

Digital Holography and Three-Dimensional Imaging (DH)

OSA Topical Meeting and Tabletop Exhibit

Collocated with:

[Fourier Transform Spectroscopy \(FTS\)](#)
[Hyperspectral Imaging and Sensing of the Environment \(HISE\)](#)
[Novel Techniques in Microscopy \(NTM\)](#)
[Optical Trapping Applications \(OTA\)](#)

Technical Conference: April 26-30, 2009

Exhibition: April 27-29, 2009

[Sheraton Vancouver Wall Centre Hotel](#)
Vancouver, BC, Canada

PDP Submissions Deadline: April 2, 2009, 12:00 p.m. noon, EDT (16.00 GMT)

[Housing Deadline](#): March 25, 2009

[Pre-Registration Deadline](#): April 1, 2009

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Byoung-ho Lee, *Seoul National Univ., Korea*, **General Chair**

Hiroshi Yoshikawa, *Nihon Univ., Japan*, **General Co-Chair**

About Digital Holography and Three-Dimensional Imaging

The topical meeting on Digital Holography and Three-Dimensional Imaging provides a forum for disseminating the science and technology of holographic interferometry for deformation or contour measurement, new technologies for phase unwrapping, 3-D optical remote sensing, 3-D holographic microscopy, 3-D optical image processing, 3-D display, and digital holography for life science or nanophotonics applications.

Topics to Be Considered

- Digital holography theory and systems
- Diffractive optics
- Optical data storage
- Phase unwrapping and phase retrieval
- Computer generated holograms
- Spatial light modulators for holography
- Incoherent digital holography
- Holographic optical elements
- 2-D and 3-D pattern recognition
- Optical correlators
- Three-dimensional imaging and processing
- Three-dimensional display
- Stereo-matching and stereoscopic cameras
- 2-D-3-D content conversion
- Shape and deformation measurement
- Polarization analysis
- Holographic imaging and microscopy
- Holographic nanofabrication methods
- Holographic optical micro-manipulation

About Digital Holography and Three-Dimensional Imaging

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Exhibitor Listings

ADVANCES in IMAGING

2009 OSA OPTICS
AND PHOTONICS
CONGRESS

April 26-30, 2009
Vancouver, BC
Canada

Collated Meetings:

Digital Holography
and Three-
Dimensional Imaging
(DH)

Fourier Transform
Spectroscopy (FTS)

Hyperspectral Imaging
and Sensing of the
Environment (HISE)

Novel Techniques in
Microscopy (NTM)

Optical Trapping
Applications (OTA)

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585, boulevard Chrest E., Suite 300
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One Broadway
Cambridge, MA 02142
Tel: 619.303.3022 (West Coast Office)
Tel: 617.401.2195 (Boston Office)
Cell Phone: 619.621.9111
rbraunschweig@amplitude-laser.com
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Channel Systems

Box 188, 402 Ara Mooradian Way
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Tel: +1 204.753.5190
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The organizers of the Advances in Imaging Congress and Tabletop Exhibit wish to acknowledge the following for their support:

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Special Events

Meet the Applied Optics Editors Dinner

Date: April 28, 2009

Time: 7:00 PM

Where: The Relish Restaurant & Lounge, 888 Nelson ST. (Between Hornby & Howe), Vancouver, BC, Canada
(Website: <http://www.relishrestaurants.com/relish/index.asp>).

Don't miss this great opportunity to meet Applied Optics Information Processing Editors:

Prof. T.-C. Poon (Division Editor, Virginia Tech)

Prof. Partha P. Banerjee (Topical Editor, Univ. of Dayton)

Prof. ByoungHo Lee (Topical Editor, Seoul National Univ., Korea)

All conference attendees, especially students, are invited to this casual networking dinner. You can sign-up onsite at the OSA Registration Desk at the Grand Ballroom Foyer Coatroom. Please RSVP by Tuesday, April 28 by 1:00 pm. **Please note: Participants pay for their own dinners.**

2009 OSA Optics & Photonics Congress
Advances In Imaging
April 26-30, 2009
Vancouver, British Columbia, Canada

OSA GROUP DINNER

Have Dinner with *Applied Optics* Editors
Students are Welcome!

All OSA conference attendees are invited to a casual networking dinner where you will have the opportunity to meet
Applied Optics Information Processing Editors:

Prof. T.- C. Poon (Division Editor, Virginia Tech)

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Prof. Byoung-ho Lee (Topical Editor, Seoul National Univ., Korea)

Tuesday, April 28, 2009, 7:00 p.m.

THE RELISH RESTAURANT & LOUNGE

888 Nelson St. (between Hornby & Howe) Vancouver, BC

Website: <http://www.relishrestaurants.com/relish/index.asp>

Sign up at the OSA Registration Desk
[Grand Ballroom Foyer, Coat Room]
by 1:00 p.m. on Tuesday, April 28

Note: Participants pay for their own dinners

Sponsored by the OSA External Relations Advisory Group

Invited Speakers

Digital Holography and Three-Dimensional Imaging (DH) / Novel Techniques in Microscopy (NTM) Joint Session

Digital Holography for MEMS Application, Anand Asundi, Vijay Raj Singh; *Nanyang Technological Univ., Singapore.*

Image Formation in Holographic Microscopy and Tomography, Colin Sheppard; *Data Storage Inst., Singapore.*

Digital Holography with Multiple-Plane Phase-Error Correction, Abbie E. Tippie, James R. Fienup; *Univ. of Rochester, USA.*

Digital Holography and Three-Dimensional Imaging (DH) / Optical Trapping Applications (OTA) Joint Session

Three-Dimensional Imaging by Three-Dimensional Point Spread Function Encoding, Rafael Piestun; *Univ. of Colorado at Boulder, USA.*

Optoelectronic Trapping of Cells, Nanowires, and Nanoparticles, Ming C. Wu; *Univ. of California at Berkeley, USA.*

Plenary Speakers

Principles and Applications of Phase-Shifting Digital Holography, Ichirou Yamaguchi^{1,2}; ¹*Toyo Seiki Seisaku-sho, Ltd., Japan*, ²*Scientist Emeritus of RIKEN, Japan.*

Tutorials

Increased Flexibility for Optical Metrology by Digital Holography, Wolfgang Osten; *Univ. of Stuttgart, Germany.*

Optical Scanning Holography, Ting-Chung Poon; *Virginia Tech, USA.*

Computer-Generated Holography; Principles and Applications, Toyohiko Yatagai; *Utsunomiya Univ., Japan.*

Invited Speakers

Digital Holography for MEMS Application, Anand Asundi, Vijay Raj Singh; *Nanyang Technological Univ., Singapore.*

Deflectometry Challenges Interferometry: 3-D-Metrology from Nanometer to Meter, Gerd Haeusler; *Univ. of Erlangen-Nuremberg, Germany*

Real-Time Computation for Electro-Holography, Tomoyoshi Ito¹, Tomoyoshi Shimobaba²; ¹*Chiba Univ., Japan*, ²*Yamagata Univ., Japan.*

Dynamic Holography, Nikolai V. Kukhtarev; *Alabama A&M Univ., USA.*

Applications of Computer Generated Holograms, Wai-Hon Lee; *Hoetron, USA.*

Acquisition and Manipulation of the Three-Dimensional Information Based on Integral Imaging, Jae-Hyeung Park; *Chungbuk Natl. Univ., Republic of Korea.*

Harmonic Holography, Demitri Psaltis; *Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.*

Digital Holographic Encryption, Kehar Singh; *Indian Inst. of Technology, Delhi, India.*

The 3-D Imaging Researches and Activities in Taiwan, Chao-Hsu Tsai; *Industrial Technology Res. Inst., Taiwan.*

	<i>Grand Ballroom A</i>	<i>Junior Ballroom D</i>	<i>Junior Ballroom C</i>	<i>Grand Ballroom B</i>	<i>Junior Ballroom A/B</i>
Sunday, April 26					
3:00 p.m.–6:00 p.m.	Registration Open, Grand Ballroom Foyer Coatroom				
Monday, April 27					
7:30 a.m.–6:30 p.m.	Registration Open, Grand Ballroom Foyer Coatroom				
8:30 a.m.–10:30 a.m.	DMA • Advances in Digital Holography	JMA • FTS/HISE Joint Session		NMA • Superresolution I	OMA • Transport, Guiding and Sorting
10:30 a.m.–11:00 a.m.	Coffee Break, Grand Ballroom C/D				
10:30 a.m.–4:30 p.m.	Exhibits Open, Grand Ballroom C/D				
11:00 a.m.–12:30 p.m.	DMB • Novel Technologies in Holography (ends at 1:00 p.m.)	FMA • James W. Brault Memorial Session	HMA • Climate Absolute Radiance and Refractivity Observatory	NMB • Superresolution II	OMB • Physics Insights by Means of Optical Trapping I
12:30 p.m.–2:00 p.m.	Lunch Break (on your own)				
2:00 p.m.–4:00 p.m.	JMB • DH/OTA Joint Session	FMB • Combs and Static FTS	HMB • Clouds and Aerosols I	NMC • Nonlinear Microscopy I	
4:00 p.m.–4:30 p.m.	Coffee Break/Exhibits, Grand Ballroom C/D				
4:30 p.m.–6:00 p.m.	DMC • Metrology by Digital Holography and Profilometry (ends at 6:15 p.m.)	FMC • Space and Flight Projects	HMC • Future Missions and Sensor Calibration	NMD • Nonlinear Microscopy II	OMC • Physics Insights by Means of Optical Trapping II
6:30 p.m.–8:00 p.m.	Conference Reception, Junior Ballroom Foyer				
Tuesday, April 28					
7:30 a.m.–6:30 p.m.	Registration Open, Grand Ballroom Foyer Coatroom				
8:30 a.m.–10:30 a.m.	JTuA • DH/NTM Joint Session: Digital Holographic Microscopy	FTuA • FTS for Astronomy and Astrophysics	HTuA • Interpretation of Hyperspectral/Multi spectral Data Through Observations and Simulations		OTuA • Biophotonics Applications
10:30 a.m.–11:00 a.m.	Coffee Break, Grand Ballroom C/D				
10:30 a.m.–6:00 p.m.	Exhibits Open, Grand Ballroom C/D				
11:00 a.m.–12:30 p.m.	DTuA • Holographic Microscopy	FTuB • Combs, Optical Fiber and Fast-Scanning	HTuB • Particle Scattering Models	NTuA • Phase Microscopy and Tomography	OTuB • Novel Uses and Applications
12:30 p.m.–2:00 p.m.	Lunch Break (on your own)				
2:00 p.m.–4:00 p.m.	DTuB • Holography Applications	FTuC • Gosat and Akari	HTuC • New Remote Sensing Perspectives	NTuB • Optical Coherence Tomography	OTuC • Dynamics of Multiple and Parallel Trapping (ends at 3:30 p.m.)
4:00 p.m.–4:30 p.m.	Coffee Break/Exhibits, Grand Ballroom C/D				
4:30 p.m.–6:00 p.m.	JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session, Grand Ballroom C/D				
6:00 p.m.–6:45 p.m.	DTuC • Optical Scanning Holography				

	<i>Grand Ballroom A</i>	<i>Junior Ballroom D</i>	<i>Junior Ballroom C</i>	<i>Grand Ballroom B</i>	<i>Junior Ballroom A/B</i>
Wednesday, April 29					
7:30 a.m.–6:30 p.m.	Registration Open, Grand Ballroom Foyer Coatroom				
8:30 a.m.–10:30 a.m.	DWA • Three-Dimensional Imaging and Display	FWA • Earth Sensing	HWA • Hyperspectral IR and Imager Data Analyses (ends at 10:00 a.m.)	NWA • New Techniques I	
10:30 a.m.–11:00 a.m.	Coffee Break, Grand Ballroom C/D				
10:30 a.m.–12:30 p.m.	Exhibits Open, Grand Ballroom C/D				
11:00 a.m.–12:30 p.m.	DWB • DH Poster Session, Grand Ballroom C/D				
11:00 a.m.–12:30 p.m.		FWB • Visible and Ultra Violet	HWB • Clouds and Aerosols II	NWB • Superresolution III	
12:30 p.m.–2:00 p.m.	Lunch Break (on your own)				
2:00 p.m.–4:00 p.m.	DWC • Computer-Generated Holograms	FWC • Spatial Heterodyne	HWC • Validation of Cloud and Aerosol Products	NWC • Endomicroscopy	
4:00 p.m.–4:30 p.m.	Coffee Break, Grand Ballroom C/D				
4:30 p.m.–6:30 p.m.	DWD • Electro-Holography and Computer-Generated Holography	FWD • Laboratory and Miniature FTS (ends at 6:00 p.m.)	HWD • Hyperspectral Applications (ends at 6:00 p.m.)	NWD • New Techniques II (ends at 5:30 p.m.)	
Thursday, April 30					
7:30 a.m.–10:30 a.m.	Registration Open, Grand Ballroom Foyer Coatroom				
8:30 a.m.–10:30 a.m.	FThA • Spectral Imaging, Grand Ballroom A				

Key to Shading	
DH Sessions	No Shading
FTS Sessions	
HISE Sessions	
NTM Sessions	
OTA Sessions	

Digital Holography and Three-Dimensional Imaging (DH) Abstracts

• Sunday, April 26, 2009 •

Grand Ballroom Foyer Coatrium

3:00 p.m.–6:00 p.m.

Registration Open

• Monday, April 27, 2009 •

Grand Ballroom Foyer Coatrium

7:30 a.m.–6:30 p.m.

Registration Open

DMA • Advances in Digital Holography

Grand Ballroom A

8:30 a.m.–10:30 a.m.

Myung K. Kim; Univ. of South Florida, USA, *Presider*

DMA1 • 8:30 a.m.

Plenary

Principles and Applications of Phase-Shifting Digital Holography,

Ichirou Yamaguchi^{1,2}; ¹Tokyo Seiki Seisakusho, Ltd., Japan, ²Scientist Emeritus of RIKEN, Japan. Phase-shifting digital holography provides the complex amplitude at the CCD plane directly and improves the quality of the reconstructed images. Basic procedures and applications for microscopy, imaging, and surface shape and deformation measurement are surveyed.

DMA2 • 9:15 a.m.

One-Shot Digital Holography for Real-Time Recording of Moving

Color 3-D Images, *Kohei Maejima, Kunihiko Sato*; Univ. of Hyogo, Japan. A new method is developed for one-shot recording of the complex-amplitude hologram. This method is generalized for the reference light with general phase distribution, and the limitation of bandwidth is also discussed.

DMA3 • 9:30 a.m.

Fast Iterative Sectional Image Reconstruction in Optical Scanning

Holography, *Xin Zhang*¹, *Edmund Y. Lam*¹, *T.-C. Poon*²; ¹Univ. of Hong Kong, China, ²Virginia Polytechnic Inst. and State Univ., USA. Inverse imaging is a versatile technique for sectional image reconstruction in optical scanning holography. Now we develop a fast iterative method that circumvents the problem by taking advantage of the structures in the matrices.

