimize point clouds for volumetric displays using 3D Gaussian Splatting. The optimization process incorporates display constraints, such as the maximum number of achievable points, and an appropriate loss function to derive suitable point configurations from multi-view images, indicating its potential to improve visual quality.

Tu-E-17

Fresnel-Domain Interpolation Method for Holographic Display

Nobukazu Yoshikawa, Takahiro Tsubouchi

Tottori Univ. (Japan)

Fresnel-domain interpolation-based reconstruction method is proposed to obtain high-quality reconstructed images from low-resolution object data for holographic displays. Optical experiments are conducted using CGHs synthesized with four different interpolation functions. Effective upscaling and smooth reconstruction were achieved using interpolation methods with the inherent low-pass filtering property of Fresnel diffraction.

Tu-E-18

Investigation of High-Speed Laser Modulation for Expanding the Viewing Angle in Electronic Holography

Yuki Kamotani, Shuhei Yoshida

Kindai Univ. (Japan)

This study addresses the limited viewing angle in electronic holography by using a DMD and laser control to enhance practicality in 3D displays, overcoming pixel pitch-related diffraction constraints.

Tu-E-19

Investigation of hologram synthesis from depth information

Koichi Yamanokuchi, Shuhei Yoshida

Kindai Univ. (Japan)

The purpose of this research is to establish a method of synthesizing holograms from depth information to simplify the process of generating 3D data in electronic holography, generate holograms using deep learning methods that can reduce the high computational cost, and verify its

effectiveness through experiments.

Tu-E-20

Deep Learning-based No-Reference Image Quality Assessment for Guiding Computational Wavefront Shaping

Haoyu Yue, Yating Chen, Liangcai Cao

Tsinghua University (P.R.China)

We integrate a differentiable deep learning-based No-Reference Image Quality Assessment network into the computational holographic wavefront shaping framework. It replaces traditional metrics like image variance and entropy to provide more robust guidance that avoids local optima, improving reconstruction fidelity and suppressing artifacts in scattering imaging.

Tu-E-21

Modulation of Angular Dispersion by Ancyluris meliboeus Photonic Structure

Weihan Liu, Yao Liang, Din Ping Tsai

City University of Hong Kong (Hong Kong)

Butterflies are known for their rich colorations. While most butterflies possess distinct optical properties, the Ancyluris meliboeus stands out prominently. This species exhibits surprising features, notably the occurrence of different colors and different dispersions across consistent structural regions of the butterfly with slightly different structures.

Tu-E-22

Experimental Investigation of Reconstruction Performance of Multimode Optical Fiber Imaging with Variational Autoencoder Against Fiber Bending

Taiki Otani, Masatoshi Bunsen, Hana Fowler

Fukuoka University (Japan)

In multimode optical fiber imaging with variational autoencoder (VAE), the image reconstruction performance deteriorates significantly when the fiber is deformed after VAE has been trained. We investigate and improve the reconstruction performance for intentional fiber bending by using training data obtained under multiple types of fiber deformation.

Tu-E-23

Numerical Investigation of the Effect of Unknown Fiber Bending on the VAE-Based Multimode Optical Fiber Imaging and Its Improvement Using Dataset Consisting of Diverse Fiber Conformation

Hana Fowler, Masatoshi Bunsen, Taiki Otani

Fukuoka Univ. (Japan)

We simulated light propagation through multimode optical fibers and used a variational autoencoder for image reconstruction under unknown bending. Reconstruction accuracy correlated with bending similarity between training and target conditions, and training with diverse bending conditions improved reconstruction, both demonstrating potential for robust multimode optical fiber imaging under practical conditions.

Tu-E-24

Super-Resolution Optical Complex Amplitude Measurement Based on Virtual Phase Conjugation supported by CNN

Junya Itoh, Atsushi Okamoto

Hokkaido University (Japan)

We propose a CNN-based noise reduction method for super-resolution optical complex amplitude measurement based on virtual phase conjugation. Numerical analysis demonstrates improved reconstruction accuracy and visual quality of intensity images, enhancing the effectiveness of low-cost, high-resolution optical imaging systems.

