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**Optical
Engineering +
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Conferences & Courses

25–29 August 2013

Exhibition

27–29 August 2013

Location

San Diego Convention Center
San Diego, California, USA



Conference 8873 • Room: Conv. Ctr. 32B

Monday–Thursday 26–29 August 2013 • Proceedings of SPIE Vol. 8873

Polarization Science and Remote Sensing VI

Conference Chairs: **Joseph A. Shaw**, Montana State Univ. (United States); **Daniel A. LeMaster**, Air Force Research Lab. (United States)

Program Committee: **Bruce E. Bernacki**, Pacific Northwest National Lab. (United States); **David B. Chenault**, Polaris Sensor Technologies, Inc. (United States); **Russell A. Chipman**, College of Optical Sciences, The Univ. of Arizona (United States); **Julia M. Craven-Jones**, Sandia National Labs. (United States); **Aristide C. Dogariu**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States); **Dennis H. Goldstein**, Polaris Sensor Technologies Inc. (United States); **Brian G. Hoover**, Advanced Optical Technologies (United States); **Michael Kudenov**, North Carolina State Univ. (United States); **Kazuhiko Oka**, Hokkaido Univ. (Japan); **Jean-Marc Thériault**, Defence Research and Development Canada, Valcartier (Canada); **J. Scott Tyo**, College of Optical Sciences, The Univ. of Arizona (United States); **Yoav Y. Schechner**, Technion-Israel Institute of Technology (Israel)

Monday 26 August

Posters-Monday

Room: Conv. Ctr. Exhibition Hall B2 . . Mon 5:30 to 7:30 pm

Conference attendees are invited to attend the poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors: view poster presentation guidelines at <http://spie.org/x30293.xml>

Photoelastic modulator non-idealities in magneto-optical polarization measurements, Stefaan Vandendriessche, Thierry Verbiest, Katholieke Univ. Leuven (Belgium) [8873-37]

Polarization characteristics of dust aerosol particles, Zengzhou Hao, Delu Pan, Fang Gong, Haiqing Huang, The Second Institute of Oceanography, SOA (China) [8873-38]

Optical characterization of amber from Chiapas, Mexico, Guadalupe Lopez, Rafael Espinoza-Luna, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Claudio Frausto-Reyes, Ctr. de Investigaciones en Óptica A.C. (Mexico) [8873-39]

A compact and robust method for spectropolarimetry, William B. Sparks, Space Telescope Science Institute (United States) [8873-40]

Oriental tomography of optical axes directions distributions of multilayer biological tissues birefringent polycrystalline networks, Natalia I. Zabolotna, Rostyslav Y. Dovhaliuk, Vinnytsia National Technical Univ. (Ukraine) [8873-41]

A portable imaging Mueller matrix polarimeter based on a hybrid modulation approach, Israel J. Vaughn, J. Scott Tyo, College of Optical Sciences, The Univ. of Arizona (United States) [8873-42]

Analyzing vector diversification, Andrey Alenin, J. Scott Tyo, College of Optical Sciences, The Univ. of Arizona (United States) [8873-43]

CALIOP receiver transient response study, Xiaomei Lu, Yongxiang Hu, Zhaoyan Liu, Shan Zeng, Charles R. Trepte, NASA Langley Research Ctr. (United States) [8873-45]

Wednesday 28 August

Session 1

Room: Conv. Ctr. 32B Wed 8:00 am to 9:40 am

Polarization Metrology and Instrumentation

Session Chair: **Julia M. Craven-Jones**, Sandia National Labs. (United States)

8:00 am: **Infrared wire grid polarizers: metrology and modeling**, Matthew C. George, Jonathon Bergquist, Rumyana Petrova, Bin Wang, Eric W. Gardner, MOXTEK, Inc. (United States) [8873-1]

8:20 am: **Assessing consistency of a Mueller matrix measurement by rotation of the sample under test**, Thomas A. Germer, National Institute of Standards and Technology (United States) [8873-2]

8:40 am: **Single-angle-of-incidence single-element rotating-polarizer (Single SERP) ellipsometer for film-substrate systems**, A. R. M. Zaghloul, Cairo Univ. (Egypt) [8873-3]