DMA4 • 9:45 a.m.

Digital Reconstruction of Axially-Thick Potentials, *Christopher*

Barsi, Jason W. Fleischer; Princeton Univ., USA. The holographic reconstruction of objects typically assumes that the object is axially thin. Here, we demonstrate a simple approach that works for axially-thick objects which evolve dynamically. Results are verified by reconstructing linear scattering experiments.

DMA5 • 10:00 a.m.

Application of Digital Micro-Mirror Devices to Spherical

Reference Beam Digital in-Line Holography, *Adekunle A. Adeyemi, Thomas E. Darcie*; Dept. of Electrical and Computer Engineering, Univ. of Victoria, Canada. We describe a technique for programming the pinhole in digital in-line holography by addressing the elements of digital micro-mirror devices. Results show expansion of the view field by 35% and projection view of 3-D features.

DMA6 • 10:15 a.m.

High-Speed Contouring of an Adaptive Fluidic Lens with Two-

Wavelength Single-Pulse Digital Holography, *Thomas Hansel*¹, *Günter Steinmeyer*¹, *Ruediger Grunwald*¹, *Uwe Griebner*¹, *Florian Schneider*², *Ulrike Wallrabe*²; ¹Max Born Inst., Germany, ²Dept. of Microsystems Engineering, Univ. of Freiburg, Germany. Contouring of dynamic phase changes of a piezoelectrically driven fluidic lens with a temporal resolution of 410 frame/s is presented. Using a dual-wavelength few-ps source, optical path differences of several 10 µm are unambiguously detected.

Grand Ballroom C/D

10:30 a.m.–11:00 a.m.

Coffee Break/ Exhibits

DMB • Novel Technologies in Holography

Grand Ballroom A

11:00 a.m.–1:00 p.m.

Partha P. Banerjee; Univ. of Dayton, USA, *Presider*

DMB1 • 11:00 a.m.

Invited

Dynamic Holography, *Nickolai V. Kukhtarev*¹, *T. Kukhtareva*¹, *P.*

*Banerjee*²; ¹Alabama A&M Univ., USA, ²Univ. of Dayton, USA. We will discuss novel types of the dynamic holographic interferometers as double-functional optical and electrical holographic single-pixel interferometer, analog and digital. Theoretical approach is compared with experimental results.

DMB2 • 11:30 a.m.

All Fourteen Bravais Lattices Can Be Fabricated by Two-Beam

Holographic Lithography, *Yuzo Ono*; Ritsumeikan Univ., Japan. This paper proposes and experimentally shows that three-dimensional photonic crystals with all fourteen Bravais lattice structures and arbitrary lattice constant can be fabricated by triple recording of two-beam interference fringes in a photoresist.

DMB3 • 11:45 a.m.

Holographic and Dynamical Imaging of Weak Patterns in Noise, *Dmitry V. Dyllov, Jason W. Fleischer*; Princeton Univ., USA.

We consider reconstruction of low-level images hidden in intense noise by two nonlinear techniques: coherence gating via holography and coherence resonance via dynamical signal-noise coupling. The latter is a new type of threshold-less stochastic resonance.

DMB4 • 12:00 p.m.

Space-Bandwidth Transfer in Spherical Reference Holography Using Wigner Transforms, Nick Loomis¹, George Barbastathis^{1,2}; ¹MIT, USA, ²Singapore-MIT Alliance for Res. and Technology Ctr., Singapore. Wigner transforms are used to intuitively explain how spherical reference waves magnify object images. Limits for optimal spatial extent and spatial frequency are given for known (or estimated) space-bandwidth content.

DMB5 • 12:15 p.m.

Computer Generated Polarization Holograms with Defined Magnitude and Orientation of Each Pixel's Birefringence, Markus Fratz^{1,2}, Dominik M. Giel¹, Peer Fischer²; ¹Fraunhofer Inst. for Physical Measurement Techniques, Germany, ²Rowland Inst. at Harvard, USA. We present polarization holograms with space-variant magnitude and orientation of the birefringence. They are fabricated in an Azobenzene thin-film and allow full control of the amplitude and phase of the diffracted fields.

DMB6 • 12:30 p.m.

New Concepts for Depth Resolved Holographic Imaging, Nektarios Koukourakis¹, Christoph Kasseck¹, Nils C. Gerhard¹, Martin R. Hofmann¹, Daniel Rytz², Sebastian Köber³, Michael Salvador³, Klaus Meerholz²; ¹Photonics and Terahertz Technology, Ruhr-Univ. Bochum, Germany, ²FEE GmbH, Germany, ³Inst. of Physical Chemistry, Univ. of Cologne, Germany. We present two new depth resolved holographic imaging concepts. First, variable depth resolution is achieved by changing the tuning width of a tunable laser. Furthermore, a concept for single-shot recording of a 3-D-image is introduced.

DMB7 • 12:45 p.m.

Reconstruction of Holograms with Automatic Extraction of Distance Parameter, Taegeun Kim¹, Ting-Chung Poon²; ¹Sejong Univ., Republic of Korea, ²Virginia Tech., USA. We show experimentally that the reconstruction of complex holograms recorded by optical scanning holography is possible without a searching process. We extract the distance parameter from the complex hologram by direct processing of the hologram.

1:00 p.m.–2:00 p.m.

Lunch Break (on your own)

JMB • DH/OTA Joint Session

Grand Ballroom A

2:00 p.m.–4:00 p.m.

Christian Depeursinge; École Polytechnique Fédérale de Lausanne, Switzerland, *Presider*

JMB1 • 2:00 p.m.

Invited

Optoelectronic Trapping of Cells, Nanowires, and Nanoparticles, Ming C. Wu; Univ. of California at Berkeley, USA. The principle and recent experimental results of optoelectronic tweezers (OET) will be

presented. Based on light-induced dielectrophoresis, OET can trap and sort colloidal particles, biological cells, nanowires and nanoparticles using a digital light projector.

JMB2 • 2:30 p.m.

Invited

Three-Dimensional Imaging by Three-Dimensional Point Spread Function Encoding, Rafael Piestun; Univ. of Colorado at Boulder, USA. Pupil-encoded point spread functions are implemented for three-dimensional image data acquisition. These systems are passive and work under broadband illumination. Applications include nanolocalization of small emitters and machine vision.

JMB3 • 3:00 p.m.

Invited

Optical Tweezers Shed Light on Cell Motility, Eric Dufresne; Yale Univ., USA. Optical tweezers are an elegant platform for the biochemical and mechanical stimulation of live cells. I will discuss the application of holographic optical tweezers to chemotaxis in neutrophils and mechanotransduction in neurons.

JMB4 • 3:30 p.m.

Motility-Contrast Imaging: Digital Holography of Cellular Motion in 3-D Tissues, David D. Nolte, John Turek; Purdue Univ., USA.

We present the first three-dimensional assays of intrinsic cellular motion applied to tissues using motility contrast imaging (MCI), a new digital holographic imaging technique that detects sub-cellular motion as a novel fully-endogenous imaging contrast agent.

JMB5 • 3:45 p.m.

Application of 3-D Tracking, Multi-Wavelength Techniques and Color Imaging in Digital Holographic Microscopy, Björn Kemper¹,

Patrik Langehanenberg¹, Sebastian Kosmeier¹, Xiaoli Mo¹, Sabine Przibilla¹, Angelika Vollmer¹, Steffi Ketelhut¹, Jinghui Xie², Gert von Bally²; ¹Ctr. for Biomedical Optics and Photonics, Univ. of Muenster, Germany, ²School of Information Science and Technology, Beijing Inst. of Technology, China. In an overview results obtained by digital holographic microscopy demonstrate 3-D-tracking of cells without mechanical focus realignment, reduction of amplitude and phase noise by using multi-wavelength techniques and prospects for subsequent refocusing of color images.

Grand Ballroom C/D

4:00 p.m.–4:30 p.m.

Coffee Break/ Exhibits

DMC • Metrology by Digital Holography and Profilometry

Grand Ballroom A

4:30 p.m.–6:15 p.m.

Jae-Hyeung Park; Chungbuk Natl. Univ., Republic of Korea, *Presider*

DMC1 • 4:30 p.m.

Tutorial

Increased Flexibility for Optical Metrology by Digital Holography, Wolfgang Osten; Univ. of Stuttgart, Germany. Abstract not available.

DMC2 • 5:15 p.m.

Depth Estimation and Optical Sectioning by Parallax Analysis, Barak Katz, Joseph Rosen; Ben-Gurion Univ. of the Negev, Israel.

We present a blind method of optical sectioning for general three-dimensional imaging. A parallax analysis on multiple view projections of a white light illuminated three-dimensional scene yields undistorted slices along the optical axis.

DMC3 • 5:30 p.m.

Automatic 3-D Shape Measurement Noise Reduction for an Optical Profilometer, Song Zhang, David Eisenmann, Scott Chumbley;

Iowa State Univ., USA. This paper presents a technique to automatically reduce the measurement noise of an optical profilometer. By approximating polynomials line-by-line horizontally and vertically, the bad measurement points are detected and fixed automatically.

DMC4 • 5:45 p.m.

Invited

Deflectometry Challenges Interferometry: 3-D-Metrology from Nanometer to Meter, Gerd Häusler^{1,2}, M. C. Knauer¹, C. Faber¹, C.

Richter¹, S. Peterhänsel¹, C. Kranitzky¹, K. Veit²; ¹Univ. of Erlangen-Nuremberg, Germany, ²3D-Shape GmbH, Germany. We will discuss deflectometry from the physicist's and from the information theoretical point of view. The intrinsic features of deflectometry - incoherence, source encoding, high dynamical range, simplicity, and scalability- enable new sensors and unexpected applications.

Junior Ballroom Foyer

6:30 p.m.–8:00 p.m.

Conference Reception

NOTES

• Tuesday, April 28, 2009 •

Grand Ballroom Foyer Coatroom

7:30 a.m.–6:30 p.m.

Registration Open

JTuA • DH/NTM Joint Session: Digital Holographic Microscopy

Grand Ballroom A

8:30 a.m.–10:30 a.m.

Hiroshi Yoshikawa; Nihon Univ., Japan, *Presider*

JTuA1 • 8:30 a.m. Invited

Image Formation in Holographic Microscopy and Tomography

Colin Sheppard¹, Shan S. Kou²; ¹Div. of Bioengineering, Natl. Univ. of Singapore, Singapore, ²Graduate School for Integrative Sciences and Engineering, Natl. Univ. of Singapore, Singapore. Coherent transfer functions for imaging in holographic microscopy and holographic tomography are discussed. For holographic microscopy, there is poor spatial frequency coverage, but it can be extended by illumination at a range of different angles.

JTuA2 • 9:00 a.m. Invited

Digital Holography for MEMS Application, Anand Asundi¹, Vijay Raj Singh²; ¹Nanyang Technological Univ., Singapore, ²Ngee Ann AEM Ctr. of Innovation, Singapore. Studies on digital holographic microscopy for full field high resolution 3-D profiling of MEMS and micro-devices are presented. Applications for thin film thickness measurement and studies on a MEMS accelerometer are presented.

JTuA3 • 9:30 a.m.

Second Harmonic and Fundamental Wavelength Digital Holographic Microscopy, Etienne Shaffer, Nicolas Pavillon, Jonas Kühn, Christian Depeursinge; École Polytechnique Fédérale de Lausanne, Switzerland. We report on a new, multi-functional second harmonic generation digital holographic microscope that allows retrieval of an object complex diffraction wavefront at both second harmonic and fundamental wavelengths.

JTuA4 • 9:45 a.m.

Three-Dimensional Phase Images Using Photothermal Microscope Integrated with Digital Holographic Interferometry, Srivathsan Vasudevan, George C. K. Chen, Andass C. K. Teu, Niladri B. Puhān, Zhiping Lin; Nanyang Technological Univ., Singapore. Photothermal microscope (PTM), offering high resolutions (~ 40 nanometers and nanoseconds) provides temperature distribution within a cell. Integrating PTM with digital holography is proposed to obtain quantitative three-dimensional images aiding real-time monitoring of biological assays.

JTuA5 • 10:00 a.m. Invited

Digital Holography with Multiple-Plane Phase-Error Correction, Abbie E. Tippie, James R. Fienup; Univ. of Rochester, USA. We correct phase screens that introduce anisoplanatic blurring in digital holography. Numerical propagations of fields, avoiding non-physical aliasing, and a sharpness metric in a nonlinear optimization designed to overcome false oversharping effects are described.

Grand Ballroom C/D

10:30 a.m.–11:00 a.m.

Coffee Break/ Exhibits

DTuA • Holographic Microscopy

Grand Ballroom A

11:00 a.m.–12:30 p.m.

George Barbastathis; MIT, USA, *Presider*

DTuA1 • 11:00 a.m. Invited

Harmonic Holography, Chia-Lung Hsieh^{1,2}, Rachel Grange¹, Ye Pu^{1,2}, Demetri Psaltis^{1,2}; ¹École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, ²Caltech, USA. We demonstrate the three-dimensional imaging capability of harmonic holographic microscopy by using 30-nm BaTiO₃ particles. Three-dimensional distributions of nanoparticles in artificial structures and biological cells are recorded and interpreted from a digital hologram.

DTuA2 • 11:30 a.m.

Exploring Cell Dynamics with Digital Holographic Microscopy, Benjamin Rappaz¹, Pascal Jourdain¹, Daniel Boss^{2,3}, Christian Depeursinge², Pierre Magistretti^{1,3}, Pierre Marquet³; ¹Brain Mind Inst., École Polytechnique Fédérale de Lausanne, Switzerland, ²Lab d'Optique Appliquée, École Polytechnique Fédérale de Lausanne, Switzerland, ³Univ. of Lausanne, Switzerland. Quantitative phase signal (QPS) provided by digital holographic microscopy has permitted to investigate Cellular Membrane nano-Fluctuations (CMnF), of red blood cells as well as to perform an optical measurement of cell electrical activity.

DTuA3 • 11:45 a.m.

Tomography of Red Blood Cells by Multiple-Wavelength Digital Holographic Microscopy, Jonas Kühn¹, Frédéric Montfort², Tristan Colomb², Benjamin Rappaz³, Corinne Morata³, Nicolas Pavillon¹, Pierre Marquet³, Christian Depeursinge¹; ¹Lab of Applied Optics, École Polytechnique Fédérale de Lausanne, Switzerland, ²Lycée Tec SA, Switzerland, ³Brain Mind Inst., École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. We present a method enabling cell-tomography by multiple-wavelength digital holographic microscopy. 20 reflection-holograms between 485 and 670 nm are sequentially acquired, then the wavefronts are summed to obtain 3-D tomographic reconstruction of red blood cells.

DTuA4 • 12:00 p.m.

Quantitative Phase Imagery with Total Internal Reflection Holographic Microscopy, William M. Ash, Myung K. Kim; Univ. of South Florida, USA. Total internal reflection holographic microscopy is used to produce quantitative phase images of biological specimens. Quantitative cellular images, algorithmic considerations and optomechanical implementation are presented and discussed. Applications include characterization of membranes, motility and metastasis.

