



## Optical Science & Engineering Conference Agenda

**Thursday, October 21, 2021**

Inspiration Hall, Norm Asbjornson Hall  
(Enter at the east end of the 3<sup>rd</sup> floor)  
Montana State University, Bozeman, Montana

Presented by the MSU Optical Technology Center (OpTeC), with support from the MSU Vice-President for Research and Economic Development, and Graduate Education.

Conference Organizers:

Dr. Joseph Shaw – OpTeC Director

Michelle Leonti – Conference Coordinator



7:45 am      **CHECK-IN and MORNING REFRESHMENTS**

8:00 am      *Welcome* Comments  
Joseph Shaw  
MSU Optical Technology Center Director

Session 1

Chair: Nicholas Borys

8:10 am      *FUV spectra of the sun from a CubeSat*  
Suman Panda, Charles Kankelborg  
Physics Dept, Montana State University, Bozeman, MT

8:30 am      *Sub-diffraction nanoscale Raman imaging of the interface in a 2D semiconductor heterostructure*  
J. Pierce Fix,<sup>1</sup> Souray Garg,<sup>2</sup> Andrey Krayev,<sup>3</sup> Michael Colgrove,<sup>1</sup> Audrey Sulkanen,<sup>4</sup>  
Minyuan Wang,<sup>4</sup> Gang-Yu Liu,<sup>4</sup> Patrick Kung,<sup>5</sup> Nicholas Borys<sup>1</sup>  
<sup>1</sup>Physics Dept, Montana State University, Bozeman, MT  
<sup>2</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT  
<sup>3</sup>HORIBA Scientific, Novato, CA  
<sup>4</sup>Chemistry Dept, University of California Davis, Davis, CA  
<sup>5</sup>Electrical & Computer Engineering Dept, The University of Alabama, Tuscaloosa, AL

8:50 am *Particle displacement sensing with sub-pixel image analysis: towards the quantum limit*  
Brian D'Urso,<sup>1</sup> Zachariah Etienne<sup>2</sup>  
<sup>1</sup>Physics Dept, Montana State University, Bozeman, MT  
<sup>2</sup>Physics Dept, University of Idaho, Moscow, ID

9:10 am *Diode-laser-based high spectral resolution lidar for tropospheric aerosol observations*  
Luke Colberg, Owen Cruikshank, Kevin Repasky  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT

9:30 am *Range Selective Digital Holographic Imaging Using FMCW Lidar*  
Matthew Goodman, R. Krishna Mohan, Wm. Randall Babbitt  
Spectrum Lab, Montana State University, Bozeman, MT

9:50 am *Characterization of Er<sup>3+</sup>-doped congruent and stoichiometric LiNbO<sub>3</sub> for quantum information applications*  
Thomas Rust, Jason Scott, Adam Olivera, Philip J. T. Woodburn, Rufus L. Cone, Charles W. Thiel  
Physics Dept, Montana State University, Bozeman, MT

10:10 am **BREAK & REFRESHMENTS**

Session 2

Chair: Krishna Rupavatharam

10:30 am *Double-reflection transmissive beam scanner for telecom wavelengths*  
Jordan Baker, Wataru Nakagawa, David Dickensheets, Kenneth Lang  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT

10:50 am *Phase Shift Interferometry for high-precision optical surface characterization*  
Jason Scott, Jacob Sharkansky, Thomas Rust, Rufus L. Cone, Charles W. Thiel  
Physics Department, Montana State University, Bozeman, MT

11:10 am *Improved optical remote sensing system to automate respiratory rate and tidal volume measurement*  
Md Siddat Bin Nesar,<sup>1</sup> Karis Trippe,<sup>2</sup> Bryce Hill,<sup>3</sup> Ryan Stapley,<sup>4</sup> Bradley Whitaker<sup>1</sup>  
<sup>1</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT  
<sup>2</sup>Electrical Engineering Dept, John Brown University, Siloam Springs, AR  
<sup>3</sup>Electrical Engineering Dept, Montana Technological University, Butte, MT  
<sup>4</sup>Biology Dept, Montana Technological University, Butte, MT

11:30 am *Spectral characterization of a division-of-focal-plane polarization imager using a grating monochromator*  
Erica Venkatesulu, Musaddeque Syed, Joseph Shaw  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT

11:50 pm *Analyzing the polarization response of hyperspectral imagers*  
Logan Riley, Erica Venkatesulu, Joseph Shaw  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT

12:10 pm **Lunch**

- 1:20 pm *Development of a spectroscopic ensemble to identify and explore excited state vibrational dynamics of Perylene Diimide superstructures*  
Skyler Hollinbeck, Erik Grumstrup  
Chemistry & Biochemistry Dept, Montana State University, Bozeman, MT
- 1:40 pm *High Bandwidth Backscanning Mirror for Coherent Chirped Pulse LIDAR Imaging*  
Andrew Oliver, David Dickensheets, Samantha Hampshire  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
- 2:00 pm *Enhanced multiexciton formation by an electron-hole plasma in 2D semiconductors*  
Matthew Strasbourg,<sup>1</sup> Cory Johns,<sup>1</sup> Zoe Nobel,<sup>1</sup> Emauil Yanev,<sup>2</sup> Thomas P. Darlington,<sup>2</sup> James C. Hone,<sup>2</sup> P. James Shuck,<sup>2</sup> Nicholas J. Borys<sup>1</sup>  
<sup>1</sup>Physics Department, Montana State University, Bozeman, MT  
<sup>2</sup>Mechanical Engineering Dept, Columbia University, New York, NY
- 2:20 pm *Optimized MVM constellations for SDM fibers*  
Eric Fink,<sup>1</sup> Jaroslaw Kwapisz,<sup>1</sup> Ioannis Roudas<sup>2</sup>  
<sup>1</sup>Mathematical Sciences Dept, Montana State University, Bozeman, MT  
<sup>2</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
- 2:40 pm **BREAK & REFRESHMENTS**

- 3:00 pm *Impact of Crosstalk in multicore fiber for hybrid classical and quantum communication network*  
Ekaterina Ponzovskaya-Devine, Alexander Kaufman, Alan Lu, Krishna Rupavatharam  
Spectrum Lab, Montana State University, Bozeman, MT
- 3:20 pm *Stimulated Raman Activated Cell Sorting*  
Jonah Theisen, Michael Neubauer, Anthony Kohtz, Stephan Warnat, Roland Hatzenpichler, Erik Grumstrup  
Chemistry & Biochemistry Dept, Montana State University, Bozeman, MT
- 3:40 pm *A bio-fluorescence hyperspectral imaging application*  
Slater Kirk, Mike Kehoe  
Resonon, Inc., Bozeman, MT

4:00 – 5:30 pm **Poster / Company Exhibit Session**

Session 5 – Poster / Company Session

*Company exhibits*

**Bridger Photonics**

**Out of the Box Manufacturing**

**MaRCTech2, Inc.**

**Resonon, Inc.**

## Research Posters

1. *Structure-property relationships of strain-induced ultrabright nanoscale emitters in a hybrid 2D semiconductor metal system*  
Mohammad Soroush, Nicholas J. Borys  
Physics Department, Montana State University, Bozeman, MT
2. *Dynamic control of excitons in single-layer WSe<sub>2</sub> with surface acoustic waves*  
Sheikh Parvez,<sup>1</sup> Samuel Berweger,<sup>2</sup> Nicholas J Borys<sup>1</sup>  
<sup>1</sup>Physics Department, Montana State University, Bozeman, MT  
<sup>2</sup>National Institute of Standards and Technology, Boulder, CO, USA
3. *Fabrication of embedded plasmonic antennas for nano-optomechanics with 2D materials*  
Joe Stage,<sup>1</sup> Nicholas J. Borys,<sup>1</sup> Andrew Lingley,<sup>2</sup> Wataru Nakagawa<sup>2</sup>  
<sup>1</sup>Physics Department, Montana State University, Bozeman, MT  
<sup>2</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
4. *Impact of lattice strain on charge carrier dynamics of lead halide perovskites*  
Sajia Afrin, Erik Grumstrup  
Chemistry and Biochemistry Dept, Montana State University, Bozeman, MT
5. *Emma Orcutt, Shelton Varapragasam, Erik Grumstrup*  
Chemistry and Biochemistry Dept, Montana State University, Bozeman, MT  
*Understanding excited state dynamics in silver-modified graphitic carbon nitride with ultrafast spectroscopic techniques*
6. *Experimental characterization of commercial wire-grid polarizers as near-infrared polarizing beam splitters*  
Kenneth Lang, Jordan Baker, David Dickensheets, Wataru Nakagawa,  
<sup>2</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
7. *Optical coherent storage: From photon echo to McCall-Hahn soliton*  
Aleks Rebane,<sup>1</sup> Hans Riesen<sup>2</sup>  
<sup>1</sup>Physics Department, Montana State University, Bozeman, MT  
<sup>2</sup>Physical Chemistry/Chemical Physics Dept, The University of New South Wales, Canberra, Australia
8. *Modeling the smile aberration in imaging spectrometers*  
Slater Kirk, Mike Kehoe  
Resonon, Inc., Bozeman, MT
9. *Optical transmittance of 3D printing materials*  
Shannon M. Hamp, Riley D. Logan, Joseph A. Shaw  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
10. *Measuring cloud thermodynamic phase with a low cost imaging polarimeter*  
Musaddeque Syed, Erica Venkatesulu, Joseph A. Shaw  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT

11. *Hyperspectral imaging for river ecology*  
Madison A. Torrey, Riley D. Logan, Shannon Hamp, Charlie Nicholson, Joseph A. Shaw  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
12. *Detection of flying insects using lidar*  
Trevor C. Vannoy, Riley D. Logan, Elizabeth M. Rehbein, Joseph A. Shaw, Bradley M. Whitaker  
Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
13. *Fiber-Coupled FMCW Lidar*  
John Lawson Turcotte<sup>1</sup>, Michael R. Roddewig<sup>2</sup>, Joseph A. Shaw<sup>2</sup>  
<sup>1</sup>Brigham Young University-Idaho, Rexburg, ID  
<sup>2</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT
14. *Coherent heterodyne receiver*  
Alexander Brisson, Alan Lu, Stephen Crouch, Wm. Randall Babbitt, Krishna Rupavatharam  
Spectrum Lab, Montana State University, Bozeman, MT
15. *Range selective digital holography using time of flight cameras*  
Cole Hammond, Wm. Randall Babbitt, R. Krishna Mohan  
Spectrum Lab, Montana State University, Bozeman, MT
16. *Preservation of Photon Coincidence After Transmission through Multicore Fiber*  
Alexander Kaufman, Jason Mickel, Krista Drummond, Krishna Rupavatharam  
Spectrum Lab, Montana State University, Bozeman, MT
17. *Construction of Hong-Ou-Mandel Interferometer for Quantum Network Research*  
Nathan Kuehl, Krishna Rupavatharam, Krista Drummond  
Spectrum Lab, Montana State University, Bozeman, MT
18. *Applications of DP-QPSK modulators for coherent lidar and quantum communications*  
Alan Lu, Krishna Rupavatharam, Wm. Randall Babbitt, Stephen Crouch, Alexander Brisson  
Spectrum Lab, Montana State University, Bozeman, MT
19. *Fog emulation for applications in digital holography*  
Brienne Malchow, Wm. Randall Babbitt, Krishna Rupavatharam, Michelle Milvich  
Spectrum Lab, Montana State University, Bozeman, MT
20. *Use of fog emulator for lidar and digital holography measurements*  
Corey Pearson, Krishna Rupavatharam, Wm. Randall Babbitt, Brienne Malchow, Jaime Neeley,  
Michelle Milvich  
Spectrum Lab, Montana State University, Bozeman, MT
21. *Demonstration of Interferometric Readout for Spatial Spectral Holographic Spectrum Analysis*  
Owen R. Wolfe, R. Krishna Mohan, Wm. Randall Babbitt  
Spectrum Lab, Montana State University, Bozeman, MT

22. *Auger electron spectroscopy for surface ferroelectric domain characterization in periodically poled lithium niobate*

Torrey McLoughlin,<sup>1</sup> Wm. Randall Babbitt,<sup>1</sup> Phillip A. Himmer,<sup>2</sup> Wataru Nakagawa<sup>2</sup>

<sup>1</sup>Physics Dept, Montana State University, Bozeman, MT

<sup>2</sup>Electrical & Computer Engineering Dept, Montana State University, Bozeman, MT

23. *Creation of correlated photons via spontaneous parametric down conversion (SPDC) for use in quantum communication systems*

Jason Mickel, Christopher Ebbers, R. Krishna Mohan

Spectrum Lab, Montana State University, Bozeman, MT

24. *Opto-mechanical design, analysis, and test of monostatic transmit/receive module for coherent active imaging* Jaime Neeley, Wm. Randall Babbitt, Krishna Rupavatharam, Michelle Milvich, Matthew Goodman

Spectrum Lab, Montana State University, Bozeman, MT

25. *Digital holographic polarimeter using dual reference beam interferometry*

Matthew Goodman, R. Krishna Mohan, Zeb W. Barber, Wm. Randall Babbitt

Spectrum Lab, Montana State University, Bozeman, MT