9:00 am: **Real-time combined reflection and transmission ellipsometry for film-substrate systems**, M. Elshazly-Zaghloul, Cairo Univ. (Egypt) [8873-4]

9:20 am: **Evaluation of calibration methods for visible-spectrum division-of-focal-plane polarimeters**, Samuel B. Powell, Washington Univ. in St. Louis (United States) [8873-5]

Session 2

Room: Conv. Ctr. 32B Wed 9:40 am to 11:10 am

Mathematics of Coherence, Polarization, and Scattering Polarization

Session Chair: **Joseph A. Shaw**, Montana State Univ. (United States)

9:40 am: **Mathematical tools for the analysis and exploitation of polarimetric measurements (Invited Paper)**, Jose J. Gil Perez, Univ. de Zaragoza (Spain) [8873-6]

Coffee Break Wed 10:10 am to 10:30 am

10:10 am: **Measurement and modeling of mirror reflectance spectrum of polarized light in the UV band**, Lu Bai, Xiren Zou, Zhensen Wu, Yanhui Li, Yunhua Cao, Haiying Li, Xidian Univ. (China) [8873-44]

10:30 am: **Partial Mueller matrix polarimeter design**, Andrey Alenin, J. Scott Tyo, College of Optical Sciences, The Univ. of Arizona (United States) [8873-7]

10:50 am: **3D radiative transfer effects in multi-angle/multispectral radio-polarimetric signals from a mixture of clouds and aerosols viewed by a non-imaging sensor**, Anthony B. Davis, Michael J. Garay, Jet Propulsion Lab. (United States); Feng Xu, Jet Propulsion Lab. (United States) and Joint Institute for Regional Earth System Science and Engineering (United States); Zheng Qu, Jet Propulsion Lab. (United States) and Raytheon Co. (United States); Claudia Emde, Ludwig-Maximilians-Univ. München (Germany) [8873-8]

Session 3

Room: Conv. Ctr. 32B Wed 11:10 am to 12:20 pm

Polarization in Remote Sensing

Session Chair: **Jean-Marc Thériault**, Defence Research and Development Canada, Valcartier (Canada)

11:10 am: **Airborne multiangle spectropolarimetric imager (AirMSPI) observations over California during NASA's Polarimeter Definition Experiment (PODEX) (Invited Paper)**, David J. Diner, Michael J. Garay, Olga V. Kalashnikova, Brian E. Rheingans, Sven Geier, Michael A. Bull, Veljko M. Jovanovic, Jet Propulsion Lab. (United States); Feng Xu, Jet Propulsion Lab. (United States) and Univ. of California, Los Angeles (United States); Carol J. Bruegge, Jet Propulsion Lab. (United States); Ab Davis, Univ. of Texas (United States); Karlton Crabtree, Russell A. Chipman, College of Optical Sciences, The Univ. of Arizona (United States) [8873-9]

11:40 am: **Influence of polarization phenomenology on material discriminability using multi-view polarimetric imagery**, Chabitha Devaraj, South Dakota State Univ. (United States); Michael Gartley, John R. Schott, Rochester Institute of Technology (United States) [8873-10]

12:00 pm: **How clear-sky polarization varies with wavelength in the visible and near infrared**, Nathan J. Pust, Joseph A. Shaw, Montana State Univ. (United States) [8873-11]

Lunch Break Wed 12:20 pm to 1:40 pm

Session 4

Room: Conv. Ctr. 32B Wed 1:40 pm to 3:30 pm

Polarization Applications I

Session Chair: **Aristide C. Dogariu**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States)

1:40 pm: **Mueller matrix microscopy** (*Invited Paper*), Mircea Mujat, R. Daniel Ferguson, Nicusor Iftimia, Physical Sciences Inc. (United States) [8873-12]