DTuA5 • 12:15 p.m.

Recording of Wide Hologram for Microscopic Images with Large Depth Using One CCD, Osamu Murata, Hiroyuki Toge, Kunihiro Sato; Univ. of Hyogo, Japan. A new technology of the holographic microscope is developed for recording 3-D image with large depth. A number of holograms are recorded using one CCD, and are arranged for generating a wide hologram.

12:30 p.m.–2:00 p.m.

Lunch Break (on your own)

DTuB • Holography Applications

Grand Ballroom A

2:00 p.m.–4:00 p.m.

William Dallas; Univ. of Arizona, USA, *Presider*

DTuB1 • 2:00 p.m.

Invited

Digital Holographic Encryption, Anith Nelleri, Joby Joseph, Kehar Singh; Indian Inst. of Technology, Delhi, India. We demonstrate that the experimental and computational degrees of freedom offered by digital holography can be used to secure three-dimensional (3-D) or complex data. Implications in the design of whole information security systems are presented.

DTuB2 • 2:30 p.m.

Digital Holographic Encryption Using Electrically Addressed Phase Key Masks, Chau-Jern Cheng¹, Jin-Wen Chou¹, Yi-Ta Lee¹, Xin-Ji Lai¹, Han-Yen Tu^{2,3}, Jen-Shiun Chiang³; ¹Natl. Taiwan Normal Univ., Taiwan, ²St. John's Univ., Taiwan, ³Tamkang Univ., Taiwan. This work describes a novel digital holographic Fresnel encryption scheme using computer-programmable random phase key masks, which are performed by electrically addressed liquid-crystal spatial light modulators for securing data via on-line optical processing.

DTuB3 • 2:45 p.m.

Holographic 3-D Visualization of Water Droplets, Partha P. Banerjee¹, George Nehmetallah¹, Nikolai V. Kukhtarev², Sarat C. Praharaj³; ¹Univ. of Dayton, USA, ²Alabama A&M Univ., USA, ³DMS Technologies Inc., USA. A digital holographic technique to visualize the shape, size and deformation of a water droplet in 3-D in static

and dynamic modes is presented. Extension to water droplets in cloud/rain, and sand particles is discussed.

DTuB4 • 3:00 p.m.

Fingerprint Biometry Applications of Digital Holography and Low-Coherence Interference Microscopy, Myung K. Kim, Mariana Potcoava; Univ. of South Florida, USA. Two-dimensional latent images as well as three-dimensional images of finger print molds are produced using quantitative phase microscopy by digital holography, digital interference holography, and low-coherence interference microscopy.

DTuB5 • 3:15 p.m.

Spectral-Spatial Depth Sectioning of Biological Samples Using Silicon Oxide Nano-Particles Doped PQ-PMMA, Yuan Luo¹, Paul Gelsinger², Jennifer Barton², George Barbastathis^{1,3}, Raymond Kostuk²; ¹MIT, USA, ²Univ. of Arizona, USA, ³Singapore-MIT Alliance for Res. and Technology Ctr., Singapore. We use silicon oxide nanoparticles in PQ-PMMA to enhance the diffraction efficiency of angle multiplexed in-plane reference beam holograms. We experimentally demonstrate this technique in use for holographic spatial-spectral imaging filters and present experimental results.

DTuB6 • 3:30 p.m.

Localization of Microfibers within Volumes Using Digital Holographic Video, Emmanouil Darakis^{1,2}, Michel Kempkes³, Taslima Khanam², Arvind Rajendran², Vinay Kariwala², Thomas J. Naughton^{1,4}, Marco Mazzotti³, Anand K. Asundi²; ¹Natl. Univ. of Ireland, Maynooth, Ireland, ²Nanyang Technological Univ., Singapore, ³ETH Zurich, Switzerland, ⁴Univ. of Oulu, Finland. Carbon fibers are studied using digital holographic sequences. Fibers have distinct orientation in space. An algorithm to identify the orientation and the size of suspended fibers from the digitally recorded holographic sequences is presented.

DTuB7 • 3:45 p.m.

Real-Time Fringe Pattern Generation with High Quality, Hoonjong Kang¹, Fahri Yaraş¹, Levent Onural¹, Hiroshi Yoshikawa²; ¹Bilkent Univ., Turkey, ²Nihon Univ., Japan. A hologram computation procedure and its GPU implementation are presented. The procedure is based on partitioning. Each segment has an approximate but simpler frequency domain representation. Quality of the results is comparable to Fresnel holograms.

Grand Ballroom C/D

4:00 p.m.–4:30 p.m.

Coffee Break/ Exhibits

JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session

Grand Ballroom C/D
4:30 p.m.–6:00 p.m.

JTuB1

Holographic Microscopy Based on Phase Shifting Interferometry and Twin-Image Analysis to Measure Optical Field of Plasmonic Beaming Light, Yongjun Lim, Joonku Hahn, Byounggho Lee; Seoul Natl. Univ., Republic of Korea. We propose a holographic microscopy based on phase shifting interferometry and detect the optical far-field distribution of plasmonic off-axis light beaming. The twin-image analysis in spatial frequency domain is adopted to reconstruct optical fields.

JTuB2

Single-Shot Optical-Path-Length-Shifting Digital Holography, Yasuhiro Awatsujii^{1,2}, Takamasa Koyama¹, Tatsuki Tahara¹, Kenichi Ito¹, Yuki Shimozato¹, Takeshi Wakamatsu¹, Atsushi Kaneko¹, Kenzo Nishio¹, Shogo Ura¹, Toshihiro Kubota³, Osamu Matoba⁴; ¹Kyoto Inst. of Technology, Japan, ²JST, Japan, ³Kubota Holography Lab Corp., Japan, ⁴Kobe Univ., Japan. The authors propose a single-shot in-line digital holography that can record two interference-fringe images generated at different planes using an image sensor. The technique was successfully demonstrated by numerical simulation and preliminary experiment.

JTuB3

Optical Image Multiplexing Encryption Using Digital Holography in a JTC Architecture, Edgar Rueda¹, John F. Barrera¹, Rodrigo Henao¹, Roberto Torroba²; ¹Univ. de Antioquia, Colombia, ²Univ. de la Plata, Argentina. An optical scheme that uses a digital holographic technique in a joint transform correlator architecture to encrypt and decrypt images is presented. A filtering procedure is implemented to improve the multiplexing capabilities of the system.

JTuB4

Advances in Quadrature-Phase-Shifting Digital Holography, Jung-Ping Liu¹, Ting-Chung Poon²; ¹Dept. of Photonics, Feng Chia Univ., Taiwan, ²Bradley Dept. of Electrical and Computer Engineering, Virginia Tech, USA. We present a technique called two-step-only quadrature phase-shifting holography in which solely two holograms are required to reconstruct a complex amplitude of the object. Neither reference wave intensity nor an object wave intensity is needed.

JTuB5

Mask-Based Vision Systems by Use of the Wigner Distribution Function and Ambiguity Function, Se Baek Oh¹, Ramesh Raskar², Douglas Lanman³, George Barbastathis¹; ¹MIT, USA, ²MIT Media Lab, USA, ³Brown Univ., USA. We analyze complex pupils in mask-based vision systems using the Wigner Distribution Function and Ambiguity Function. The amplitude and phase variations behave

differently; this formulation provides a novel approach to the design of imaging systems.

JTuB6

3-D Selective Imaging of Sound Sources in Air from 1-D Laser Vibrometry Measurements, Erik Olsson, Mikael Sjödhahl; Luleå Univ. of Technology, Sweden. Digital holographic and tomographic reconstruction algorithms have been used for imaging of sound sources. Making the tomographic reconstruction first produces images with higher quality. Higher resolution and selective imaging is obtained by using multiple frequencies.

JTuB7

On-Axis Phase-Shifting Profilometry with Two Spatial Frequencies Using Concentric-Circular Patterns, Eun-Hee Kim, Joonku Hahn, Byounggho Lee; Seoul Natl. Univ., Republic of Korea. On-axis phase-shifting profilometry with two spatial frequencies is proposed. The carrier frequency results from the difference in positions of camera and projector on common axis. We use concentric-circular patterns to extract the depth of objects.

Posters JTuB8–JTuB16 can be found in the FTS abstracts section.

Posters JTuB17–JTuB21 can be found in the HISE abstracts section.

Posters JTuB22–JTuB29 can be found in the NTM abstracts section.

Posters JTuB30–JTuB35 can be found in the OTA abstracts section.

DTuC • Optical Scanning Holography

Grand Ballroom A
6:00 p.m.–6:45 p.m.
Mikael Sjödhahl; Luleå Univ. of Technology, Sweden, Presider

DTuC1 • 6:00 p.m.

Tutorial

Optical Scanning Holography, Ting-Chung Poon; Virginia Tech, USA.
Abstract not available.

• **Wednesday, April 29, 2009** •

Grand Ballroom Foyer Coatroom

7:30 a.m.–6:30 p.m.

Registration Open

DWA • Three-Dimensional Imaging and Display

Grand Ballroom A

8:30 a.m.–10:30 a.m.

Sung-Kyu Kim; Korea Inst. of Science and Technology, Republic of Korea, President

DWA1 • 8:30 a.m. Invited

Acquisition and Manipulation of the Three-Dimensional Information Based on Integral Imaging, Jae-Hyeung Park; Chungbuk Natl. Univ., Republic of Korea. Integral imaging provides a useful tool for dealing with the three-dimensional information of the object space. Various approaches to acquire and manipulate the three-dimensional information based on integral imaging principle are presented.

DWA2 • 9:00 a.m.

Joint Source-Channel Coding for Transmitting Digital Holographic Data over Noisy Channel, Li-Chien Lin¹, Ho-En Liao¹, Kuo-Kuei Lin²; ¹Dept. of Communications Engineering, Feng Chia Univ., Taiwan, ²Dept. of Information Engineering and Computer Science, Feng Chia Univ., Taiwan. We propose a joint source-channel coding (JSCC) scheme to minimize the end-to-end image distortion within a given transmission rate. The optimal quantizer and Rate-compatible punctured code are employed before the transmission of the holographic data.

DWA3 • 9:15 a.m.

Depth Conversion Method in Curved Integral Imaging System Using a Large Aperture Lens, Yongri Piao¹, Dong-Hak Shin², L. Liliana², Eun-Soo Kim¹; ¹Kwangju Univ., Republic of Korea, ²Dongseo Univ., Republic of Korea. We propose a computational method of depth conversion in curved integral imaging system using a large-aperture lens. The proposed method can be implemented by a simple pixel transform without information loss of elemental images.

DWA4 • 9:30 a.m.

Real-Time Multiple SLM Color Holographic Display Using Multiple GPU Acceleration, Fahri Yaraş, Hoonjong Kang, Levent Onural; Bilkent Univ., Turkey. A real-time color holographic video display system computes holograms from point cloud of a rigid object by using multi-GPU system and uses three different colored LEDs for reconstruction. Experimental results are satisfactory.

DWA5 • 9:45 a.m.

Calibration of Elemental Images in Integral Photography Capture for Electric Holography, Kenji Yamamoto, Tomoyuki Mishina, Makoto Okui; NICT, Japan. Calibration of elemental images in integral photography is necessary for high quality imaging. We introduce our live electronic holography initially, and mention our calibration. We will show reconstructed objects both with and without our calibration.

DWA6 • 10:00 a.m.

Invited

The 3-D Imaging Researches and Activities in Taiwan, Chao-Hsu Tsai; Industrial Technology Res. Inst., Taiwan. More and more companies, research institutes, and universities are throwing in the development of the related technologies. In this paper, the recent researches and activities of 3-D imaging technologies in Taiwan are presented.

Grand Ballroom C/D

10:30 a.m.–11:00 a.m.

Coffee Break/ Exhibits

DWB • DH Poster Session

Grand Ballroom C/D

11:00 a.m.–12:30 p.m.

DWB1

Improved Three-Dimensional Depth Extraction Using Super Resolved Elemental Image Set, Keehoon Hong¹, Jisoo Hong¹, Jin-mo Kang¹, Jae-Hyun Jung¹, Jae-Hyeung Park², Byoung-ho Lee¹; ¹Seoul Natl. Univ., Republic of Korea, ²Chungbuk Natl. Univ., Republic of Korea. We proposed a new method to improve depth extraction in integral imaging using super-resolution algorithm. Simulation results show the extractable depth resolution is enhanced after the super-resolution procedure.

DWB2

Laser Based Method for Real-Time Three-Dimensional Monitoring of Chest Wall Movement, Matija Jezersek¹, Matjaz Flezar², Janez Mozina¹; ¹Univ. of Ljubljana, Slovenia, ²Univ. Clinic Golnik, Slovenia. Novel method for monitoring three-dimensional chest wall movement is presented. It is based on laser multiple-line triangulation technique. The measuring frequency is 80Hz. The method was developed for training persons with breathing diseases.

DWB3

Design and Fabrication of Computer Generated Holograms for Fresnel Domain Lithography, Jose A. Dominguez-Caballero¹, Satoshi Takahashi¹, Sung J. Lee², George Barbastathis^{1,3}; ¹MIT, USA, ²Samsung Electronics Co. Ltd., Republic of Korea, ³Singapore-MIT Alliance for Res. and Technology Ctr., Singapore. An optimization algorithm for the design of Fresnel domain computer-generated holograms for

lithographic applications is presented. The holograms are fabricated experimentally and their performance characterized. A sensitivity analysis is performed to estimate potential fabrication errors.

DWB4

The Wigner Distribution Function of Volume Holographic Optical Elements, *Se Baek Oh*¹, *George Barbastathis*^{1,2}; ¹MIT, USA, ²Singapore-MIT Alliance for Res. and Technology Ctr., Singapore. We present the Wigner Distribution Function of volume holographic optical elements by adopting a linear-systems approach. Specifically, the Wigner Distribution Function of a volume holographic optical element recorded by two plane waves is derived analytically.

DWB5

Extended Depth-of-Field and 3-D Information Extraction in Digital Holographic Microscopy, *Isabelle Bergeönd*¹, *Tristan Colomb*², *Nicolas Pavillon*¹, *Yves Emery*², *Christian Depeursinge*¹; ¹École Polytechnique Fédérale de Lausanne, Switzerland, ²Lyncée Tec SA, Switzerland.

A comparison of algorithms for depth-of-field extension in the particular field of digital holographic microscopy is presented. Using the reconstruction properties of holography, a simple 3-D reconstruction method from a single hologram is deduced.

DWB6

A Proposal for Digital Holographic Microscopy Observable in Multi-View and Multi-Resolution, *Tomoyoshi Shimobaba*¹, *Tomoyoshi Ito*²; ¹Yamagata Univ., Japan, ²Chiba Univ., Japan. We propose a new digital holographic microscopy, that enables simultaneous multi-view reconstructed images with a large area and high-resolution, using Shifted-Fresnel diffraction instead of Fresnel diffraction.