Tu-E-25

Consideration on Ranging Precision Formularization of FMCW LiDAR

Kouki Yoshida, Masahiro Ueno, Munekazu Date, Akinori Furuya, Hiroyuki Kawai

Tokushima Bunri University (Japan)

We have developed FMCW LiDAR equipment that can measure distances to objects with rusted surfaces (i.e., an object with low reflectivity). The ranging precision of the FMCW LiDAR equipment was formulated and the precisions from the formula were compared to the simulation results.

Tu-E-26

Withdrawn

Tu-E-27

Tunable chromatic dispersion system using a geometric phase lens and refractive lens pair

Junyeong Seo[1], Seongwook Jang[1], Luke D Mayer[2], Hyo Mi Park[1], Daewook Kim[3], Ki Nam Joo[1]

[1]Chosun Univ. (Korea) , [2]Arizona Univ. (U.S.A.) , [3]Konhuk Univ. (Korea)

A tunable chromatic dispersion system using a geometric phase lens and refractive lens pair is developed. The chromatic dispersion is generated by the diffraction feature and controlled by lens spacing. The system was simulated and experimentally demonstrated as the dispersion range from -3.8 mm to 4.4 mm.

Tu-E-28

Design and verification of a broadband quarter-waveplate beyond wavelength-dependent limitations

Yunjong Oh, Seonile Seo, Ki-Nam Joo

Chosun Univ. (Korea)

In this investigation, theoretically designed a broadband quarter-waveplate by independently rotating a wavelength-dependent half-waveplate and quarter-waveplate to achieve constant phase retardation over a wide spectral range. The feasibility of the broadband quarter-waveplate was verified by comparing the Stokes parameters of the ideal waveplate with experimental results.

Tu-E-29

Proposed AI for Recognition of Sakura Shrimp by Image Analysis

Masaki Shiozaki, Takahito Umehara, Masaki Nagata

Shizuoka University (Japan)

An integrated computer-vision framework estimates Sakura shrimp length distribution and ovigerous proportion to inform sustainable catch criteria. Mask R-CNN and YOLOv8 models applied to stereo and board images achieved 90 % detection, ±2 mm length error, and 0 % false positives, providing quantifiable decision support for Suruga Bay fisheries management.

Tu-E-30

Long-term temperature monitoring by multiplexed Fiber Bragg Grating sensor system combined with incoherent FMCW optical ranging system

Zhixuan Cheng, Ibuki Abe, Koichi Iiyama

Kanazawa Univ. (Japan)

This study presents a long-term temperature monitoring system by integrating multiplexed Fiber Bragg Grating (FBG) sensors with an incoherent Frequency-Modulated Continuous-Wave (FMCW) optical ranging system. The combined approach enables precise distributed temperature measurements with accurate distance detection and enhanced monitoring accuracy and reliability over extended periods.

Tu-E-31

Micro-Motion Sensing based on the Optical Doppler Effect Using Volume Holographic Optical Element

Riku Saito, Daisuke Barada

Utsunomiya Univ. (Japan)

This study presents a micro-motion sensor utilizing volume holographic optical elements (VHOEs) to detect fine movements via the optical Doppler effect. By measuring frequency shifts in diffracted light, the sensor achieves high-precision velocity detection, offering potential for applications in VR-based training requiring delicate motor skills and real-time motion feedback.

Tu-E-32

Method for measuring the attenuation coefficient spectrum of scintillating fibers based on bidirectional measurement and side-induced fluorescence methods

Yuta Fukumoto, Shuhei Yoshida

Kindai Univ (Japan)

Evaluation of the attenuation spectrum of scintillating fibers is important for applications in visible light communication and radiation detection. This study proposes a method combining bi-directional and side-induced fluorescence measurements to determine the attenuation coefficient spectrum. The method was validated experimentally using a commercially available scintillating fiber.

