



Optical Science & Engineering Conference Agenda

Thursday, September 29, 2022

Inspiration Hall, Norm Asbjornson Hall
Montana State University, Bozeman, Montana

Daytime: enter at the east end of the 3rd floor

Evening: enter at the east end of the 2nd floor

Conference Organizers:

Dr. Joseph Shaw – OpTeC Director

Michelle Leonti – Conference Coordinator

Presented by the MSU Optical Technology Center (OpTeC), with support from the MSU Vice-President for Research and Economic Development and with sponsorship by OptoSigma Corp. and the City of Bozeman Department of Economic Development.



8:00 am **CHECK-IN and MORNING REFRESHMENTS**

8:15 am *Conference Opening Remarks*
Joseph Shaw
MSU Optical Technology Center Director

Session 1

Chair: Nicholas Borys

8:20 am *Substrate-induced effects on the dynamics of quantum light emitters in 2D semiconductors*
Matthew Strasbourg,¹ Emanuil Yanev,² Parvez Sheikh,¹ Thomas P. Darlington,² James C. Hone,² P. James Schuck,² Nicholas J. Borys¹
¹Physics Dept., Montana State University
²Mechanical Engineering Dept., Columbia University

8:40 am *Spectral hole burning optical filters for quantum information and coherent photonics applications*
Thomas Rust,¹ Thomas Böttger,² Jason Scott,¹ and Charles Thiel¹
¹Physics Dept., Montana State University
²University of San Francisco

- 9:00 am *Construction and optimization of a free-space Hong-Ou-Mandel interferometer*
Nathan Kuehl and Krishna Rupavatharam
Spectrum Lab, Montana State University
- 9:20 am *Investigation of localized quantum dot-like states in single-layer WS₂ on a gold surface*
Mohammad Soroush,¹ Kiyoung Jo,² Emanuil Yanev,³ P. James Schuck,³ Deep Jariwala,²
Nicholas J. Borys¹
¹Physics Dept., Montana State University
²University of Pennsylvania
³Columbia University
- 9:40 am *Fabrication of embedded plasmonic antennas for nano-optomechanics and quantum light emission with 2D materials*
Joe Stage,¹ Andrew Lingley,² Wataru Nakagawa,² Nicholas J Borys¹
¹Physics Dept., Montana State University
²Electrical & Computer Engineering Dept., Montana State University

10:00 am **BREAK & REFRESHMENTS**

Session 2

Chair: Randy Babbitt

- 10:30 am *FMCW LIDAR enabled phase compensation for range selective digital holographic imaging*
Matt Goodman, Krishna Rupavatharam, Wm. Randall Babbitt
Spectrum Lab, Montana State University
- 10:50 am *Interferometric readout for spatial spectral holographic LIDAR applications*
Owen Wolfe, Wm. Randall Babbitt, R. Krishna Mohan
Spectrum Lab, Montana State University
- 11:10 am *Improved characterization and performance of a double-reflection transmissive beam scanner for 1550 nm*
Jordan Baker, Kenneth Lang, David Dickensheets, Wataru Nakagawa
Electrical & Computer Engineering Dept., Montana State University
- 11:30 am *MicroPulse differential absorption lidar for thermodynamic profiling in the lower atmosphere*
Luke Colberg, Owen Cruikshank, Patrick F. Morgan, Kevin S. Repasky
Electrical & Computer Engineering Dept., Montana State University
- 11:50 pm *Improving insect detection from LIDAR measurements with wavelet features and machine learning hyperparameter optimization*
Ryan C Ficken,¹ Walden T Marshall,² Trevor C Vannoy,³ Joseph A. Shaw,³ Bradley M Whitaker³
¹Electrical & Computer Engineering Dept., North Carolina State University
²Thayer School of Engineering, Dartmouth University
³Electrical & Computer Engineering Dept., Montana State University