DWB7

Three-Dimensional Shape Measurement Using Binary Spatio-Temporal Encoded Illumination, *Yong Li*¹, *Haihua Zhang*¹, *Fang Song*², *Hongzhen Jin*¹, *Hui Wang*¹; ¹Zhejiang Normal Univ., China, ²Inst. of Command and Technology, People's Liberation Army, China. A method for 3-D imaging by pseudorandom sequence projecting is proposed. The symbols for constructing sequence are encoded with local spatial and temporal coordinates of adjacent pixels. Both the shape and texture can be obtained.

DWB8

Fast Calculation Method for Computer Generated Hologram Using Three-Dimensional Affine Transformation in Real Space, *Hironobu Sakata*, *Yuji Sakamoto*; Graduate School of Information Science and Technology, Hokkaido Univ., Japan. We propose a method using three-dimensional affine transformation in real space to calculate holograms at high-speed from patch model, and report the experimental result.

DWB9

Partially Coherent Digital in-Line Holographic Microscopy, *Jorge Garcia-Sucerquia*¹, *Diana Alvarez-Palacio*², *Jurgen Kreuzer*³; ¹Univ. Nacional de Colombia, Colombia, ²Univ. de Antioquia, Colombia, ³Dalhousie Univ., Canada. Using a blue LED we show that Digital In-line Holography Microscopy (DIHM) can yield micron resolution. With compact LED-DIHM we study biological samples with comparable results to those obtained with more expensive and complex LASER-DIHM.

DWB10

Diffraction Spatiotemporal Lens with Wavelength Dispersion Compensation, *Kouhei Kimura*¹, *Satoshi Hasegawa*¹, *Satoshi Yamashita*², *Yoshio Hayasaki*^{1,2}; ¹Utsunomiya Univ., Japan, ²Univ. of Tokushima, Japan. A diffractive spatiotemporal lens that performs simultaneous spatial and temporal focusing is proposed. The diffractive lens also achieves a compensation of wavelength dispersion for a femtosecond laser pulse.

DWB11

Quadrature Phase-Shifting Digital Holography, *Suezou Nakadate*, *Tomohiro Kiire*, *Masato Shibuya*; Tokyo Polytechnic Univ., Japan. Digital holography using a quadrature phase-shifting interferometer is presented. Two quadrature phase-shifted holograms are acquired to give the digital phase hologram. The object image is reconstructed by digital convolutions with the Fast Fourier Transform algorithm.

DWB12

Quantization Noise: An Additional Constraint for the Extended Sampling Theorem, *Damien P. Kelly*¹, *Nitesh Pandey*¹, *Bryan M. Hennelly*¹, *Thomas J. Naughton*^{1,2}; ¹Natl. Univ. of Ireland, Maynooth, Ireland, ²Univ. of Oulu, Finland. Recovery of spatial frequencies above the Nyquist limit is of interest in digital holography. We examine how finite pixel size and quantization error introduced by a CCD camera affect the recovery of these frequencies.

DWB13

Rapid SLM Design for Grid-Free Multispot Positioning in 2-D and 3-D with a Modified Gerchberg-Saxton Algorithm, *David Engström*¹, *Anders Frank*², *Jan Backsten*², *Mattias Goksör*¹, *Jörgen Bengtsson*²; ¹Univ. of Gothenburg, Sweden, ²Chalmers Univ. of Technology, Sweden. A single-plane FFT-based algorithm which optimizes a defocused field corresponding to a desired spatial configuration of focused spots is presented. The defocused target field allows for grid-free spot positioning in 2-D and 3-D.

DWB14

Integral Imaging Microscope Using Point Light Source Array, *Young-Tae Lim*, *Jae-Hyeung Park*, *Nam Kim*, *Ki-Chul Kwon*; Chungbuk Natl. Univ., Republic of Korea. Three-dimensional integral imaging microscope using point light source array is proposed. The specimen is illuminated by the point light source array and captured as a form of the elemental images.

DWB15

Interferometric Procedure for Decoupling Morphometry and Refractive Index Measurements via Digital Holographic Microscopy, Freddy Alberto Monroy Ramirez¹, Jorge Garcia-Sucerquia²; ¹Physics Dept., Univ. Nacional de Colombia, Colombia, ²Physics School, Univ. Nacional de Colombia, Colombia. An experimental decoupling procedure that separates the thickness and the relative refraction index of transparent objects is discussed with Digital Holography Microscopy. The sample is immersed into different media. Experimental results are presented.

DWB16

Reconstruction of Digital Hologram by Use of the Wavelet Transform, Jingang Zhong, Jiawen Weng, Cuiying Hu; *Inst. of Optoelectronic Engineering, Jinan Univ., China*. A reconstruction approach for digital holography by use of Gabor wavelet transform is described. The zero-order diffraction image and the twin-image are eliminated automatically without spatial filtering. The theory and experimental results are shown.

DWB17

Computational Depth Conversion Technique for Display of Orthoscopic 3-D Real Images in Integral Imaging, Dong-Hak Shin¹, L. Liliana¹, Byung-Gook Lee¹, Eun-Soo Kim²; ¹Dongseo Univ., Republic of Korea, ²Kwangwoon Univ., Republic of Korea. We propose a computational depth conversion technique for displaying orthoscopic 3-D real images in integral imaging. In the proposed technique, depth-converted elemental image array is obtained through smart pixel mapping process and image interpolation technique.

DWB18

Computational Integral Imaging Reconstruction Method of 3-D Images Based on Pixel-to-Pixel Mapping and Interpolation Technique, Dong-Hak Shin, Dong-Jin Kim, Byung-Gook Lee; *Dongseo Univ., Republic of Korea*. We propose a novel computational integral imaging reconstruction method using a pixel-to-pixel mapping and an interpolation technique. To confirm the feasibility of the proposed system, some experiments are carried out and the results are presented.

DWB19

Efficient Generation of Video Hologram Using Spatio-Temporal Redundant Data of 3-D Video, Seung-Cheol Kim, Eun-Soo Kim; *3-D Display Res. Ctr., Kwangwoon Univ., Republic of Korea*. In this paper, a new method for efficient generation of video hologram for 3-D video is proposed by combined use of redundant data of 3-D video and look-up table techniques.

DWB20

Efficient Generation of Hologram Crawl Caption Using N-LUT Method, Seung-Cheol Kim, Eun-Soo Kim; *3-D Display Res. Ctr., Kwangwoon Univ., Republic of Korea*. In this paper, generation method of hologram crawl caption for hologram TV system is proposed. That is, the hologram caption is generated using pre-calculated elemental fringe pattern for each character.

DWB21

Correct Depth Analysis on the Stereoscapy, Kwang Hoon Lee^{1,2}, Dong-Wook Kim², Yong-Moo Kwon², Nam-Ho Hur³, Sung-Kyu Kim²; ¹Konkuk Univ., Republic of Korea, ²Korea Inst. of Science and Technology, Republic of Korea, ³ETRI, Republic of Korea. In stereoscapy, the image distance by the focused object distance at camera model makes a different disparity compared to the original at pin-hole model and it will be one of the causes of depth distortion.

DWB22

Improving Intensity of Reconstructed Image by Digital Blazed Grating in Opto-Electronic Holography, Tao Wang, Ying-jie Yu, Huadong Zheng, Wen-jing Zhou; *Dept. of Precision Mechanical Engineering, Shanghai Univ., China*. Multi-order images appear in the reconstruction of hologram with liquid crystal spatial light modulator (LC-SLM) which leads to low intensity. Digital blazed grating is added to hologram which can improve the intensity impressively by 479.2%.

DWB23

Study on Phase Stitching Technique on Digital Holography, Wenjing Zhou¹, Gang Chen¹, Yingjie Yu¹, Weijuan Qu²; ¹Shanghai Univ., China, ²Nanyang Technological Univ., Singapore. A phase stitching approach on multi-apertures digital holograms is proposed to enlarge the testing area with high resolution. An experiment for a USAF test targets is performed and a favorable stitching result is obtained.

DWB24

Modified Goldstein Algorithm Using Boundary Information in Phase Unwrapping, Seon Kyu Yoon^{1,2}, Sung-kyu Kim¹; ¹Korea Inst. of Science and Technology, Republic of Korea, ²Korea Univ., Republic of Korea. In phase unwrapping process, Goldstein algorithm is well known but it is not an adequate method to perfectly restore the sharp edge of the object from the wrapped information. We suggested the solution to overcome it.

DWB25

Seam Elimination on 3-D Image Generated by Integral Floating Display, Joohwan Kim¹, Gilbae Park¹, Younghoon Kim¹, Sung-Wook Min², Byoungho Lee¹; ¹Seoul Natl. Univ., Republic of Korea, ²Kyung Hee Univ., Republic of Korea. We propose a method for seam elimination of three-dimensional image generated by integral floating display

using eye tracking scheme. The tracked location of observer's eye is reflected in determining the locations of virtual cameras.

DWB26

2-D/3-D Convertible Display Using PSS Film, *Byoung-Sub Song, Soon-gi Park, Sung-Wook Min; Kyung Hee Univ., Republic of Korea.* 2-D/3-D convertible display using PSS film is proposed using the integral imaging method, which can be implemented easier and simpler than the conventional systems. The proposed system is explained and verified with some experimental results.

DWB27

Enhancement of Viewing Angle and Viewing Distance in Integral Imaging by Head Tracking, *Gilbae Park, Jisoo Hong, Yunhee Kim, Byounggho Lee; Seoul Natl. Univ., Republic of Korea.* We present a head-tracking based method for improving viewing angle and viewing distance in integral imaging system. Elemental images can be made in different regions as the position of a viewer dynamically changes.

DWB28

High Fidelity Microlithography Patterning Using Computer Generated Holograms, *Richard McWilliam¹, Alan Purvis¹, Gavin L. Williams², Jesus Toriz-Garcia², Luke N. Seed², Peter A. Ivey³; ¹Durham Univ., UK, ²Univ. of Sheffield, UK, ³Innotec Ltd., UK.* We investigate the achievable fidelity of line patterns produced by iterative and analytically derived computer generated holographic photomasks for the fabrication of microelectronic circuits by photolithographic exposure. Metrics for comparison are given.

DWB29

Phase Compensation of Optical Holographic Microscopy Using Image Processing Algorithm, *Chiung-Liang Chen¹, Li-Chien Lin², Chen-Hui Lien²; ¹Aletheia Univ., Taiwan, ²Feng Chia Univ., Taiwan.* An image processing algorithm is proposed to find the minimum variation region of phase information to meet the neighborhood constraint in phase unwrapping algorithm. This algorithm is applied to the phase aberration compensation in DHM.

DWB30

Monocular Depth Cue in MF 3-D Display, *Sung-Kyu Kim¹, Dong-Wook Kim¹, Yong-Moo Kwon¹, Jung-Young Son²; ¹Imaging Media Ctr., Korea Inst. of Science and Technology, Republic of Korea, ²Daegu Univ., Republic of Korea.* Experimental results of the monocular MF 3-D display show clear monocular focus on four different depths. Therefore, we can apply the MF 3-D display to monocular 3-D displays.

DWB31

Wide-Viewing Angle Multi-Layer Integral Imaging Display, *Ganbat Baasantseren¹, Jae-Hyeung Park¹, Nam Kim¹, Jae-Jeong Eun²; ¹Chungbuk Natl. Univ., Republic of Korea, ²Changwon National Univ., Republic of Korea.* Wide-viewing angle integral imaging three-dimensional display using two layered masks is proposed.

In experiment, the viewing angle of the proposed method is measured to be two times wider than conventional integral imaging display.

DWB32

Adaptive Computation of Computer-Generated Holograms, *Shuhong Xu¹, Farzam Farbiz¹, Sanjeev Solanki², Xinan Liang², Xuewu Xu²; ¹Inst. for Infocomm Res., Agency for Science, Technology and Res., Singapore, ²Data Storage Inst., Agency for Science, Technology and Res., Singapore.* Regular Effective Hologram Regions (EHRs) for object subspaces are pre-calculated. Object points are categorized online and the corresponding EHRs are used for hologram computation. The use of EHRs increases computational speed and benefits reconstruction quality.

DWB33

Quasi-Cylindrical Digital Hologram by Superposition of Digital Holograms Recorded on Concyclic Positions, *Takanori Nomura, Yusuke Teranishi, Eiji Nitanaï, Takuhisa Numata; Wakayama Univ., Japan.* The method to generate a quasi-cylindrical digital-hologram by numerical propagation is presented. A number of digital holograms of an central object recorded on concyclic positions are used for superposition.

DWB34

Experimental Report on Fully Interferometric Three-Dimensional Imaging Spectrometry, *Kyu Yoshimori, Masumi Sasamoto; Iwate Univ., Japan.* Three-dimensional spectral image has been obtained by fully passive interferometric technique. This paper reports new experimental results in which measured object is composed of a pair of monochromatic point sources having different frequencies.

DWB35

Collimating Transfer System with Generalized Arbitrary Phase-Step Digital Holography, *Wang-Ta Hsieh¹, Min-Tzung Shiu¹, Chung-Sheng Chiang¹, Ming-Kuei Kuo², Je-Chuang Wang³, Chi-Ching Chang⁴; ¹School of Defense Science, Natl. Defense Univ., Taiwan, ²Dept. of Electronic and Electrical Engineering, Natl. Defense Univ., Taiwan, ³Dept. of Applied Chemistry and Material Engineering, Natl. Defense Univ., Taiwan, ⁴Inst. of Electro-Optical Engineering, Ming Dao Univ., Taiwan.* The working principle of collimating transfer system with generalized arbitrary phase-step digital holography is presented. The images can be reconstructed by operator analysis and optical means. Applications to microscopy and 3-D imaging are under development.

DWB36

Computer-Generated Holographic Stereograms, *William J. Dallas^{1,2}, Tom D. Milster¹, Pierre-Alexander Blanche¹, Arnold C. Friedman², Hans Roehrig^{1,2}, Elizabeth A. Krupinski²; ¹College of Optical Sciences, Univ. of Arizona, USA, ²Dept. of Radiology, Univ. of Arizona, USA.* We examine one type of holographic stereogram and its implementation on two

widely different media. The first medium is photoresist for a conventional computer-generated hologram. The second medium is photo-refractive polymer for re-writable holograms.

12:30 p.m.–2:00 p.m.

Lunch Break (on your own)

DWC • Computer-Generated Holograms

Grand Ballroom A

2:00 p.m.–4:00 p.m.

Presider to Be Announced

DWC1 • 2:00 p.m.

Tutorial

Computer-Generated Holography; Principles and Applications, Toyohiko Yatagai; *Utsunomiya Univ., Japan*. Principles and applications of computer-generated holograms including interferometry, information processing, 3-D display and so on are presented.

DWC2 • 2:45 p.m.

Fast Generation of Hologram Sub-Lines Based on Field Programmable Gate Array, Peter Tsang¹, Jung-Ping Liu², Ting-Chung Poon³, Wai Keung Cheung¹; ¹City Univ. of Hong Kong, Hong Kong, ²Feng Chia Univ., Taiwan, ³Virginia Tech, USA. An economical hardware solution based on Field Programmable Gate Array (FPGA) for generating horizontal-parallax-only (HPO) hologram sub-lines at a rate of over 100M pixels per second is reported.