Tu-E-33

Polarization and Intensity Noise Analysis in Electro Optic Sensor Using Voltage Compensated Photoreceiver

Yuki Kazama[1], Takahiro Uchida[1], Mitsuru Shinagawa[1], Jun Katsuyama[2], Yoshinori Matsumoto[2], Shinichiro Tezuka[2]

[1]HOSEI University, [2]Yokogawa Electric Corporation (Japan)

This study describes polarization and intensity noise analysis using a voltage-compensated photoreceiver in an electro-optic sensor system for the low-frequency region. In DFB laser, intensity noise is greater than polarization noise. However, in FP laser, we obtained clear polarization and intensity noises in the low-frequency region below 0.1 Hz.

Tu-E-34

Fluorescence measurement of liquid in a bottle using a compact spectrometer with a single optical fiber as a probe

Koichi Muro

Teikyo Univ. (Japan)

We have proposed a system that uses a single optical fiber for both irradiation and reception (a single optical fiber probe miniature spectrometer). In this study, we applied this system to fluorescence measurement and investigated the fluorescence measurement of liquids in bottles.

Tu-E-35

Luminosity Prediction of White LEDs from Labeled Images Using CNN

Yuki Yamamoto[1], Shuki Nakabo[1], Tomoaki Kashiwao[1], Tomomi Ito[2], Momoka Kimoto[2], Ryo Takeda[2]

[1]Kindai Univ, [2]Sumitomo Osaka Cement Co., Ltd (Japan)

In this study, white LED images generated from CAD models were labeled and used to predict total luminous flux with a convolutional neural network (CNN). The proposed method demonstrated high effectiveness in total luminous flux prediction, offering significant reductions in both cost and computational time.

Tu-E-36

Effects of High-Refractive-Index Nanoparticles on Total Luminous Flux Enhancement of a White LED with Lens Shape Unevenness and Reduced Encapsulating Resin Transmittance

Kasumi Kohyama[1], Yuki Hashimoto[1], Tomomi Ito[2], Ryo Takeda[2], Momoka Kimoto[2], Tomoaki Kashiwao[1]

[1]Kindai Univ. , [2]Sumitomo Osaka Cement Corp. (Japan)

This study examined the effect of nanoparticles on improving total luminous flux under conditions of reduced mold resin transmittance and a concave-convex lens shape. The addition of nanoparticles at 1 and 2 wt% consistently enhanced luminous flux compared to the case without nanoparticles, regardless of transmittance and lens geometry.

Tu-E-37

Skin Creation Using Mirrors and Modeling of Foundation-applied Skin Appearance in Ray-tracing Simulation

Masato Toyoda[1], Tomoaki Kashiwao[1], Sana Okano[1], Ryo Takeda[2], Momoka Kimoto[2], Tomomi Ito[2]

[1]Kindai Univ. , [2]Sumitomo Osaka Cement Co., Ltd (Japan)

In this study, we developed a simulation environment for UV scattering agents containing ZnO, TiO2, and SiO2 particles, respectively, by modeling the appearance of skin. This enables the visualization of the impact of differences in the refractive index and particle size of particles within a foundation layer on skin appearance.

Tu-E-38

Effectiveness of Labeled CAD Images for Predicting Total Luminous Flux Using CNN

Shuki Nakabo[1], Yuki Yamamoto[1], Tomomi Ito[2], Ryo Takeda[2], Momoka Kimoto[2], Tomoaki Kashiwao[1]

[1]Kindai Univ. , [2]Sumitomo Osaka Cement Co., Ltd (Japan)

We aim to optimize white LED packaging's optical design using convolutional neural networks (CNNs). This study focuses on improving LED image total luminous flux

prediction accuracy. We propose a training approach combining labeled images generated from real LED samples via semantic segmentation with segmentation images derived from CAD model geometry.