12:10 pm **Lunch on your own**

Session 3

Chair: Erik Grumstrup

- 1:10 pm *Impact of lattice strain on charge carrier dynamics of lead halide perovskites*
Sajia Afrin, Erik Grumstrup
Chemistry & Biochemistry Dept., Montana State University
- 1:30 pm *Observing charge injection in silver-modified graphitic carbon nitride using ultrafast spectroscopic techniques*
Emma Orcutt, Shelton Varapragasam, Erik Grumstrup
Chemistry & Biochemistry Dept., Montana State University
- 1:50 pm *Using UV/NIR pump-probe microscopy to investigate ligand influence on transport properties of perovskite quantum dots*
Joseph J. Thiebes and Erik Grumstrup
Chemistry & Biochemistry Dept., Montana State University
- 2:10 pm *Effect of hydrogen content on rare earth fluorescence in lithium niobate*
Steven Rehbein, Thomas Rust, Charles Thiel
Physics Dept., Montana State University
- 2:30 pm *Rotationally resolved flame emission from mono- and bi-propellant nitromethane combustion at elevated pressures*
Joshua Sinrud and Robert A. Walker
Chemistry & Biochemistry Dept., Montana State University
- 2:50 pm **BREAK & REFRESHMENTS**

Session 4

(move to NAH 165)

Chair: Wataru Nakagawa

- 3:20 pm *Real time, shot-noise limited, image-based particle tracking*
Brian D'Urso,¹ Leonardo R Werneck,² Megan Nolan,³ Austin Brandenberger,⁴ Zachariah B. Etienne²
¹Physics Dept., Montana State University
²University of Idaho
³University of Missouri – Kansas City
⁴Purdue University
- 3:40 pm *Automatic 2D material detection in optical images using deep learning based computer vision*
Fereshteh Ramezani,¹ Sheikh Parvez,² J Pierce Fix,² Nicholas J Borys,³ Bradley Whitaker¹
¹Electrical & Computer Engineering Dept., Montana State University
²Material Science Program, Montana State University
³Physics Dept., Montana State University

- 4:00 pm *Polarimetric direct-detection for superchannels*
Jaroslaw Kwapisz,¹ Ioannis Roudas,² Eric Fink,¹ Aishik Biswas⁴
¹Mathematical Sciences Dept., Montana State University
²Electrical & Computer Engineering Dept., Montana State University
- 4:20 pm *Mapping surface hoar with a hyperspectral imager at a laboratory scale*
James Dillon,¹ Evan Schehrer,² Kevin Hammonds¹
¹Civil Engineering Dept., Montana State University
²Material Science Program, Montana State University
- 4:40 pm *UAV-Based Hyperspectral Imaging for River Algae Pigment Estimation*
Riley D. Logan,¹ Shannon M. Hamp,¹ Madison A. Torrey,² Rafael Feijó de Lima,³ Benjamin P. Colman,³ H. M. Valett,⁴ and Joseph A. Shaw¹
¹Electrical & Computer Engineering Dept., Montana State University
²Environmental Engineering Dept., Montana State University
³Ecosystem and Conservation Sciences Dept., University of Montana
⁴Division of Biological Sciences, University of Montana

Session 5 6:00 – 8:00 pm Poster / Company Session Inspiration Hall (2nd floor)

Company Exhibits

| | | |
|------------------------------|------------------------------|-------------------------------------|
| AdvR, Inc. | Glenair | Resonon, Inc. |
| Agile Focus Designs | Keysight Technologies | S2 Corporation |
| Altos Photonics, Inc. | Lumibird, Inc. | Teledyne FLIR Laser Crystals |
| Bridger Photonics | OptoSigma Corporation | and Components |

6:00 pm Evening Welcoming Remarks
Joseph Shaw, OpTeC Director
Alison Harmon, Vice President for Research & Economic Development