DWC3 • 3:00 p.m.

Computer Generated Holograms Designed to Reduce Intensity Fluctuations During SLM Update, Martin Persson¹, David Engström¹, Anders Frank², Jan Backsten², Mattias Goksör¹, Jörgen Bengtsson²; ¹Biophotonics Group, Dept. of Physics, Univ. of Gothenburg, Sweden, ²Photonics Lab, Dept. of Microtechnology and Nanoscience, Chalmers Univ. of Technology, Sweden. We have investigated design criteria for calculation of computer generated holograms, aiming to reduce the deterioration of the spot pattern during SLM updates. A modified Gerchberg-Saxton algorithm that efficiently minimizes unwanted intensity fluctuations is introduced.

DWC4 • 3:15 p.m.

Real-Time Generation of Full Color Image Hologram with Compact Distance Look-up Table, Hiroshi Yoshikawa, Takeshi Yamaguchi, Ryo Kitayama; *Nihon Univ., Japan*. The full parallax image hologram is generated with look-up table. The speed of 19 frames per second is obtained with PC. The hologram has 1,400 x 1,050 pixels and consists of 10,000 object points.

DWC5 • 3:30 p.m.

Invited

Applications of Computer Generated Holograms, Wai-Hon Lee; *Finity Labs Inc., USA, USA*. In this paper we describe the use of computer-generated holograms in creating light diffusing film for

use in back lighted liquid crystal displays (LCD). Method of producing this type of optical film is also described

Grand Ballroom C/D

4:00 p.m.–4:30 p.m.

Coffee Break/ Exhibits

DWD • Electro-Holography and Computer-Generated Holography

Grand Ballroom A

4:30 p.m.–6:30 p.m.

Takanori Nomura; *Wakayama Univ., Japan, Presider*

DWD1 • 4:30 p.m.

Invited

Real-Time Computation for Electro-Holography, Tomoyoshi Ito¹, Tomoyoshi Shimobaba²; ¹Chiba Univ., Japan, ²Yamagata Univ., Japan. This paper describes hardware-based real-time electro-holography. We developed high-speed computational system for an electro-holographic display, holographic particle image velocimetry and digital holographic microscopy, using a field programmable gate array and a graphic processing unit.

DWD2 • 5:00 p.m.

Band-Limited Zoneplate Method for Elimination of the Conjugate Image in Electronic Holography, Yumi Tanemoto, Yasuhiro Takaki; *Inst. of Symbiotic Science and Technology, Tokyo Univ. of Agriculture and Technology, Japan*. The use of a band-limited zoneplate to eliminate the conjugate image is discussed. Computational complexity is reduced by interpolating a complex-amplitude zoneplate sampled with a pitch twice as large as the pixel pitch of SLM's.

DWD3 • 5:15 p.m.

High Speed Digital Image Plane Holography for Measuring Three Component Velocity Fields in Brain Aneurism Models, Virginia Palero, Julia Lobera, M. Pilar Arroyo; *I3A-Univ. of Zaragoza, Spain*. The applicability of Digital Image Plane Holography for fluid velocimetry can be broadened with high repetition-rate set-ups. Implementation of such systems requires solving problems of low coherence length, big pixel size and complex shape objects.

DWD4 • 5:30 p.m.

Doppler Phase-Shifting Digital Holography, Daisuke Barada, Yuichi Kikuchi, Toyohiko Yatagai; *Ctr. for Optical Res. and Education (CORE), Utsunomiya Univ., Japan*. A novel reconstruction method utilizing optical Doppler effect for digital holography was proposed. Some images were obtained by a high speed camera to remove the zeroth-order and conjugate images and recorded object images were reconstructed.

DWD5 • 5:45 p.m.

Blu-Ray Mastering Process Applied to the Manufacturing of Computer Generated Holograms, Christophe Martinez, Alain Fargeix, Olivier Lemonnier, Brigitte Martin, Marie-Francoise Armand, Roseline

Templier; CEA-Leti Minatec, France. We present a Blu-ray mastering process based on PtOx layer laser engraving. The process has been upgraded for maskless lithography and applied to the manufacturing of Computer Generated Holograms.

DWD6 • 6:00 p.m.

Multi-Lambda Digital Holography with Auto Calibration of Temporal Phase-Shifts and Synthetic Wavelengths. *Daniel Carl, Markus Fratz, Marcel Pfeifer, Dominik M. Giel, Heinrich Höfler; Fraunhofer Inst. for Physical Measurement Techniques, Germany.*

A fast auto calibration method for (lensless) multi-wavelength digital holography with arbitrary temporal phase-shifts is presented. The calibration algorithm is simple to calculate and needs just one additional image acquisition per wavelength.

DWD7 • 6:15 p.m.

Mutual Influence of Time-Shared Optical Traps Studied by Means of Video Holographic Microscopy, *Peter D. J. van Oostrum¹, Astrid van der Hors², Alfons van Blaaderen¹; ¹Soft Condensed Matter, Debye Inst. for Nanomaterials Science, Utrecht Univ., Netherlands, ²Dept. of Physics, Simon Fraser Univ., Canada.* Holographic microscopy and calculations in three dimensions are used to explore how properties of an optical trap, such as stiffness and trapping position, are influenced by other traps in its vicinity.

NOTES

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

A

Achilefu, Samuel—NTuB5
Ackerman, Andrew—HWB1
Ackerman, Steven A.—HWB1,
HWC4
Ackermann, Jörg—HMC2
Ade, Peter A. R.—FTuC4
Adeyemi, Adekunle A.—**DMA5**
Adler, Douglas—JMA4
Afanasiev, Kirill—JTUB34, **OTuA5**
Aguet, François—NMB3
Albella, Pablo—**JTuB25**
Aldenius, Maria—JTUB12
Alvarez-Palacio, Diana—DWB9
Aminou, Donny M.—FMC1
Anderson, James—**HMA1**, HMA4,
HMC3
Andilla, Jordi—JTUB33
Arden-Jacob, Jutta—NMB2
Arezki, Brahim—FTuB4
Armand, Marie-Francoise—DWD5
Arroyo, M. Pilar—**DWD3**
Ash, William M.—**DTuA4**
Asundi, Anand—DTuB6, **JTuA2**
Awatsuji, Yasuhiro—**JTuB2**

B

Baasantseren, Ganbat—**DWB31**
Babcock, David D.—**FThA6**, FWC3
Bachler, Brandon R.—NMC4
Backman, Vadim—NTuB6
Backsten, Jan—DWB13, DWC3
Badizadegan, Kamran—NTuA1,
NTuA2
Balikov, Daniel—NTuB6
Balla, Naveen K.—NWB3
Banerjee, Partha P.—DMB1, **DMB**,
DTuB3
Bao, Hong Chun—NWD3
Barada, Daisuke—**DWD4**
Baran, Anthony—**HTuB2**, **HTuC**
Barbastathis, George—DMB4,
DTuA, DTuB5, DWB3,
DWB4, JTUB5
Barnet, Christopher—**HTuA**,
HTuC2, HWC5
Barrera, John F.—JTUB3
Barsi, Christopher—**DMA4**
Barthelemy, Alain—NWC6
Barton, Jennifer—DTuB5
Bartoo, Aaron C.—NWC3
Baum, Bryan A.—**HMA**, HMB4,
HMB5, HWB3
Beeby, Ralph—HWC6
Behr, Bradford—FWC4
Ben-Jaffel, Lotfi—FWC5

Benech, Pierre—JTUB9
Bengtsson, Jörgen—DWB13, DWC3
Bergeman, Thomas—FWD2
Berglund, Andrew J.—**NWB5**
Bergoënd, Isabelle—**DWB5**
Bernard, F.—FMB5
Bernath, Peter—**FWA1**, FWA3, **JMA**
Bernhardt, Birgitta—FMB2
Best, Fred A.—FMA2, FMA4, JMA4
Betremieux, Yan—FWC5
Bi, Lei—HMB4
Bierhoff, Walter C. J.—NWC5
Bifano, Thomas G.—NMD3
Biteen, Julie S.—NMA5
Bjoraker, G. L.—FMA3
Blackie, Douglas—**FWB3**
Blackwell-Whitehead, Richard—
FTuA3, FWB2, FWB3
Blake, Thomas A.—**FWA6**
Blanche, Pierre-Alexander—DWB36
Blatherwick, Ron—HMC5
Blavier, Jean-Francois—JMA3
Blumstein, Denis—**FMC2**
Boone, Chris—FWA3
Boonsue, Suporn—FMC3
Booth, Martin J.—**NWA1**
Borbos, Eva—HWA2
Borg, Lori—FMA4
Bornemann, Jorge—HMC4
Borvoii, Anatoli—**HTuB4**
Boss, Daniel—DTuA2
Botvinick, Elliot—**OMA1**
Bouma, Brett E.—**NTuB4**
Boussioutas, Alex—NWD1
Bouyer, Philippe—**OTuC5**
Bowman, Richard W.—**OMC3**
Bozinovic, Nenad—**NWC3**
Brachet, F.—FMB5
Brasunas, John C.—FMA3, **FTuA1**
Braun, A. L.—NWC5
Brehm, Markus—FTuB2
Brevier, Julien—NWC6
Bristow, Paul—JTUB12
Brockett, Gillian—FWC4
Brzobohatý, Oto—OTuC3
Buffet, L.—FMC2
Buijs, Henry—**FMA1**
Buil, C.—FMB5, FMC2
Burnham, Daniel—OTuB3
Burton, Sarah D.—FWA6

C

Cagigal, Manuel P.—**JTuB23**
Calbet, Xavier—HMC4, HTuC3
Camy-Peyret, C.—FMC2

Canales, Vidal F.—JTUB23
Cansot, E.—FMB5
Carberry, David M.—**OMA5**
Carl, Daniel—**DWD6**
Carlson, Ronald C.—FMA3, **FTuA5**
Carriles, Ramon—NMD4
Case, Jason—OTuA1
Casteras, C.—FMB5
Cauwenberghs, Gert—NWA6
Cenko, Andrew—**FWC4**
Chamberland, Martin—**FThA2**,
FThA3, JTUB14
Chan, Robert K. Y.—FWB4
Chandler, Eric V.—**NMD4**
Chang, Chi-Ching—DWB35
Chang, Yuan-Shuo—JTUB29
Charron, Luc G.—**OMA4**
Chatfield, Robert—HMC5
Chen, Chiung-Liang—**DWB29**
Chen, Gang—DWB23
Chen, George C. K.—JTUB4
Chen, Jocelyn S. Y.—OMA6
Chen, Nanguang—**NWA5**
Chen, Xin-Chang—JTUB29
Cheng, Chau-Jern—**DTuB2**
Cheng, Zhaohui—HWC5
Chestukhin, Anton—NTuB5
Cheung, Wai Keung—DWC2
Chi, Yu M.—NWA6
Chia, Thomas H.—NMD2
Chiang, Chung-Sheng—DWB35
Chiang, Jen-Shiun—DTuB2
Chiou, Linda—FWA3
Chiu, Daniel—**OMA2**
Chiu, Jui-Yuan C.—HTuC5
Chmyrov, Andriy—**NMB2**
Choi, Wonshik—**NTuA1**, NTuA2,
NTuB
Chong, Shau Poh—NWA5
Chou, Jin-Wen—DTuB2
Christenson, Todd C.—NWC7
Chu, Kengyeh K.—**NMD3**, NWA4,
NWC3
Chumbley, Scott—DMC3
Chylek, Petr—HTuC1
Čižmár, Tomáš—OTuC3, OTuA4
Coddington, Ian R.—**FMB1**, **FTuB**
Colomb, Tristan—DTuA3, DWB5
Connor, Brian—JMA3
Contag, Christopher H.—NWC1,
NWC2
Corliss, Jason—FWC5
Couillard, Benjamin—JTUB14
Courau, E.—FMB5
Cox, Caroline V.—**FMC4**

Crawford, James M.—NWC2
Crozet, Patrick—FWD2
Cui, Meng—NMC4
Cureton, Geoff P.—**JTuB21**
Curtis, Jennifer—**OTuA2**
Custillon, Guillaume—JTUB9

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D'Odorico, Sandro—JTUB12
Dainty, Chris—NTuA6
Dallas, William—**DTuB**, **DWB36**
Damania, Dhwanil—NTuB6
Darakis, Emmanouil—**DTuB6**
Darcie, Thomas E.—DMA5
Dasari, Ramachandra R.—NTuA1,
NTuA2
Davis, Anthony B.—**HTuC6**
Day, Daniel—OMC4
de Oliveria, Nelson—**FWB1**
Debarre, Delphine—NWA1
Dee, Nick—NMC6
Deneke, Hartwig M.—HWC3
Depeursinge, Christian—DTuA2,
DTuA3, DWB5, **JMB**,
JTUB3
Desbiens, Raphaël—**FTuC**, FTUC3,
JTUB13, FThA5
Deschênes, Jean-Daniel—FTUB1,
FTUB3
Descour, Michael R.—NWC7
Desjardins, Adrien E.—NWC5
Desouza-Machado, Sergio—HMC5
Desroches, Jérôme—**NWC6**
Desyatnikov, Anton S.—OMB4,
OTuB2, OTuC4
Deutscher, Nick—JMA3
Dewhirst, Mark—NTuB2
Dholakia, Kishan—OTuC3
Dineen, Colm—**OTuB5**
Divakarla, Murty G.—**HWC5**
Dominguez-Caballero, Jose A.—
DWB3
Dong, L.—FMB3
Downing, Benjamin P. B.—OMB3,
OTuA3
Drake, Ginger—HMA3
Drexhage, Karl-Heinz—NMB2
Drissen, Laurent—**FTuA2**
Drummond, James R.—JTUB11
Dubois, Patrick—FThA2
Dufresne, Eric—**JMB3**
Dunagan, Steve—HTuC4
Duquette, Dominique—FTuC3
Dutcher, Steve—FMA2, JTUB17
Dykema, John—JMA4, HMA1,
HMA4, HMC3
Dylov, Dmitry V.—**DMB3**

E

Edelstein, Jerry—FTuA4
Eisenmann, David—DMC3
Emery, Yves—DWB5
Englert, Christoph R.—FThA6, **FWC**,
FWC1, FWC3
English, Stephen—HMC4
Engström, David—**DWB13**, DWC3
Erskine, David J.—**FTuA4**
Espejo, Joey—HMA3
Eun, Jae-Jeong—DWB31
Euser, Tijmen G.—OMA6
Evans, Wayne F.—**FWA4**
Evstrapov, Anatoly—JTUB27