Tu-E-39

Measurement System for Long-infrared Wavelength Metalens

Shang-ping Yeh, Pin-duo Chen, Chin-ming Wang

National Central University (R.O.C.)

We present a measurement system for characterizing three LWIR metalenses (M1, M5, M6) with distinct phase designs and polarization functions. Using laser-fabricated gratings and MTF analysis, our system ensures accuracy via contrast calibration and stray light suppression. Results closely match simulations, validating the platform's effectiveness for infrared metalens evaluation.

Tu-E-40

Numerical Simulations of Optoelectronic Neural Network Using Off-Axis Binary Holograms on Digital Micromirror Device

Yusaku Matsumoto, Rio Tomioka, Masanori Takabayashi

Kyushu Institute of Technology (Japan)

We propose an optoelectronic deep neural network architecture using a DMD with binary computer-generated holograms to enable high-speed optical modulation. Simulations comparing DMD and LC-SLM on the MNIST image classification task show that DMD achieves comparable performance to LC-SLM in 2-class classification, demonstrating its utility for simple tasks.

Tu-E-41

Quantum Random Number Generation by Metalens Array

Shufan Chen, Yubin Fan, Din Ping Tsai

City University of Hong Kong (Hong Kong)

Quantum Random Number Generation (QRNG) leverages quantum effects for secure, true randomness. Our research introduces a compact, high-dimensional QRNG system using a metalens array, eliminating the need for post-randomness extraction. This innovation enhances efficiency and offers a smaller, integrated

solution compared to existing commercial products.

Tu-E-42

Experimental Evaluation of Mode-Dependent Output Response in a Mode-Selective Switch Using SLM-Based Angular Modulation

Hibiki Kakuta, Atsushi Okamoto

Hokkaido University (Japan)

We experimentally evaluated mode-dependent output responses in a mode-selective switch using SLM-based angular modulation. Distinct efficiency characteristics were observed for LP_{01} and $LP_{11}b$ modes, attributed to their spatial structures. The results highlight the importance of mode structure in optimizing diffraction-based mode control for spatial division multiplexing systems.

17:45 - 18:15 Break

18:15 - 20:15 Banquet

Oct. 22, 2025 (Wednesday)

We-A: [Special Session] Frontiers in Computational Imaging: Beyond Conventional Optics

Presiders: Takanori Nomura (Wakayama Univercity, Japan)
Ryota Kawamata (Hitachi, Ltd., Japan)

We-A-01 **Invited**
8:40 **On the Use of Deep Learning Techniques for Holographic Image Reconstruction**

Chanseok Lee, Jiseong Barg, Taesung Kwon, Gookho Song, Yoosun Kim, Jang Mooseok

KAIST (Korea)

This talk will explore deep learning approaches for holographic imaging, which poses an ill-posed problem of retrieving complex-valued object functions from diffraction intensity maps. It will focus on ways to incorporate physical forward models with learning schemes to solve the inverse problem under perturbative configurations.

We-A-02 **Invited**
9:05 **Video-rate Hyperspectral Camera: Progress Towards Practical Applications**

Motoki Yako[1], Hideaki Gomi[1], Satoshi Sato[1], Koji Shibuno[2], Atsushi Ishikawa[1]

[1]Panasonic Holdings Corporation, [2]Panasonic Entertainment & Communication Corp. (Japan)

Hyperspectral cameras have been developed to facilitate advanced sensing such as automatic visual inspection, smart agriculture, bioinformatics, and so on. To encourage the adoption of hyperspectral cameras in business scenarios, we have successfully developed a highly sensitive hyperspectral camera, and demonstrated efficient acquisition and utilization of spectral information.

