



Optical Science & Engineering Conference

Montana Manufacturing Extension Center (MMEC)
2310 University way, Bldg #2, Suite 1
Bozeman, Montana

Presented by the MSU Optical Technology Center (OpTeC), with support from the MSU Vice-President for Research and Economic Development, the Montana Photonics Industry Alliance (MPIA), and the City of Bozeman.



Conference Agenda Wednesday, August 8, 2018

Conference Organizers:
Dr. Joseph Shaw – OpTeC Director
Diane Harn – Conference Coordinator

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

8:25 am Joseph Shaw
MSU Optical Technology Center Director
Welcoming comments

Session 1 Research talks Session chair: Wm. Randall Babbitt

8:30 am Laura M. Eshelman,¹ Martin Jan Tauc,¹ Taiga Hashimoto,² Preston Hooser,¹ Kendra Gillis,³ William Weiss,³ Bryan Stanley,⁴ Glenn E. Shaw,⁵ and Joseph A. Shaw¹
¹Electrical & Computer Engr. (ECE) Dep't, Montana State University, Bozeman, MT
²Applied Physics Department, Hokkaido University, Sapporo, Japan
³Physics Department, BYU-Idaho, Rexburg, ID
⁴Physics Department, Colorado State University, Fort Collins, CO
⁵Geophysical Institute, University of Alaska, Fairbanks, AK
All-sky polarization measurements of the total solar eclipse on 21 August 2017

9:00 am Tianbo Liu and David L. Dickensheets
¹MSU Electrical & Computer Engineering (ECE) Department
MEMS 3-Dimensional Scanner for Handheld Confocal Microscopy

- 9:20 am Wm. Randall Babbitt
Spectrum Lab, Montana State University, Bozeman, MT
Spectrum Lab: past, present, and future
- 9:30 am Aislinn Daniels,¹ Wm. Randall Babbitt,^{1,2} Zeb Barber,¹ and Mark Neifeld^{1,3}
¹Physics Department, Montana State University, Bozeman, MT
²Spectrum Lab, Montana State University, Bozeman, MT
³ECE Department & College of Optical Sciences, University of Arizona, Tucson, AZ
Demonstration of vector matrix multiplication using a spatial-spectral material
- 9:40 am Owen Wolfe, Tia Sharpe, R. Krishna Mohan, and Zeb W. Barber
Spectrum Lab, Montana State University, Bozeman, MT
Demonstration of stimulated photon echo separation using an interferometric cancellation
- 9:52 am Torrey McLoughlin,¹ Lillian Zimmerman,² Nikolas Torgerson,³ Wm. Randall Babbitt,¹
Philip Himmer,⁴ and Wataru Nakagawa³
¹Physics Department, Montana State University, Bozeman, MT
²Chemical & Biological Engineering Dep't, Montana State University, Bozeman, MT
³ECE Department, Montana State University, Bozeman, MT
⁴Montana Microfabrication Facility, Montana State University, Bozeman, MT
Contact poling sub-micron electrodes for first order quasi-phase matched backward nonlinear interactions

10:05 am **BREAK & REFRESHMENTS**

Session 2 Research talks Session chair: Joseph Shaw

- 10:25 am Clarissa M. DeLeon,¹ Elizabeth Rehbein,² Martin Jan Tauc,¹ Jesse Barber,³ Kurt Fristrup,⁴
and Joseph A. Shaw¹
¹ECE Department, Montana State University, Bozeman, MT
²MSU Physics Department
³Biological Sciences Department, Boise State University, Boise, ID
⁴Natural Sounds and Night Skies Division, National Park Service, Fort Collins, CO
Field deployment of a wing-beat-modulation scanning lidar system for studying insects
- 10:40 am Max Brodheim,¹ Martin Jan Tauc,² and Joseph A. Shaw²
¹Physics Department, Hobart and William Smith Colleges, Geneva, NY
²ECE Department, Montana State University, Bozeman, MT
Calibrating and upgrading a scanning sky polarimeter
- 10:55 am Jordan Baker,¹ Martin Jan Tauc,² and Joseph A. Shaw²
¹Physics Department, New Mexico Tech, Socorro, NM
²ECE Department, Montana State University, Bozeman, MT
Calibrating and processing data from a 3-channel optical aurora detector
- 11:10 am Martin Jan Tauc, Carol L. Baumbauer, Benjamin Moon, Andrew M. Abel, David W.
Riesland, Laura M. Eshelman, Wataru Nakagawa, and Joseph A. Shaw
ECE Department, Montana State University, Bozeman, MT
Cloud thermodynamic phase detection with a 3-channel shortwave infrared polarimeter

11:30 am Nicholas Borys^{1,2}
¹Physics Department, Montana State University, Bozeman, MT
²Molecular Foundry, Lawrence Berkeley National Lab, Berkeley, CA
Understanding the exciton-driven nanoscale optical properties of atomically thin 2D semiconductors

12:00 pm **Lunch** on your own

Session 3 Research Talks Session chair: Erik Grumstrup

1:30 pm Mahmoudreza Dadras,¹ Ioannis Roudas,¹ and Jaroslaw Kwapisz²
¹ECE Department, Montana State University, Bozeman, MT
²Mathematical Sciences Department, Montana State University, Bozeman, MT
Mode selection for measuring modal dispersion in Stokes space

1:50 am Brian D'Urso, Bradley Slezak, Charlie Lewandowski, and Dominic Bair
Physics Department, Montana State University, Bozeman, MT
Optomechanics with a particle in a magneto-gravitational trap