Research Posters

- Design and optical analysis of an FMCW LIDAR and digital holographic system for object detection at 100 m - 5000 m*
Zachary Lakin, Corey Pearson, Matthew Goodman, Wm. Randall Babbitt, R. Krishna Mohan, Christopher Ebbers
Spectrum Lab, Montana State University
- Creation of entangled photons via spontaneous parametric down conversion (SPDC) for use in quantum communication systems*
Jason Mickel, R. Krishna Mohan, Christopher Ebbers
Spectrum Lab, Montana State University
- Construction and verification of fog emulator for lidar and digital holography measurements*
Corey Pearson, Brianne Malchow, Jaime Neeley, Stephen Crouch, Krista Drummond, Matthew Goodman, Krishna Rupavatharam, Wm. Randall Babbitt
Spectrum Lab, Montana State University

4. *Single sideband suppressed carrier chirped optical waveform generation using I/Q modulator and RFSoc*
Caleb Rohn, Andre Olearain, R. Krishna Mohan, Wm Randall Babbitt
Spectrum Lab, Montana State University
5. *Range selective digital holography using time of flight cameras*
Cole Hammond, R. Krishna Mohan, Wm Randall Babbitt
Spectrum Lab, Montana State University
6. *Vibration Cancellation for Off Axis Digital Holography*
Amy Hermann,¹ Corey Pearson,² Wm. Randall Babbitt,² Matthew Goodman,² Krishna Rupavatharam,² Benjamin Thiesing²
¹Southern Methodist University
²Spectrum Lab, Montana State University
7. *Using nano-photoluminescence to determine the homogeneity of an excitonic Moire superlattice*
Tim Faltermeier, Joe Stage, Nicholas J Borys
Physics Dept., Montana State University
8. *Inducing single-photon emitter formation in 2D single-layer transition metal dichalcogenide alloys*
J Pierce Fix and Nicholas J Borys
Physics Dept., Montana State University
9. *Dynamic control of excitons in single-layer WSe2 with surface acoustic waves*
Sheikh Parvez,¹ Samuel Berweger,² Nicholas J Borys¹
¹Physics Dept., Montana State University
²NIST, Boulder, CO
10. *Quantum emission in strained MoS2 nanoribbons*
Samuel Wyss,¹ Matthew Strasbourg,¹ Xufan Li,² Nicholas J Borys,¹ James Schuck³
¹Physics Dept., Montana State University
²Honda Research Institute
³Mechanical Engineering Dept., Columbia University
11. *Polarized dermoscopic wide field micro-camera for integration into a reflectance confocal microscope*
Joseph Aist,¹ Valentine Tretter,¹ Nicholas George,¹ Randall Martin,¹ Milind Rajadhyaksha,² David Dickensheets¹
¹Electrical & Computer Engineering Dept., Montana State University
²Memorial Sloan Kettering Cancer Center
12. *Step-stare technique for coherent lidar using mems mirrors*
Andrew Oliver, Samantha Hampshire, Edward Zingone, David Dickensheets
Electrical & Computer Engineering Dept., Montana State University