We-A-03 **Invited**
9:30 **Computational depth-enhanced microscopy for high-throughput biomedical imaging**

Chulmin Joo

Yonsei University (Korea)

We introduce E2E-BPF computational microscope, designed for high-resolution imaging of large-scale, irregular specimens

without requiring serial refocusing. Enabled by a physics-informed, deep learning-based approach, the system co-optimizes a phase filter and deconvolution network to deliver high-resolution images with a depth of field over 15x greater than that of conventional microscopes.

We-A-04

9:55 **Time-freezing single-pixel imaging for high-speed rotating objects**

Sicheng Long, Zibang Zhang, Shiping Li, Ying Li, Jingang Zhong

Jinan University (P.R.China)

We developed a real-time imaging system that can virtually freeze time to capture clear images of fast-spinning objects over long durations. Real-time monitoring of rotating parts such as the turbine blades used in power plants or the fan blades of jet engines is critical for detecting early signs of damage — such as wear or cracks — helping prevent serious failures and reducing maintenance needs.

We-A-05

10:15 **Computational Wavefront Sensing for Complex Optical Fields**

Yunhui Gao[1], Liangcai Cao[1], Din Ping Tsai[2]

[1]Tsinghua University, [2]City University of Hong Kong (P.R.China)

We present a computational wavefront sensing framework that allows for single-shot, reference-less characterization of ultra-complex optical fields at high spatial resolution. By leveraging the intrinsic physical properties of light, we experimentally demonstrate wavefront sensing of highly aberrated or turbulent wavefront, structured light and speckle fields.

10:35 - 10:55 Break

We-B: Materials, Components, and Devices

Presider: Tadayuki Imai (Kyoto University of Advanced Science, Japan)

We-B-01 **Invited**

10:55 **Development of Spin Photo Detector by using a CoFeB magnetic tunnel junction**

Tetsuya Shibata[1], Tomohito Mizuno[1], Takeshi Nojiri[1], Takekazu Yamane[1], Weihao Zhang[1], Yusho Hirata[1], Hideaki Fukuzawa[1], Yuichi Kasatani[2], Arata Tsukamoto[2]

[1]TDK Corporation, [2]Nihon University (Japan)

Ultra-fast photoelectric conversion devices are a crucial element in photonics applications. In this study, we experimentally confirmed the photo detector operation using MTJ (Magnetic Tunnel Junction) by irradiation with laser light. We named it spin photo detector and it has huge potential applications that require ultra-fast photo detection.

We-B-02

11:20 **Expansion of Vertical Field of View in AR Light Guide Using Cylindrical Wave Volume Holographic Optical Element**

Ryotaro Moritomo, Daisuke Barada

Utsunomiya Univ. (Japan)

A cylindrical-wave volume holographic optical element was fabricated using vertical-angle multiplexed exposure. Optical experiments demonstrated significant vertical expansion of both the field of view and eyebox, indicating its potential for enhancing see-through HMD displays while maintaining high transparency and compactness.

We-B-03

11:40 **Photopolymerization of Resin by Evanescent Wave Exposure**

Koichiro Yurugi, Daisuke Barada

Utsunomiya Univ. (Japan)

Resin curing was experimentally demonstrated using evanescent light generated via internal laser waveguiding in glass, suggesting the feasibility of near-field photopolymerization for high-resolution 3D microfabrication.

12:00 - 13:45 Lunch

We-C: LiDAR

Presider: Satoru Higashino (Sony Storage Media Solutions, Japan)

We-C-01 **Invited**

13:45 **Digital Coherent LiDAR and Its Application to Tidal Level Observation**

Jun'ichi Abe, Tatsuya Fujimoto, Hidemi Noguchi, Yuta Koda, Toshiyuki Nomura

NEC Corporation (Japan)

This paper presents a long-range LiDAR technology employing digital coherent

techniques, developed to address various social challenges, and differing from conventional LiDAR approaches. Application examples, including remote tidal level observation and airport runway monitoring, demonstrate that the developed technology can significantly improve the efficiency of infrastructure monitoring.