2:10 pm: **Extraction of the inclination angle of nerve fibers in the human brain with 3D-polarized light imaging**, Julia Reckfort, Hendrik Wiese, Melanie Dohmen, David Graessel, Forschungszentrum Jülich GmbH (Germany); Uwe Pietrzyk, Forschungszentrum Jülich GmbH (Germany) and Bergische Univ. Wuppertal (Germany); Karl Zilles, Forschungszentrum Jülich GmbH (Germany); Katrin Amunts, Forschungszentrum Jülich GmbH (Germany) and Heinrich-Heine- Univ. Duesseldorf (Germany); Markus Axer, Forschungszentrum Jülich GmbH (Germany) [8873-13]

2:30 pm: **Polarization-components techniques for NDE of composite heat damage**, Brian G. Hoover, David E. Taliaferro, Virgil Kohlhepp III, Advanced Optical Technologies (United States) [8873-14]

2:50 pm: **LWIR polarization sensing: investigation of liquids and solids with MoDDIFS**, Gilles Fortin, AEREX avionique inc. (Canada); Jean-Marc Thériault, Defence Research and Development Canada, Valcartier (Canada); Paul Lacasse, AEREX avionique inc. (Canada) [8873-15]

3:10 pm: **Using linear polarization for LWIR hyperspectral sensing of liquid contaminants**, Jean-Marc Thériault, Defence Research and Development Canada, Valcartier (Canada); Gilles Fortin, Paul Lacasse, AEREX avionique inc. (Canada); François Bouffard, Hugo Lavoie, Defence Research and Development Canada, Valcartier (Canada) [8873-16]

Coffee Break Wed 3:30 pm to 4:00 pm

Remote Sensing Plenary Session

Room: Conv. Ctr. 32B 4:00 pm to 5:25 pm

Session Chairs: **Allen H.-L. Huang**, Univ. of Wisconsin-Madison (United States); **Hal J. Bloom**, Science and Technology Corp. (United States)

4:00 to 4:05 pm: **Welcome and Opening Remarks**, Allen H.-L. Huang, Univ. of Wisconsin-Madison (United States)

4:05 pm: **Rapidly updated hyperspectral sounding and imaging data for severe storm prediction** (*Plenary*), Gail E. Bingham, Utah State Univ. (United States) [8867-101]

4:45 pm: **The geostationary remote infrared pollution sounder: measurement of the carbon gases from space** (*Plenary*), Mark Schoeberl, Hal J. Bloom, Ryan Spackman, Science and Technology Corp. (United States); Chad S. Fish, Space Dynamics Lab., Utah State Univ. Research Foundation (United States); Martin J. McHugh, Larry L. Gordley, GATS, Inc. (United States) [8866-101]

Thursday 29 August

Session 5

Room: Conv. Ctr. 32B Thu 8:00 am to 10:00 am

Polarization Imaging Systems and Components

Session Chair: **J. Scott Tyo**, College of Optical Sciences, The Univ. of Arizona (United States)

8:00 am: **Thermally stable imaging channeled spectropolarimetry**, Julia M. Craven-Jones, Brandyn M. Way, Jeffery P. Hunt, Sandia National Labs. (United States); Michael W. Kudenov, North Carolina State Univ. (United States); Jeffrey A. Mercier, Sandia National Labs. (United States) [8873-17]

8:20 am: **A novel design for a spectropolarimeter**, Ad L. Verlaan, TNO (Netherlands); Hedser van Brug, TNO Science and Industry (Netherlands); Huib Visser, Technisch Physische Dienst-TNO (Netherlands) [8873-18]

8:40 am: **Fabrication and performance evaluation of pixelated nano-wire grid polarizer**, Shengkui Gao, Raphael Njuguna, Viktor Gruev, Washington Univ. in St. Louis (United States) [8873-19]

9:00 am: **Wide field snapshot imaging polarimeter using modified Savart plates**, Naooki Saito, Satoru Odate, Katsura Otaki, Nikon Corp. (Japan); Masahiro Kubota, Rintaro Kitahara, Kazuhiko Oka, Hokkaido Univ. (Japan) [8873-20]

9:20 am: **An adaptive multi-channel spectropolarimeter(MSP) for identifying the spots of pollutants on the water surface**, Ferdenant A. Mkrtchyan, Institute of Radio Engineering and Electronics (Russian Federation) [8873-21]