F

Faber, C—DMC4
Fan, Jinda—NTuB5
Fang-Yen, Christopher—NTuA1,
NTuA2
Farbiz, Farzam—DWB32
Fargeix, Alain—DWD5
Farley, Vincent—FThA2
Farré, Arnau—**JTuB33**
Faulk, Ben—OTuA1
Feld, Michael S.—NTuA1, NTuA2
Feldkhun, Daniel—**NWA3**
Fermann, M. E.—FMB3
Ferrand, Jerome—**JTuB9**
Ferrec, Yann—**FMB6**
Fetzer, Eric J.—HTuA3
Fiedler, Lars—**HMC2**
Field, Jeff—NMD4
Fienup, James R.—JTUB5
Finikova, Olga S.—NMC7
Fischer, Herbert—**JMA2**
Fischer, Martin—NMC1
Fischer, Peer—DMB5
Flasar, F. M.—FMA3, FTuA1
Flavin, Dónal A.—FWD5
Fleischer, Jason W.—DMA4, DMB3
Flezar, Matjaz—DWB2
Flynn, Connor J.—HTuC4
Fontanella, Andrew—NTuB2
Ford, Tim N.—NWC3
Forde, Nancy—OMB3, OTuA3,
OTuB
Frank, Anders—DWB13, DWC3
Fratz, Markus—**DMB5**, DWD6
Friedl-Vallon, Felix—**FThA1**, **FWA**,
JTUB10, JTUB16
Friedman, Arnold C.—DWB36
Fu, Dan—NMC1
Furlan, Walter D.—**JTuB35**

G

Gagnon, Jean-Philippe—FThA2
Gaier, Todd—HWD4
Gambacorta, Antonia—HWC5
Ganz, T.—FTUB2

Gao, Xiaohui—FTUB5
Garbos, Martin K.—**OMA6**
Garcés-Chávez, Veneranda—OTuC3
Garcia-Sucercua, Jorge—DWB15,
DWB9
Geissbühler, Stefan—NMB3
Gelsing, Paul—DTUB5
Genest, Jérôme—**FMA**, **FTuB1**,
FTUB3, JTUB14
Gerhardt, Nils C.—DMB6
Gero, P. J.—**HMC3**
Giaccari, Philippe—FMC3
Giaccari, P.—FTUB1
Gibson, Graham M.—OMA5, OMC3
Giel, Dominik M.—DMB5, DWD6
Giménez, F.—JTUB35
Giménez, M. H.—JTUB35
Giroux, Jacques—JTUB11
Gmitro, Arthur F.—**NWC4**, **NWD4**
Goda, Keisuke—**NWC8**
Goksör, Mattias—DWB13, DWC3
Goldberg, Mitchell D.—HTuA2,
HTuA5, HWC5,
HWD2
Gom, Brad G.—JTUB15
Gonzalez, Emilio—NWC1
González, Francisco—JTUB25
Grange, Rachel—DTUB1
Green, Paul—FMC4, **HWC6**
Greuell, Wouter—HWC3
Griebner, Uwe—DMA6
Grier, David G.—OMC1
Grieve, James A.—OMA5
Grieve, Kate—NWA1
Griffith, David—JMA3
Griffiths, Peter R.—**FWA5**
Grille, Romain—**FTuB4**
Grunwald, Ruediger—DMA6
Gu, Min—NWD1, NWD2, NWD3,
OMC4
Guandique, Ever A.—FTuA5
Guelachvili, Guy—**FMB2**, **FWD**
Guérineau, Nicolas—FMB6
Gulde, Thomas—JTUB10
Guo, Shuguang—FWD4, **NTuB3**
Gustafsson, Mats—**NMA4**

H

Ha, Woosung—OTuA6
Hack, Erwin—NWB4
Hahn, Joonku—JTUB1, JTUB7
Hajian, Arsen R.—FWC4
Halas, Naomi J.—OMB2
Hale, Tom—HTuC1
Haliyo, D. Sinan—OMC3
Ham, Seung-Hee—HWB3
Hamazaki, Takashi—FTuC2
Hammer, Daniel—NTuB5
Hanna, Simon—OMA3, OMA5,
OMC2

Hänsch, Theodor W.—FMB2
Hansel, Thomas—DMA6
Harber, Dave—HMA3
Harbers, Rik—NWC5
Harlander, John M.—FThA6, FWC1,
FWC2, FWC3
Harries, John E.—FMC4, HWC6
Harris, Walter—FWC5
Hartl, Ingmar—FMB3
Hartmann, Henrik—FTuA3
Hasegawa, Satoshi—DWB10
Häusler, Gerd—DMC4
Havemann, S.—HTuA4
Hawat, Toufic—HMC5
Hawthorne, Benjamin—NWA2
Hayasaka, Tadahiro—HWC2
Hayasaki, Yoshio—DWB10, DWC
Hébert, Philippe—FMB5, FMC2
Heidinger, Andrew—HMB1, HWC4
Heintzmann, Rainer—NWA, NWB1
Hell, Stefan W.—NMA1
Helmerson, Kristian—OMB2
Helms, Mike W.—NWC2
Henaio, Rodrigo—JTUB3
Hendargo, Hansford C.—NTuA3,
NTuB2
Hendriks, Benno H. W.—NWC5
Hennelly, Bryan M.—DWB12
Henry, Didier—FMB6
Hester, Brooke C.—OMB2, OMC
Heuerman, Karl—HMA3
Heymsfield, Andrew J.—HMB5
Hezemans, Cees A.—NWC5
Höfler, Heinrich—DWD6
Hofmann, Martin R.—DMB6
Holben, Brent N.—HTuC4
Holz, Robert—FMA2, HWA2,
HWC4
Holzwarth, Ronald—FMB2
Hong, Jisoo—DWB1, DWB27
Hong, Keehoon—DWB1
Hoover, Erich E.—NMD4
Horikk, Jeroen J. L.—NWC5
Hourtoule, Claire—NWC3
Hristlova-Veleva, Svetla—HTuA3
Hsieh, Chia-Lung—DTuA1
Hsieh, Wang-Ta—DWB35
Hsu, Ken—NWB2
Hu, Cuiying—DWB16
Huang, Allen—HWA, JMA1
Huang, Hung-Lung (Allen)—HMB4
Huang, Kui-Teng—JTUB30
Huang, Yi—HMA4
Huang, Zhiwei—NMC5
Hubanks, Paul A.—HWB1
Hur, Nam-Ho—DWB21

I

Iftimia, Nicusor V.—NTuB5
Ikin, Leo—OMA5

Ito, Kenichi—JTUB2
Ito, Tomoyoshi—DWB6, DWD1
Ivey, Peter A.—DWB28
Iwai, Hidenao—NTuA4
Iwaniuk, Daniel—NWB4
Izatt, Joseph—NTuA, NTuA3,
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Izdebskaya, Yana V.—OMB4,
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J

Jacquet, Patrick—FMB2
Jalali, Bahram—NWC8
Jang, Hyun-Sung—JTUB18
Jennings, Donald E.—FMA3, FThA,
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Jeong, Yoonseob—OTuA6
Jeromin, Andreas—NMC6
Jesacher, Alexander—NWA1
Jezersek, Matija—DWB2
Ji, Won-Soo—JTUB28
Jia, Baohua—NWD2
Jin, Hongzhen—DWB7
Jin, Hongchun—HWA3
Jin, Xin—HTuA2, HTuA5
Jing, Juanjuan—FTuB5
Jofre, Ana—OTuA1
Johnson, Roy R.—HTuC4
Johnson, Timothy—FWA6
Joiner, Joanna—HMB2, HWD
Jones, Scott C.—JTUB15
Joseph, Joby—DTuB1
Jourdain, Pascal—DTuA2
Jung, Jae-Hyun—DWB1
Jung, Yongmin—OTuA6
Junio, Joseph—OTuB4

K

Kahn, Brian H.—HTuA3, HWA3
Kamin, Dirk—NMA1
Kaneda, Hidehiro—FTuC1
Kaneko, Atsushi—JTUB2
Kang, Hoonjong—DTuB7, DWA4
Kang, Hong—NWD2
Kang, Jin-mo—DWB1
Kangaslahti, Pekka—HWD4
Karásek, Vítězslav—OTuC3
Kariwala, Vinay—DTuB6
Kaspar, Roger—NWC1
Kasseck, Christoph—DMB6
Kassianov, Evgueni—HTuC4
Kattawar, George—HMB4, HTuB1
Katz, Barak—DMC2
Katzir, Abraham—FTuB4
Kawada, Mitsunobu—FTuC1
Kawashima, Takahiro—FTuC3
Keeley, Fred W.—OTuA3
Keilmann, Fritz—FTuB2
Kelly, Damien P.—DWB12
Kemper, Björn—JMB5

Kempkes, Michel—DTuB6
Kendrick, Mark J.—OMC5
Keppel-Aleks, Gretchen—JMA3
Kerber, Florian—JTUB12
Kern, Pierre—FTuB4
Kester, Robert T.—NWC7
Ketelhut, Steffi—JMB5
Khanam, Taslima—DTuB6
Kiire, Tomohiro—DWB11
Kikuchi, Yuichi—DWD4
Kim, Dong-Jin—DWB18
Kim, Dong-Wook—DWB21, DWB30
Kim, Dae-Chan—JTUB28
Kim, Eun-Soo—DWA3, DWB17,
DWB19, DWB20
Kim, Eun-Hee—JTUB7
Kim, Joohwan—DWB25
Kim, Jhoon—HTuA6
Kim, Jongki—OTuA6
Kim, Junki—OTuA6
Kim, Kum-Lan—JTUB19
Kim, Mijin—HTuA6
Kim, Myung K.—DMA, DTuA4,
DTuB4
Kim, Nam—DWB14, DWB31
Kim, Sung-Kyu—DWA
Kim, Seung-Cheol—DWB19,
DWB20
Kim, Sung-Kyu—DWB21, DWB24,
DWB30
Kim, Taegeun—DMB7
Kim, Younghoon—DWB25
Kim, Yunhee—DWB27
Kim, Yoonjae—JTUB19
Kimura, Kouhei—DWB10
Kindel, B.—HMA2
King, Michael D.—HWB1
King, Tom—HWC5
Kino, Gordon S.—NWC1, NWC2
Kishore, Rani—OMB2
Kitayama, Ryo—DWC4
Kivshar, Yuri S.—OMB4, OTuB2,
OTuC4
Kleinert, Anne—JTUB10, JTUB16
Knauer, M. C.—DMC4
Knuteson, Robert—JMA4, FMA2,
FMA4, JTUB17
Knyazikhin, Yuri—HTuC5
Köber, Sebastian—DMB6
Koch, S. W.—OTuB5
Kopp, Greg—HMA2, HMA3
Korobtsov, Alexander—JTUB34,
OTuA5
Kosmeier, Sebastian—JMB5
Kostuk, Raymond—DTuB5
Kotlarchyk, Maxwell—OMA1
Kotova, Svetlana—JTUB34, OTuA5
Kou, Shan S.—JTU1
Koukourakis, Nektarios—DMB6
Kovacev, Milutin—JTUB8

Koyama, Takamasa—JTB2
Kozawa, Yuichi—JTB32, NMA3
Kranitzky, C.—DMC4
Kreuzer, Jurgen—DWB9
Krolikowski, Wieslaw Z.—OMB4,
OTuB2, OTuC4
Krupinski, Elizabeth A.—DWB36
Kubasik-Thayil, Anisha—NWA1
Kubota, Toshihiro—JTB2
Kuehn, Ralph—HWC4
Kühn, Jonas—DTA3, JTA3
Kukhtarev, Nickolai V.—DMB1,
DTuB3
Kukhtareva, T.—DMB1
Kumer, John (Jack) B.—HMC5
Kunde, V. G.—FMA3
Kunde, Virgil G.—FTuA5
Kuo, Ming-Kuei—DWB35
Kuporosov, Yury—JTB27
Kustova, Natalia—HTuB4
Kuze, Akihiko—FMC, FTuC2
Kwon, Ki-Chul—DWB14
Kwon, Yong-Moo—DWB21, DWB30

L

Labby, Z.—FWC2
Labonnote, Laurent—HWB2
Lagueux, Philippe—FThA2
Lai, Xin-Ji—DTuB2
Lam, Edmund Y.—DMA3
Lambriqtsen, Bjorn—HWD4
Landau, Sara M.—NWC7
Langehanenberg, Patrik—JMB5
Lanman, Douglas—JTB5
LaPorte, Dan—FMA2
Lara, David—NTuA6
Larar, Allen M.—HTuA1, HWD3
Larigauderie, C.—FMC2
Lasser, Theo—NMB3
Last, Alan—FMC4, HWC6
Lattanzio, Alessio—HTuC3
Lauterbach, Marcel A.—NMA1
Lawler, James E.—FWC2
Lazarz, Evan—NMC6
Le Coarer, Étienne—FMB4, JTB9
Leblanc, Lisa—JTB11
Lee, Byoung-ho—DWB1, DWB25,
DWB27, JTB1, JTB7
Lee, Byung-Gook—DWB17, DWB18
Lee, Byung-II—JTB19
Lee, El-Hang—JTB28
Lee, Eun S.—JTB22, JTB24
Lee, Hyesog—NMA6
Lee, Jaehwa—HTuA6
Lee, Jae Y.—JTB22, JTB24
Lee, Kwang - Hoon—DWB21
Lee, Seungwon—HTuA3
Lee, Seung Gol—JTB28
Lee, Sejin—OTuA6
Lee, Sung J.—DWB3

Lee, Wai-Hon—DWC5
Lee, Yi-Ta—DTuB2
Lemonnier, Olivier—DWD5
Lengel, Anton—JTB16
Leroy, Stephen—HMA1, HMA4
Levene, Michael J.—NMD2
Levesque, Luc—FTuC3
Levin, Carly—OMB2
Lewi, Tomer—FTuB4
Li, Jianping—FWB4
Li, Jun—HTuA2
Li, Jinlong—HTuA2
Li, Jun—HTuA5, HWA2, JTB17
Li, Jingliang—NWD2, NWD3
Li, Siyuan—FTuB5
Li, Yong—DWB7
Liang, Xinan—DWB32
Liao, Ho-En—DWA2
Liddle, J. A.—NWB5
Lien, Chen-Hui—DWB29
Lilge, Lothar—OMA4
Liliana, L.—DWA3, DWB17
Lim, Daryl—NWA4, NWC3
Lim, Young-Tae—DWB14
Lim, Yongjun—JTB1
Lin, Hermann—JTB26
Lin, Kuo-Kuei—DWA2
Lin, Li-Chien—DWA2, DWB29
Lin, Yuxiang—NWD4
Lin, Zhiping—JTA4
Liu, Jung-Ping—DWC2, JTB4
Liu, Jonathan T. C.—NWC1, NWC2
Liu, Lin—NTuB3
Liu, Xu—HTuA1, HWD3
Liu, Xingpin—HWC5
Liu, Yan-an—JTB20
Liu, Zhihai—OTuC2, JTB31
Liu, Zhaowei—NMA6
Livingston, John M.—HTuC4
Livschitz, Yakov—HMC2
Lloyd, James P.—FTuA4
Lobera, Julia—DWD3
Loesel, J.—FMB5
Loomis, Nick—DMB4
Lopez-Mariscal, Carlos—OMA
López-Quesada, Carol—JTB33
Losevsky, Nikolay—JTB34, OTuA5
Louradour, Frederic—NWC6
Love, Steven P.—HTuC1
Lu, Fake—NMC5
Luo, Yuan—DTuB5