We-C-02 **Invited**

14:10 **Vertical profile measurement of atmospheric aerosol concentration by lidar**

Yoshitaka Jin

National Institute for Environmental Studies (Japan)

This paper introduces a multi-wavelength high spectral resolution lidar (HSRL) method using a scanning Michelson interferometer developed at National Institute for Environmental Studies, Japan for long-term stable observation of the vertical distribution of mass concentrations of various atmospheric aerosols (mineral dust, sea salt, black carbon, and air pollution aerosols).

14:35 - 14:40 Short Break

We-PD: Post Deadline

Presider: Yuichi Nakamura (Toyohashi University of Technology, Japan)

We-PD-01
14:40

We-PD-02
14:55

15:10 - 15:15 Short Break

15:15 - 15:30 Awards & Closing

AUTHOR INDEX

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From Shanghai Airport: approx. 180 minutes
From Taoyuan Airport: approx. 200 minutes
From Hong Kong Airport: approx. 280 minutes
From Changi Airport: approx. 430 minutes

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自「羽田空港」至「JR 宇都宮駅」

Train:

1. Take the Tokyo Monorail from Haneda Airport to Hamamatsuchō Station (about 20 minutes).
2. At Hamamatsuchō, transfer to the JR Yamanote Line or Keihin-Tohoku Line and ride to Tokyo Station (about 6 minutes).
3. Transfer at Tokyo Station to the JR Tōhoku Shinkansen (e.g., Yamabiko or Nasuno) to Utsunomiya Station (about 50 minutes).

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- Board the Limousine Bus at Haneda Airport to Utsunomiya Station (approx. 160 minutes).

< From Narita Airport to JR Utsunomiya Station >
自「成田空港」至「JR 宇都宮駅」

Train:

1. Take the Narita Express (N'EX) from Narita Airport to Tokyo Station (about 60 minutes).
2. Transfer at Tokyo Station to the JR Tōhoku Shinkansen (e.g., Yamabiko or Nasuno) to Utsunomiya Station (about 50 minutes).

Limousine Bus:

- Board the Limousine Bus at Narita Airport to Utsunomiya Station (approx. 150 minutes).

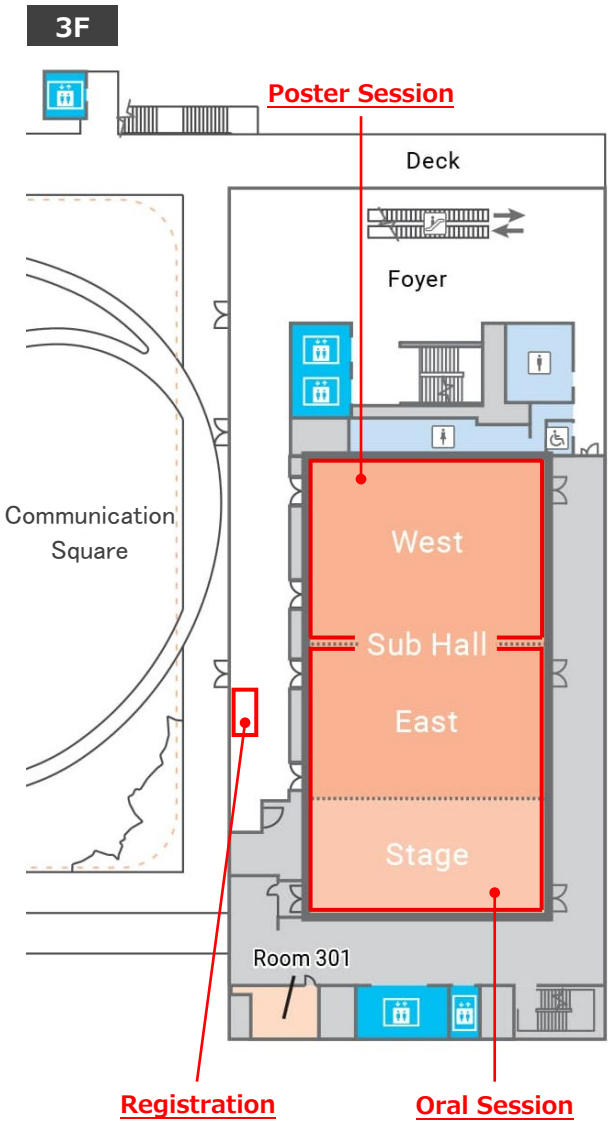
< From Utsunomiya Station to Light Cube Utsunomiya >
自「JR 宇都宮駅」至「ライトキューブ宇都宮」