9:40 am: **SWIR active polarization imaging**, Daniel A. LeMaster, Air Force Research Lab. (United States); Adoum H. Mahamat, College of Optical Sciences, The Univ. of Arizona (United States); Bradley M. Ratliff, Space Computer Corp. (United States); Andrey Alenin, J. Scott Tyo, College of Optical Sciences, The Univ. of Arizona (United States); Bradley M. Koch, Air Force Research Lab. (United States) [8873-22]

Coffee Break Thu 10:00 am to 10:20 am

Session 6

Room: Conv. Ctr. 32B Thu 10:20 am to 11:40 am

Polarization-based Optical Systems and Components

Session Chair: **Russell A. Chipman**, College of Optical Sciences, The Univ. of Arizona (United States)

10:20 am: **Evaluation of Mueller matrix of achromatic axially symmetric waveplate**, Kazuki Komaki, Tositaka Wakayama, Saitama Medical Univ. (Japan); Israel J. Vaughn, J. Scott Tyo, College of Optical Sciences, The Univ. of Arizona (United States); Yukitoshi Otani, Utsunomiya Univ. (Japan); Toru Yoshizawa, NPO 3D Associates (Japan) [8873-23]

10:40 am: **Compact spatial heterodyne interferometer using polarization gratings**, Michael W. Kudenov, Matthew N. Miskiewicz, Michael Escuti, North Carolina State Univ. (United States); Eustace L. Dereniak, College of Optical Sciences, The Univ. of Arizona (United States) [8873-24]

11:00 am: **Spectroscopic full polarimeters using spatial carriers**, Kazuhiko Oka, Yujin Haga, Yoshihiko Komaki, Hokkaido Univ. (Japan) [8873-25]

11:20 am: **Design of a polarimeter with two ferroelectric liquid crystal panels**, Alba Peinado, Angel Lizana, Juan Campos, Univ. Autònoma de Barcelona (Spain) [8873-26]

Lunch Break Thu 11:40 am to 1:10 pm

Session 7

Room: Conv. Ctr. 32B Thu 1:10 pm to 1:50 pm

Polarization Applications II

Session Chair: **Michael W. Kudenov**, College of Optical Sciences, The Univ. of Arizona (United States)

1:10 pm: **Identifying scattering functions from polarization correlations in backscattering**, John Broky, Aristide C. Dogariu, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States) [8873-28]

1:30 pm: **The retrieval of scattering coefficient of marine particles from polarimetric observations**, Amir Ibrahim, Alexander Gilerson, Jan Stepinski, Ahmed El-Habashi, Samir Ahmed, The City College of New York (United States) [8873-29]

Session 8

Room: Conv. Ctr. 32B Thu 1:50 pm to 2:40 pm

Polarization in mm-wave Imaging

Session Chair: **Bruce E. Bernacki**, Pacific Northwest National Lab. (United States)

1:50 pm: **Fully polarimetric passive W-band millimeter wave imager for wide area search**, Jonathan R. Tedeschi, Bruce E. Bernacki, James F. Kelly, David M. Sheen, Douglas L. McMakin, Thomas E. Hall, Brian K. Hatchell, Patrick L. J. Valdez, Pacific Northwest National Lab. (United States) [8873-30]

2:10 pm: **Simulations of polarization dependent contrast during the diurnal heating cycle for passive millimeter-wave imagery** (*Invited Paper*), John P. Wilson, Maciej Murakowski, Univ. of Delaware (United States); Christopher A. Schuetz, Phase Sensitive Innovations, Inc. (United States); Dennis W. Prather, Univ. of Delaware (United States) [8873-31]

Session 9

Room: Conv. Ctr. 32B Thu 2:40 pm to 3:20 pm

Processing and Displaying Polarimetric Imagery

Session Chair: **Daniel A. LeMaster**, Air Force Research Lab. (United States)

2:40 pm: **Polarization display based on the human visual system just noticeable difference**, Adoum H. Mahamat, J. Scott Tyo, College of Optical Sciences, The Univ. of Arizona (United States) [8873-32]

3:00 pm: **Material characterization using passive multispectral polarimetric imagery**, Melissa Sawyer, Air Force Institute of Technology (United States) [8873-35]