M

Maddux, Brent—HWB1
Maddy, Eric—HTuC2, HWC5
Maejima, Kohei—DMA2
Magistretti, Pierre—DTuA2
Maheshwari, Sameer—NTuB6
Mahgoub, Ahmed—JTB13, FThA5
Maillard, Jean-Pierre—FThA4, FTuA

Makhlouf, Houssine—NWC4
Malinovskaya, Svetlana A.—NMC2
Mamoutkine, A. A.—FMA3
Mandella, Michael J.—NWC1,
NWC2
Mandon, Julien—FMB2
Märki, Iwan—NMB3
Marquet, Pierre—DTuA2, DTuA3
Marshak, Alexander—HTuC5
Marston, Philip L.—OMB5
Martin, Brigitte—DWD5
Martin, Guillermmo—FTuB4
Martin-Badosa, Estela—JTB33
Martinez, Christophe—DWD5
Matoba, Osamu—JTB2
Matthews, Thomas—NMC1
Maucher, Guido—JTB10
Maussang, I.—FMB5
Mazzotti, Marco—DTuB6
McClelland, Jabez J.—NWB5
McGloin, David—OMB, OTuB3
McIntyre, David H.—OMC5
McKay, H. A.—FMB3
McMahon, Matthew D.—NWB5
McMillan, Robert S.—FWC4
McWilliam, Richard—DWB28
Meade, Jeff—FWC4
Meerholz, Klaus—DMB6
Mehta, Shalin B.—NTuA5
Meng, Zhaokai—HMB4
Menon, Rajesh—NMA2
Menzel, Paul—HWA1, HWA2
Merenda, Fabrice—OTuA6
Mertz, Jerome—NMD3, NWA4,
NWC3, NWD
Meyer, Kerry—HWB4
Meyer, Michael—NWA2
Miao, Ming—OTuA3
Miao, Qin—NWA2
Michaelian, Kirk H.—FWD3
Mihajlovic, Nenad—NWC5
Miles, Mervyn J.—OMA5, OMC2
Milster, Tom D.—DWB36
Min, Sung-Wook—DWB25, DWB26
MIPAS-Team—JMA2
Mishina, Tomoyuki—DWA5
Mitchell, David L.—HWA4
Mo, Xiaoli—JMB5
Moerner, W. E.—NMA5
Moloney, Jerome V.—OTuB5
Monsoriu, Juan A.—JTB35
Montagner, Francois—HMC2
Montes-Usategui, Mario—JTB33
Montfort, Frédéric—DTuA3
Moon, Euclid E.—NMA2
Morand, Alain—JTB9
Moratal, Corinne—DTuA3
Moreau, Louis M.—FMC3, FTuC3,
JTB11
Moreno, Fernando—JTB25

Morgner, Uwe—JTB8
Morrish, Dru—**NWD1**, NWD2
Mozina, Janez—DWB2
Mu, Yu-Hong—JTB30
Muirhead, Philip S.—FTA4
Mujat, Mircea—NTB5
Mulligan, Mark—JMA4
Murakami, Noriko—FTC1
Murata, Osamu—**DTA5**
Murison, Marc—FWC4
Murphy, Dominic F.—**FWD5**
Murray, Jon—FMC4
Muterspaugh, Matthew W.—FTA4

N

Nagle, Fred—FMA2
Nakadate, Suezou—**DWB11**
Nakagawa, Takao—FTC1
Nakajima, Masakatsu—FTC2
Nasiri, Shaima L.—**HWA3**
Naughton, Thomas J.—DTB6,
DWB12
Nave, Gillian—**FWB**, FWB2, **FWB5**,
JTB12
Naylor, David A.—FTC4, JTB15
Nehmetallah, George—DTB3
Nelleri, Anith—DTB1
Nelson, Alan C.—NWA2
Neubert, Tom—**JTuB10**
Neumann, Thomas—NWA2
Newbury, Nathan R.—FMB1
Newman, Stuart—HWC6
Nguyen, Thanh—FTA5, **JTuB13**
Nichols, Sarah R.—NMC4
Nilsson, Hampus—FTA3
Nishio, Kenzo—JTB2
Nitanai, Eiji—DWB33
Nixon, C. A.—FMA3
Nolte, David D.—**JMB4**
Nomura, Takanori—**DWB33**, **DWD**
Notholt, Justus—JMA3
Numata, Takuhisa—DWB33

O

O, Beom-Hoan—JTB28
Ogilvie, Jennifer P.—**NMC4**
Oh, K.—OTA6
Oh, Se Baek—**DWB4**, **JTuB5**
Okada, Yoko—FTC1
Okui, Makoto—DWA5
Olsson, Erik—**JTuB6**
Ono, Yuzo—**DMB2**
Onural, Levent—DTB7, DWA4
Ootsubo, Takafumi—FTC1
Orphal, Johannes—**FWA2**
Osten, Wolfgang—**DMC1**
Ostroverkhova, Oksana—OMC5
Ou, Mi-Lim—JTB19
Ou-Yang, H. Daniel—**OTuB4**

P

Pacoret, Cécile—OMC3
Padgett, Miles J.—OMA5, OMC3
Pagnoux, Dominique—NWC6
Pais, Andrea—FWD4
Palero, Virginia—DWD3
Pandey, Nitesh—DWB12
Panetta, R. L.—**HTuB3**
Pardo, Juan R.—**FTuA6**
Park, Gilbae—DWB25, **DWB27**
Park, Jae-Hyeung—**DMC**, **DWA1**,
DWB1, DWB14, DWB31
Park, Kyoung-Duck—**JTuB28**
Park, Soon-gi—DWB26
Park, Sang Seo—HTA6
Park, Se-Geun—JTB28
Park, Yongkeun—NTA1
Patlan, Vsevolod—OTA5
Pavani, Sri Rama Prasanna—**NMA5**
Pavelin, Ed—HMC4
Pavillon, Nicolas—DTA3, DWB5,
JTA3
Pavlonis, Michael—**HMB3**
Pearl, J. C.—FMA3
Péquignot, E.—FMC2
Perrin, L.—FMB5
Persson, Martin—**DWC3**
Peterhänsel, S.—DMC4
Pfeifer, Marcel—DWD6
Piao, Yongri—DWA3
Pickering, Juliet—FMC4, **FWB2**,
FWB3, HWC6
Picqué, Nathalie—FMB2
Pierangelo, C.—FMB5
Piestun, Rafael—**JMB2**, NMA5
Piletic, Ivan—NMC1
Pilewskie, Peter—**HMA2**, HMA3,
HWB
Pilorz, Stuart H.—FTA5
Pitter, Mark C.—NWB2
Piyawattanametha, Wibool—**NWC1**
Platnick, Steven—**HWB1**, HWB4,
HWC, HWC4
POLDER Aerosol/Cloud Teams—
HWB2
Poon, Ting-Chung—DMA3, DMB7,
DTuC1, DWC2, JTB4
Potcoava, Mariana—DTB4
Potvin, Simon—**JTuB14**
Pradhan, Prabhakar—NTB6
Praharaj, Sarat C.—DTB3
Przibilla, Sabine—JMB5
Psaltis, Demetri—**DTuA1**
Pu, Ye—DTA1
Puhan, Niladri B.—JTA4
Purvis, Alan—DWB28

Q

Qu, Weijuan—DWB23

R

Ra, Hyejun—NWC1
Rahn, J. R.—NWA2
Rairden, Rick L.—HMC5
Rajendran, Arvind—DTB6
Ralchenko, Yu.—JTB12
Ramirez, Freddy A. Monroy.—
DWB15
Rappaz, Benjamin—DTA2, DTA3
Raskar, Ramesh—JTB5
Razueva, Eugenia—OTA5
Redemann, Jens—**HTuC4**
Régnier, Stéphane—OMC3
Rehman, Shakil—NWB3
Reichelt, M.—OTB5
Reid, Jonathan—**OTuB1**
Revercomb, H. E.—FMA4, **FMA2**,
HMC, **JMA4**, JTB17
Reynolds, Jeremy—NWD1
Richter, C.—DMC4
Riedi, Jerome—HWB2
Riley, Zack—NMC6
Rinsland, Curtis—**FWA3**
Rizzoli, Silvio O.—NMA1
Roberts, Yolanda—HMA2, HMA3
Roche, Aidan E.—HMC5
Rode, Andrei V.—**OMB4**, **OTuB2**,
OTuC4
Rodriguez, Antonio—FMC1
Rodriguez, Oscar—**NTuA6**
Roebeling, Rob—**HMB**, **HWC3**
Roehrig, Hans—DWB36
Roesler, Fred L.—FWC1, FWC2,
FWC5
Roichman, Yael—**OMC1**
Romani, P. N.—FMA3
Rommelùère, Sylvain—FMB6
Rongen, Heinz—JTB10
Rosen, Joseph—DMC2
Ross, Amanda J.—**FWD1**, **FWD2**
Rouse, Andrew R.—NWC4
Rueda, Edgar—**JTuB3**
Ruehl, A.—FMB3
Rufus, James—FWB3
Rusciano, Giulia—**OMB1**, **OTuC**
Russell, Phil B.—HTC4
Russell, Philip S.—OMA6
Rytz, Daniel—DMB6

S

Saiz, Jose M.—JTB25
Sakamoto, Yuji—DWB8
Sakata, Hironobu—**DWB8**
Sakdinawat, Anne—**NMB5**
Salami, Houssam—FWD2
Salathe, Rene-Paul—OTA6
Salek, Mir Farrokh—NWD4
Salieres, Pascal—JTB8
Salvador, Michael—DMB6
Samenini, Prathyush—NMC1

Sams, Robert L.—FWA6
Samuelson, Sean R.—FWD4
Sansone, Craig J.—FWB5, JTUB12
Santos, Silvia—NWC3
Sasamoto, Masumi—DWB34
Sato, Kunihiko—DMA2, DTUA5
Sato, Shunichi—JTUB32, **NMA3**
Savary, Simon—JTUB14
Schmid, Beat—HTUC4
Schmit, Timothy J.—HTUA5
Schneider, Florian—DMA6
Schumann, Wolfgang—FMC1
Schutgens, Nick—HWC3
Seed, Luke N.—DWB28
Seibel, Eric J.—NWA2
Sejnowski, Terrence J.—NWA6
Serabyn, Eugene—FTUA6
Shaffer, Etienne—**JTuA3**
Shah, Duoaud—OMA4
Shanbhag, N.—HMA2
Shank, Charles—NMB1
Shao, Limin—FWA5
Sheetz, Kraig—NMD4
Shepherd, Neal—NTUA3
Sheppard, Colin—**JTuA1, NMA,**
NTUA5, **NWB3**
Sherlock, Vanessa—JMA3
Shibai, Hiroshi—FTUC1
Shibuya, Masato—DWB11
Shimobaba, Tomoyoshi—**DWB6,**
DWD1
Shimozato, Yuki—JTUB2
Shin, Dong-Hak—**DWA3, DWB17,**
DWB18
Shinozuka, Yohei—HTUC4
Shiu, Min-Tzung—DWB35
Shreim, Samir—OMA1
Shroff, Hari—NMB1
Shvedov, Vladlen G.—**OMB4,**
OTUB2, OTUC4
Šiler, Martin—**OTUA4**
Siméoni, D.—FMC2
Simon-Miller, A. A.—FMA3
Simpson, Stephen H.—**OMA3,**
OMC2
Sindbert, Simon—NWB1
Singh, Kehar—**DTUB1**
Singh, Satish K.—NWC3
Singh, Vijay Raj—JTUA2
Siniuk, Aliaksandr—HTUC4
Sinks, Louise E.—**NMC7**
Siskind, David E.—FWC1
Sjödahl, Mikael—**DTUC,** JTUB6
Skala, Melissa C.—**NTUB2**
Small, Alexander R.—**NMB4, NWC**
Smillie, Darren G.—FWB2
Smith, Peter L.—FWB2, FWB3
Smith, William L.—HTUA1, HWD3,
JTuB17
Sohn, Byung-Ju—**HWB3,** JTUB18

Sohn, Eun-Ha—JTUB19
Solanki, Sanjeev—DWB32
Solgaard, Olav—NWC1
Somekh, Michael G.—NWB2
Son, Jung-Young—DWB30
Song, Byoung-Sub—DWB26
Song, Chul Han—HTUA6
Song, Fang—DWB7
Song, Hwan-Jin—JTUB18
Soucy, Marc-Andre—FTUC3, JTUB11
Spencer, Locke D.—**FTUC4, JTUB15**
Spray, John G.—FMC3
Squier, Jeff—NMD4
Stark, Glenn—FWB3
Stark, Hendrik—FMC1
Starr, David—**HWC1**
Steinmeyer, Günter—DMA6
Stevens, Michael H.—FWC1
Stuhlmann, Rolf—**FMC1, HMC4,**
HTUC3
Subramanian, Hariharan—**NTUB6**
Sun, Cheng—NMA6
Sun, Fengying—HWC5
Sun, Jingjing—NTUB3
Sung, Yongjin—NTUA1, **NTUA2**
Suran, Eric—NWC6
Suto, Hiroshi—FTUC2
Swann, William C.—FMB1

T

't Hooft, Gert W.—NWC5
Tahara, Tatsuki—JTUB2
Takahashi, Hidenori—FTUC1
Takahashi, Satoshi—DWB3
Takaki, Yasuhiro—DWD2
Tanbakuchi, Anthony A.—NWC4
Tanemoto, Yumi—**DWD2**
Tang, Guanglin—HTUB3
Tang, Jianyong—NMB1
Tang, Shuo—**NMC3**
Tanii, Jun—FTUC3
Tanner, Alan—HWD4
Taurand, Geneviève—FTUB1, **FTUB3**
Taylor, Joe—FMA2, **FMA4, JMA4**
Taylor, J. P.—HTUA4
Teixeira, João—HTUA3
Templier, Roseline—DWD5
Teranishi, Yusuke—DWB33
Teu, Andass C. K.—JTUA4
Thapa, R.—FMB3
Thelen, Jean-Claude—**HTUA4**
Thomas, B. K.—FMB3
Thompson, Lucy—FMC3
Thompson, Michael A.—NMA5
Thorne, Anne—FWB2, FWB3
Tippie, Abbie E.—**JTuA5**
Tjemkes, Stephen—FMC1, **HMC4,**
HTUC3
Tkaczyk, Tomasz S.—NWC7