Approx. 2 minutes on foot from the East Exit of JR Utsunomiya Station.

For more information, please refer to the following URL:
https://light-cube.jp/en/access/

CONFERENCE SITE FLOOR

Light Cube Utsunomiya Floor Map



HOTEL ACCOMMODATIONS

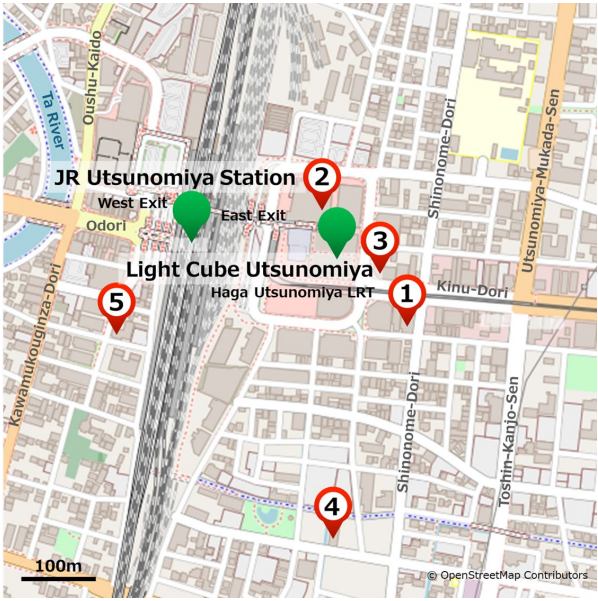
Below are several candidate hotels near the ISOM'25 conference site (Light Cube Utsunomiya).

- APA Hotel Utsunomiya-Ekimae
  https://www3.apahotel.com/hotel/syutoken/tochigi/utsunomiya-ekimae/
- Candeo Hotels Utsunomiya
  https://www.candeohotels.com/en/tochigi-utsunomiya/
- Daiwa Roynet Hotel Utsunomiya
  https://www.daiwaroynet.jp/en/utsunomiya/
- Four Points Flex by Sheraton Utsunomiya
  https://www.marriott.com/en-us/hotels/ibruu-four-points-flex-utsunomiya/overview/
- Smile Hotel Utsunomiya Nishiguchi Ekimae
  https://smile-hotels.com/hotels/show/utsunomiyanishiguchiekimae/

There are many hotel booking websites in Japan. Some of examples are listed below. You can make reservations on these sites. Please note that ISOM does not reserve any special room blocks for attendees.

- Hotels.com
  https://www.hotels.com/?pos=HCOM_ASIA&locale=en_JP
- JAPANiCAN.com
  http://www.japanican.com/
- Japan Traveler Online
  http://japantraveleronline.com/
- Rakuten Travel
  http://travel.rakuten.com/

CITY AND HOTEL MAP



① APA Hotel Utsunomiya-Ekimae

② Candeo Hotels Utsunomiya

③ Daiwa Roynet Hotel Utsunomiya

④ Four Points Flex by Sheraton Utsunomiya

⑤ Smile Hotel Utsunomiya Nishiguchi Ekimae

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