13. *Optically detected electrochemical impedance microscopy (OD-EIM): impact of heterogeneity on charge transport of electrochemical devices*
Mashrur Ahmed Chowdhury,¹ Erik Grumstrup,¹ Reed Boduch²
¹Chemistry & Biochemistry Dept., Montana State University
²Siena College
14. *Leveraging ultrafast microscopies to explore excited state dynamics and the structure-function relationship of organic systems*
Skyler Hollinbeck and Erik Grumstrup
Chemistry & Biochemistry Dept., Montana State University
15. *Charge-carrier transport in novel solid-state perylene diimide locked assemblies*
Alexander King,¹ Erik Grumstrup,¹ Jean-Hubert Olivier²
¹Chemistry & Biochemistry Dept., Montana State University
²University of Miami
16. *Coherent raman activated cell sorting*
Jonah Theisen,¹ Erik Grumstrup,¹ Hatzenpichler Lab,¹ Warnat Lab²
¹Chemistry & Biochemistry Dept., Montana State University
²Mechanical & Industrial Engineering Dept., Montana State University
17. *Modeling the response of the CAPRI-SUN x-ray sensor to a solar flare*
Max Johnson and Charles Kankelborg
Physics Dept., Montana State University
18. *Auger electron spectroscopy mapping of ferroelectric domains in periodically poled lithium niobate*
Torrey McLoughlin,¹ Wm. Randall Babbitt,¹ Wataru Nakagawa²
¹Physics Dept., Montana State University
²Electrical & Computer Engineering Dept., Montana State University
19. *Progress towards a polarimetric frequency-modulated continuous-wave (FMCW) LIDAR*
Steve Shea, Dylan J. Maxwell, Michael R. Roddewig, Andrew D. Oliver, David L. Dickensheets, and Joseph A. Shaw
Electrical & Computer Engineering Dept., Montana State University
20. *Lambertian surfaces with over- and under-filled sensor field of view*
Nathaniel J Field and Joseph A Shaw
Electrical & Computer Engineering Dept., Montana State University
21. *Low-cost multispectral imager for monitoring algal blooms*
Shannon Hamp, Riley D. Logan, and Joseph A. Shaw
Electrical & Computer Engineering Dept., Montana State University

22. *Extinction Coefficients and Lidar Feasibility to Aid Algal Monitoring via Drone-Based Hyperspectral Imaging*
 Madison Torrey,¹ Andrew Rodriguez,² Riley D. Logan,³ Rafael Feijo de Lima,⁴ and Joseph A. Shaw³
¹Environmental Engineering Dept., Montana State University
²Environmental Engineering Dept., Cal Poly Humboldt
³Electrical & Computer Engineering Dept., Montana State University
⁴Ecosystem and Conservation Sciences Dept., University of Montana
23. *Imaging of moon polarization in support of nighttime cloud phase remote sensing*
 Sierra L. J. Dabby, Erica Venkatesulu, and Joseph A. Shaw
¹Atmospheric Sciences, University of California - Berkeley
²Electrical & Computer Engineering Dept., Montana State University
24. *Rare-earth and transition metal ions for photonic applications in semiconductor hosts*
 Adam Olivera, Jason Scott, Thomas Rust, Rufus Cone, and Charles Thiel
 Physics Dept., Montana State University
25. *Investigation of transition metal doping of semiconductors for quantum technologies*
 Jason Scott, Adam Olivera, Thomas Rust, Rufus Cone, and Charles Thiel
 Physics Dept., Montana State University
26. *In situ characterization of LLZO synthesis using complementary Raman, XRD and TGA*
 Steven Montoya and Robert Walker
 Chemistry & Biochemistry Dept., Montana State University
27. *Time resolved emission studies of amino acid partitioning into model biological membranes*
 Rhys Trousdale and Robert Walker
 Chemistry & Biochemistry Dept., Montana State University
28. *Gypsum dissolution under the effect of surfactant and analysis of environmentally related ions in water*
 Galip Yiyen, Kodie Duck, and Robert Walker
 Chemistry & Biochemistry Dept., Montana State University
29. *LiDAR image analysis using changepoint detection*
 Nathaniel Sweeney,¹ Caroline Xu,² Joseph A. Shaw,¹ Bradley M Whitaker,¹ Toby Dylan Hocking³
¹Electrical & Computer Engineering Dept., Montana State University
²University of Michigan
³School of Informatics, Computing, and Cyber Systems, Northern Arizona University
30. *Facial feature identification in thermal images using deep learning methods*
 Caleb Schreier,¹ Fereshteh Ramezani,² Bradley M Whitaker²
¹School of Engineering and Engineering Technology, LeTourneau University
²Electrical & Computer Engineering Dept., Montana State University
31. *Configurable strain lattices in WSe₂*
 Artie Battaglin, Joseph Stage, J Pierce Fix, and Nicholas J Borys
 Physics Dept., Montana State University