Tobin, David C.—FMA2, FMA4,
HMC1, JMA4
Toge, Hiroyuki—DTUA5
Tomilin, Maxim—JTUB27
Toon, Geoff—**JMA3**
Toriz-Garcia, Jesus—DWB28
Torroba, Roberto—JTUB3
Tran, Alex K.—HTUC4
Trémas, T.—FMB5
Tremblay, Pierre—**FMB, FThA3**
Tromberg, Bruce—NMC3
Tsai, Chao-Hsu—**DWA6**
Tsai, Hsin-Yu—**NMA2**
Tsang, Peter—**DWC2**
Tsia, Kevin—NWC8
Tu, Han-Yen—DTUB2
Turek, John—JMB4
Turner, Daved—HWC4

U

Ura, Shogo—JTUB2
Ustun, Teoman—NTUB5

V

Valle, Pedro J.—JTUB23
van Blaaderen, Alfons—DWD7
van der Horst, Astrid—DWD7,
OMB3, OTUA3
van der Weide, Daniel—**FTUB2**
van Oostrum, Peter D. J.—**DWD7**
Varnai, Tamas—HTUC5
Vasudevan, Srivathsan—**JTuA4**
Vaughan, Mark—HWC4
Vaziri, Alipasha—**NMB1, NWB**
Veilleux, James—FTUC3
Veit, K.—DMC4
Villemaire, André—FThA2
Vincent, Frederic—FWC5
Vinogradov, Sergei A.—NMC7
Vollmer, Angelika—JMB5
Volostnikov, Vladimir—OTUA5
Volpe, Giovanni—**OTUA, OTUC1**
von Bally, Gert—JMB5
von Ribbeck, Hans-Georg—FTUB2
Vorontsov, Evgeny—**JTuB34,**
OTUA5
Vučinić, Dejan—**NWA6**

W

Wagner, Kelvin—NWA3
Wagner, Sebastian—HTUC3
Wakamatsu, Takeshi—JTUB2
Walker, Kaley A.—JTUB11
Wallrabe, Ulrike—DMA6
Wang, Chih-Ling—**JTuB26**
Wang, Hui—DWB7
Wang, Je-Chuang—DWB35
Wang, Tao—**DWB22**
Waquet, Fabien—HWC2
Warren, Warren S.—**NMC1, NMD**

Washenfelder, Rebecca—JMA3
Wei, Ming—**JTuB20**
Wei, Ruyi—**FTuB5**
Weisz, Elisabeth—**HWA2, JTuB17**
Wen, Qing—**FWD3**
Weng, Fuzhong—**HWD1**
Weng, Jiawen—DWB16
Wennberg, Paul—JMA3
Westphal, Volker—**NMA1, NMB**
Wicker, Kai—NWB1
Widengren, Jerker—NMB2
Wielicki, B. A.—HTuA1
Williams, Gavin L.—DWB28
Wills, Jonathan—OTuB1
Wilson, Tony—NWA1
Wind, Galina—HWB1
Wiscombe, Warren—HTuC5
Wishnow, Ed—FTuA4
Wong, Chee Howe—NWA5
Wright, Jason T.—FTuA4
Wu, Jing—**OMC4**
Wu, Lei—**FWD4, NTuB3, NWD1**
Wu, Ming C.—**JMB1**
Wu, Qiongshui—FTuB5
Wu, Zhongfu—JTuB31
Wunch, Debra—JMA3

X

Xie, Huikai—FWD4, NTuB3, NWD1
Xie, Jinghui—JMB5
Xiong, Xiaozhen—HTuC2
Xiong, Yi—NMA6
Xu, Chris—NMC, NMD1
Xu, Shuhong—**DWB32**
Xu, Xuewu—DWB32

Y

Yamaguchi, Ichirou—**DMA1**
Yamaguchi, Takeshi—DWC4
Yamamoto, Kenji—**DWA5**
Yamashita, Satoshi—DWB10
Yamashita, Yutaka—NTuA4
Yamauchi, Toyohiko—**NTuA4**
Yang, Bor-Wen—**JTuB29, JTuB30**
Yang, Jun—JTuB31, OTuC2
Yang, Ping—**HMB4, HMB5, HTuB,**
HWB3
Yaraş, Fahri—DTuB7, **DWA4**
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Yoon, Seon Kyu—**DWB24**
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Yoshimori, Kyu—**DWB34**
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Zhao, Mingtao—NTuA3
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Advances in Imaging
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UPDATE SHEET

Withdrawals:

NMC6	JTuB34
FTuA4	JTuB35
OTuA5	HTuC6
JTuB23	DWA3
JTuB29	DWB2
JTuB30	HWD4

Substituted Papers:

The paper **HTuC6** that is in your program will not be presented. During this time slot, the following postdeadline paper will be presented in its place: **PHTuC6, Airborne Radiometer Measurements of Above Cloud Reflectance in the Presence and Absence of Aerosols**, *Odele Coddington¹, Peter Pilewski¹, Tomislava Vukicevic¹, John Livingston², Steve Platnick³, Gala Wind³, Jens Redemann⁴, Philip B. Russell⁴*; ¹Univ. of Colorado at Boulder, USA, ²SRI Intl., USA, ³NASA GSFC, USA, ⁴NASA AMES, USA.

The poster **JTuB17** will be presented during the session **HWA • Hyperspectral IR and Imager Data Analyses** (April 29, 2009, 8:30 a.m.–10:30 a.m., Junior Ballroom C) as oral presentation **HWA5**.

Presider Updates:

Nickolai V. Kukhtarev; Alabama A&M Univ., USA, will preside over session **DMB • Novel Technologies in Holography**, on Monday, April 27, 2009, 11:00 a.m. –1:00 p.m. in Grand Ballroom A.

Yoshio Hayasaki; Utsunomiya Univ., Japan, will preside over session **DWC • Computer-Generated Holograms**, on Wednesday, April 29, 2009, 2:00 p.m.–4:00 p.m. in Grand Ballroom A.

Presenter Changes:

DTuA1, Harmonic Holography will now be presented by *Chia-Lung Hsieh^{1,2}*, ¹Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, ²Caltech, USA.

NTuA5, Linear Phase-Gradient Imaging with Asymmetric Illumination Based Differential Phase Contrast (AIDPC), will now be presented by *Colin J. R. Sheppard, Natl. Univ. of Singapore, Singapore*.

Time Changes:

HWA will end a half hour later at 10:30 a.m.

Exhibits will end at 12:30 p.m. on Wednesday, April 29, 2009.

Postdeadline Paper Programs:

Post deadline Paper Programs are available at Registration.

Special Events:

Meet the Applied Optics Editors Dinner on Tuesday, April 28, 2009, 7:00 p.m. All conference attendees, especially students, are invited to this casual networking dinner. More information is available at Registration.

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POSTDEADLINE PAPERS

ADVANCES IN IMAGING

Digital Holography and
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Fourier Transform Spectroscopy (FTS)

Hyperspectral Imaging and
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Optical Trapping Applications (OTA)

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•Tuesday, April 28, 2009•

Junior Ballroom C

2:00 p.m.–4:00 p.m.

HTuC • New Remote Sensing Perspectives

Anthony Baran; Met Office, UK, Presider

PHTuC6 • 3:45 p.m.

Airborne Radiometer Measurements of above Cloud Reflectance in the Presence and Absence of Aerosols, *Odele Coddington¹, Peter Pilewskie¹, Tomislava Vukicevic¹, John Livingston², Steve Platnick³, Gala Wind³, Jens Redemann⁴, Philip B. Russell⁴*; ¹Univ. of Colorado at Boulder, USA, ²SRI Intl., USA, ³NASA GSFC, USA, ⁴NASA AMES, USA. We present cloud retrieval results from SSFR measurements made in the presence and absence of aerosols and show comparisons to MODIS. A method for treating aerosol bias in retrievals as systematic model uncertainty is described.

Grand Ballroom C/D

4:30 p.m.–6:00 p.m.

JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session

PJTuB36

Automated Particle Characterization Using Holographic Video Microscopy, *Fook Chiong Cheong, David G. Grier; New York Univ., USA*. With an efficient particle identification algorithm, combine with hardware acceleration and software optimization, holographic microscopy data can be analysis in near real time with sufficient accuracy to enable unattended holographic tracking and particle characterization.

PJTuB37

Incoherent Optical Imaging Using Synthetic Aperture with Fresnel Elements, *Barak Katz, Joseph Rosen; Ben-Gurion Univ. of the Negev, Israel*. We present a new lensless incoherent holographic system operating in a synthetic aperture mode. Spatial resolution exceeding the Rayleigh limit is obtained by tiling several holographic elements into a complete Fresnel hologram of observed objects.

PJTuB38

CrIS Radiance Spectra Modeling and End-to-End Error Analysis, *Nikita Pougatchev, Gregory Cantwell, Gail Bingham; Space Dynamics Lab, Utah State Univ., USA*. We present the Cross-track Infrared Sounder (CrIS) end-to-end error model consisting of instrument model and Validation Assessment Model. Models' descriptions along with examples of application are presented.

PJTuB39

SPDM - Single Molecule Superresolution of Receptor Clusters in *E. coli* Bacteria, *Thomas Ruckelshausen¹, Paul Lemmer¹, Victor Sourjik², Christoph Cremer^{1,3,4}*; ¹Kirchhoff-Inst. for Physics, Univ. of Heidelberg, Germany, ²Ctr. for Molecular Biologie Heidelberg, Univ. of Heidelberg, Germany, ³Inst. for Pharmacy and Molecular Biotechnology, Univ. of Heidelberg, Germany, ⁴Inst. for Molecular Biophysics, The Jackson Lab, USA. In *E. coli* bacteria the chemotaxis phosphatase protein CheZ was labeled with YFP (yellow fluorescent protein). Their reversible photobleaching is used for an optical isolation in time. An average localization precision of 22nm was achieved.

•Wednesday, April 29, 2009•

Junior Ballroom C

8:30 a.m.–10:30 a.m.

HWA • Hyperspectral IR and Imager Data Analyses

Allen Huang; Univ. of Wisconsin at Madison, USA, Presider

PHWA6 • 10:15 a.m.

Investigations of Cirrus in the Far Infrared with the Tropospheric Airborne Fourier Transform

Spectrometer (TAFTS), *Caroline Cox¹, Neil Humpage¹, Paul Green¹, Juliet Pickering¹, John Harries¹, Jonathan Taylor², Anthony Baran², Alan Last¹, Jon Murray¹; ¹Imperial College London, UK, ²Met Office, UK*. An overview of the results of recent field campaigns performed with the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS) to study the radiative properties of cirrus in the far infrared spectral region is presented.

Grand Ballroom C/D

11:00 a.m.–12:30 p.m.

DWB • DH Poster Session

PDWB37

Femtosecond Time-Resolved Off-Axis Digital Holography, *Tadas Balciunas, Andrius Melninkaitis, Andrius Vanagas, Valdas Sirutkaitis; Laser Res. Ctr., Vilnius Univ., Lithuania*. We present time-resolved off-axis digital holography for investigation of laser-induced plasma filaments in condensed media. An experimental setup with tilted reference pulse allows larger crossing angles to be used for recording of digital holograms.

PDWB38

A High-Definition Full-Parallax CGH Created by the Polygon-Based Method, *Kyoji Matsushima, Sumio Nakahara; Kansai Univ., Japan*. A large-scaled full-parallax CGH with 4 billion pixels is produced by a polygon-based method. The CGH reconstructs a fine 3-D image and gives a large sensation of depth owing to the silhouette-masking technique.

Key to Authors and Presiders
(**Bold** denotes Presider or Presenting Author)

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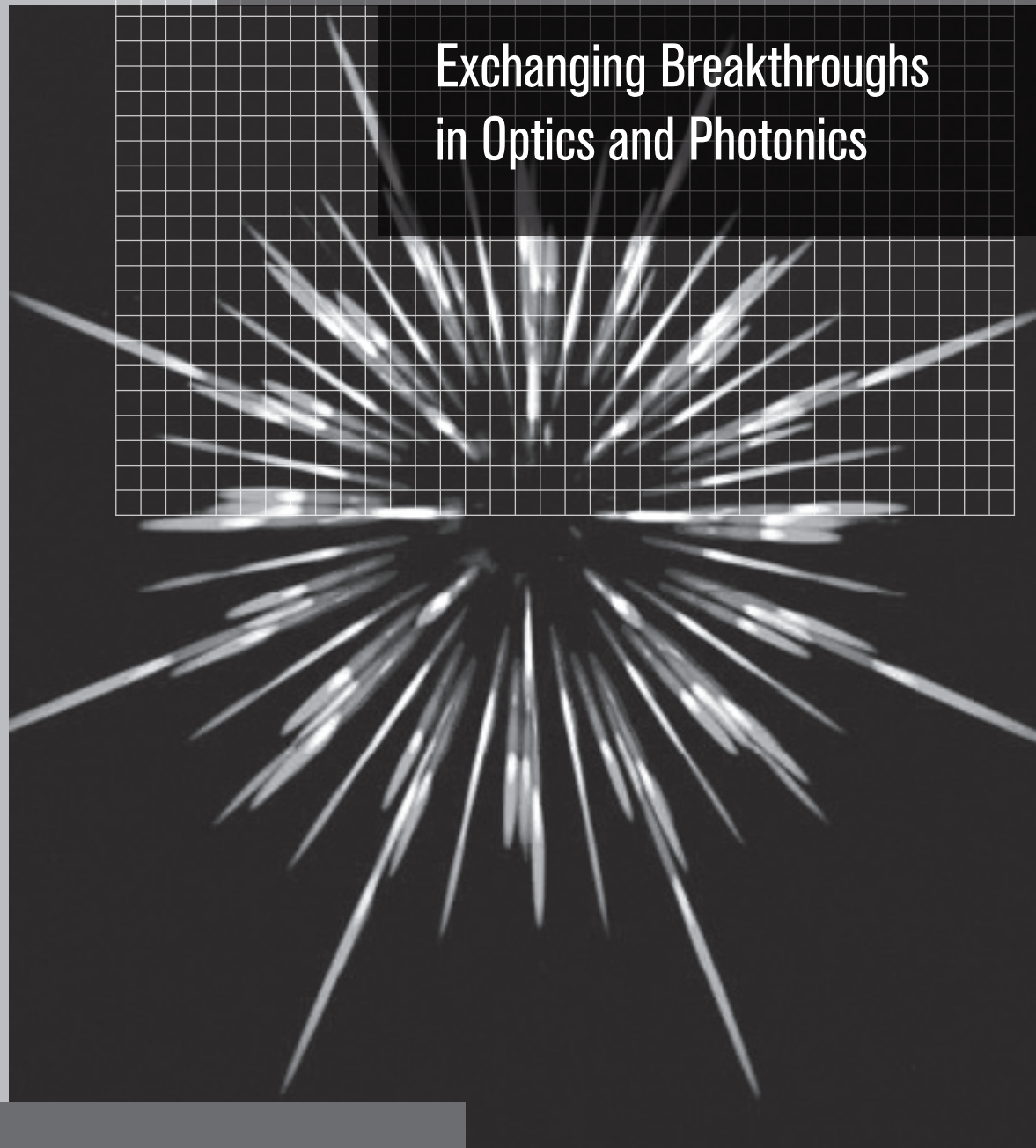
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