2:10 pm Catharine E. Bunn,¹ Kevin S. Repasky,^{1,2,3} Scott M. Spuler,³ Matthew Hayman,³ and Robert A. Stillwell³
¹Physics Department, Montana State University, Bozeman, MT
²Electrical & Computer Engineering Dep't, Montana State University, Bozeman, MT
³National Center for Atmospheric Research, Boulder, CO
Development of diode laser-based differential absorption lidar (DIAL) for thermodynamic profiling in the lower troposphere

2:30 pm Ann Peterson
MSU TechLink
SBIR: Funding your innovation

2:45 pm Mitch Heins
Synopsys, Inc. – Photonic Design Tools
How Photonic Integrated Circuits (PICs) are being used today

3:15 pm BREAK

Session 4 Research and Economic Development Session Chair: Trent Berg

3:40 pm Stephen Crouch
Blackmore Sensors and Analytics
FMCW Lidar for Autonomous Driving and Defense Applications

4:00 pm Panel Discussion on University – Industry Partnerships
Joseph Shaw – OpTeC Director
Randy Babbitt – Spectrum Lab Director
Daniel Juliano – Director of MSU Technology Transfer
Trent Berg – MPIA President & Photonics and Laser Technology Program Director
Kris Merkel – S2 Corp. President/CEO

4:50 pm Room transition & poster setup

5:30 – 7:30 pm **POSTER SESSION & Hors d'oeuvres**

6:00 pm Presentation of 2018 Montana Optics Innovator Award

Session 5 – Poster Session

Company exhibits

AdvR, Inc.

Blackmore Sensors and Analytics, Inc.

Lattice Materials Corp.

Quantel USA

S2 Corporation

Wavelength Electronics

Altos Photonics

FLIR/Scientific Materials Corp.

Montana Instruments

Resonon, Inc.

Synopsys

3D at Depth

Research Posters

1. Jake Lindquist
Wavelength Electronics – Bozeman, MT
Low-noise, lightweight, small-footprint laser diode driver and stable temperature control (0.0008 °C) enables high-precision atmospheric methane measurements using unmanned aerial systems
2. Craig Wall
Montana Instruments - Bozeman, MT
Temperature controlled micro-Raman spectroscopy as a nanoanalytical tool for studying 2D materials
3. Riley D. Logan,¹ Bryan Scherrer,¹ Jacob Senecal,² Neil Walton,² Amy Linck,² John Sheppard,² and Joseph A. Shaw¹
¹Electrical and Computer Engineering Department, Montana State University, Bozeman, MT
²Gianforte School of Computing, Montana State University, Bozeman, MT
Using hyperspectral imaging with machine learning to monitor produce from grocery stores
4. Daniel Walsh, Jeffrey Anderson, and Ioannis Roudas
Electrical & Computer Engineering Department, Montana State University, Bozeman, MT
High-capacity local area networks using plastic optical fibers
5. Tristan Gray, Andrew Hohne, Carol Baumbauer, James Dilts, Benjamin Moon, Jed Pai, Martin Jan Tauc, Joseph A. Shaw, and Wataru Nakagawa
Electrical & Computer Engineering Department, Montana State University, Bozeman, MT
Optical nanostructure-based polarization and spectral filters
6. Casey Kennedy,¹ Andrew H. Hill,² Eric S. Massaro,¹ and Erik M. Grumstrup^{1,2}
¹Chemistry & Biochemistry Department, Montana State University, Bozeman, MT
²Materials Science Program, Montana State University, Bozeman, MT
Ultrafast excited state transport and decay dynamics in cesium lead mixed-halide perovskites

7. Geoffrey Piland¹ and Erik M. Grumstrup^{1,2}
¹Chemistry & Biochemistry Department, Montana State University, Bozeman, MT
²Materials Science Program, Montana State University, Bozeman, MT
Characterization of excited state dynamics in semiconductors utilizing femtosecond stimulated Raman microscopy

8. Jose Luis Figueroa, Jr.,¹ Jed Pai,² Lillian Zimmerman,³ Nikolas Torgerson,² Torrey McLoughlin,⁴ Tristan Gray,² and Wataru Nakagawa²
¹Physics Department, St. Mary's University, San Antonio, TX
²Electrical & Computer Engineering Department, Montana State University, Bozeman, MT
³Chemical & Biological Engineering Department, Montana State University, Bozeman, MT
⁴Physics Department, Montana State University, Bozeman, MT
Optimization of nanoscale electrode fabrication for poling nonlinear crystals

9. Katie Link and Robert A. Walker
 Chemistry and Biochemistry Department, Montana State University, Bozeman, MT
Cooperative adsorption of lipid films and soluble sugars at the aqueous/vapor interface

10. Grace Purnell and Robert A. Walker
 Chemistry and Biochemistry Department, Montana State University, Bozeman, MT
Hindered isomerization at the silica/aqueous interface: surface polarity or restricted solvation?

11. Martha Welander and Robert A. Walker
 Chemistry and Biochemistry Department, Montana State University, Bozeman, MT
Enhanced redox resilience in ALT doped NiO-YSZ SOFC anodes

12. Bradley R. Slezak, Charles W. Lewandowski, and Brian D'Urso
 Physics Department, Montana State University, Bozeman, MT
Feedback cooling the motion of a magneto-gravitationally trapped microsphere

13. J. M. Carr, P. J. T. Woodburn, A. Marsh, R. L. Cone, and C. W. Thiel
 Physics Department, Montana State University, Bozeman, MT
Flux-growth of rare-earth-doped YVO₄ and NaCl single crystals

14. Jack Vincent and Anja Kunze
 Electrical & Computer Engineering Department, Montana State University, Bozeman, MT
Synchronous microelectrode array recording and calcium imaging of neuronal activity