

# 2023 Physics of Sensing Program Review

Dr. Michael Yakes | November 13-16, 2023 | Arlington, VA - hybrid

Basic Research Innovation Collaboration Center (BRICC)  
4100 N Fairfax Drive, Suite 450 | Arlington VA 22203

## Agenda Day 1 | Monday, November 13, 2023

| Time  | Topic   | Speaker                   |
|-------|---|---------------------------|
| 12:30 | Check-in /Zoom Log-in   |                           |
| 1:00  | Space Domain Awareness in Cislunar Space  | Dan Scheeres, Colorado    |
| 1:30  | Remote sensing via multi-path optical interference of reflected light           | Lauren Zarzar, Penn St.   |
| 2:00  | Adaptive Data-Driven Actionable Intelligence for SSA in an Evidential Framework | Mrinal Kumar, Ohio St.    |
| 2:30  | BREAK   |                           |
| 3:00  | Innovative Single-Pixel Imaging Regularized by Event Data (InSPIRED)            | Anthony Giljum, AFRL RV   |
| 3:30  | Non-imaging advanced scene characterization                                     | Nick Vamivakas, Rochester |
| 4:00  | MEETING ADJOURN   |                           |

## Agenda Day 2 | Tuesday, November 14, 2023

| Time  | Topic   | Speaker                    |
|-------|---|----------------------------|
| 8:00  | Check-in /Zoom Log-in   |                            |
| 8:30  | Profiling of Atmospheric Turbulence using Time-Lapse Imagery of Non-Cooperative Targets from Multiple Spatially Separated Cameras | Santasri Bose-Pillai, AFIT |
| 9:00  | All-Optical Transformations Performed Using Diffractive Materials   | Aydogan Ozcan, UCLA        |
| 9:30  | Spectral NLOS imaging: towards photo-realistic NLOS reconstructions   | Andreas Velten, Wisconsin  |
| 10:00 | BREAK   |                            |

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| <b>10:30</b> | Resident Space Object Characterization by Fusing Polarized and Unpolarized Light Curves                               | John Crassidis, Buffalo       |
| <b>11:00</b> | Optimizing Entanglement to attain Quantum Limit of Long-Baseline Imaging  | Saikat Guha, Arizona          |
| <b>11:30</b> | LAser guide Star Sensor Integrated Extreme Adaptive optics (LASSIE)   | Lauren Schatz, AFRL RD        |
| <b>12:00</b> | <b>LUNCH</b>  |                               |
| <b>1:00</b>  | Super-Resolution Imaging and Sensing with Relative Motion in Structured Illumination and Multiply-Scattered Light     | Kevin Webb, Purdue            |
| <b>1:30</b>  | On the Problem of Deep Turbulence: Expanding the Field of View, Bandpass, and Observing Conditions of the Fresnel WFS | Justin Crepp, Notre Dame      |
| <b>2:00</b>  | The influence of boundary effects and type of environment on turbulence profiles                                      | Miranda Van Irsel, Dayton     |
| <b>2:30</b>  | <b>BREAK</b>  |                               |
| <b>3:00</b>  | Ultra-broadband speckle imaging for space domain awareness  | Stuart Jefferies, Georgia St. |
| <b>3:30</b>  | Multi-Fidelity Uncertainty Propagation to Track Maneuvering Spacecraft  | Brandon Jones, Texas          |
| <b>4:00</b>  | <b>MEETING ADJOURN</b>  |                               |

| <b>Agenda Day 3   Wednesday, November 15, 2023</b> |   |                           |
|--|---|---------------------------|
| <b>Time</b>  | <b>Topic</b>  | <b>Speaker</b>            |
| <b>8:00</b>  | <b>Check-in /Zoom Log-in</b>  |                           |
| <b>8:30</b>  | HOTNMS: Harnessing Optomechanical effects for Tailoring Noise properties of Mechanical Sensors    | Swati Singh, Delaware     |
| <b>9:00</b>  | A Comprehensive Sensor Data Processing Infrastructure for Local Domain Awareness of Space Objects | Andy Sinclair, AFRL RV    |
| <b>9:30</b>  | Electromagnetic Field Sensing Through Superradiance in 2D Materials                               | Shengxi Huang, Rice       |
| <b>10:00</b>                                       | <b>BREAK</b>  |                           |
| <b>10:30</b>                                       | Center for Space Situational Awareness Research (CSSAR)   | Francis Chun, USAFA       |
| <b>11:00</b>                                       | The Science of Non-Resolved Space Object Signatures for Space Domain Awareness                    | Miguel Velez- Reyes, UTEP |

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| <b>11:30</b> | Fundamental Bounds of Information in Photon Starved Passive Multidimensional Imaging and Recognition in the Presence of Environmental Degradation | Bahram Javidi, Connecticut  |
| <b>12:00</b> | <b>LUNCH</b>  |                             |
| <b>1:00</b>  | Photonic nanocomposite films made by pulsed laser deposition  | Abdalla Darwish, Dillard    |
| <b>1:30</b>  | Unravelling dependencies on turbulence strength and propagation geometry in models of optical scintillation                                       | Jeremy Bos, Michigan Tech   |
| <b>2:00</b>  | Computationally-driven search for new infra-red absorbing semiconductors with long carrier lifetime   | Geoffroy Hautier, Dartmouth |
| <b>2:30</b>  | <b>BREAK</b>  |                             |
| <b>3:00</b>  | BRICC's Technology Transfer and Transition Capabilities   | Sunny Shariar, VT-ARC       |
| <b>3:30</b>  | Sensing with Fractal, Diffraction-encoded Beams   | Luat Vuong, UC-Riverside    |
| <b>4:00</b>  | <b>MEETING ADJOURN</b>  |                             |

| <b>Agenda Day4   Thursday, November 16, 2023</b> |   |                                 |
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| <b>Time</b>                                      | <b>Topic</b>  | <b>Speaker</b>                  |
| <b>8:00</b>                                      | <b>Check-in /Zoom Log-in</b>  |                                 |
| <b>8:30</b>                                      | SHADOW IMAGING: Research in Fundamental Issues for a New Capability in Space Domain Awareness                       | Peter McMahan-Crabtree, AFRL RV |
| <b>9:00</b>                                      | Ultrafast Automatic Event Recognition Using Multiphoton Atomic Transitions  | Selim Shariar, Northwestern     |
| <b>9:30</b>                                      | A fine-wire sensor array for ground-based and airborne in-situ measurements of optical turbulence in the atmosphere | Andreas Muschinski, NWRA        |
| <b>10:00</b>                                     | <b>BREAK</b>  |                                 |
| <b>10:30</b>                                     | Color Resolved Spacecraft Observations as a Tool for Sensing Material Identity and Chemical State                   | Ryan Hoffman, AFRL RV           |
| <b>11:00</b>                                     | End-to-End Design of Low-cost Computational Telescopes  | Laura Waller, UC Berkeley       |
| <b>11:30</b>                                     | Improved BRDF Measurement and Modeling with Out-of- Plane and Wavelength Dependence                                 | Todd Small, AFIT                |

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| <b>12:00</b> | <b>LUNCH</b>   |                            |
| <b>1:00</b>  | Statistically Inferred Multi-Modal Photon Information Content Quantification and Assessment Via Quanta Photogrammetry                      | Moriba Jah, Texas          |
| <b>1:30</b>  | Dynamics of Charge and Energy Transport in 2D/3D Mixed-dimensional Heterostructures enabled by Remote Epitaxy and Layer Resolved Splitting | Kyusang Lee, VA            |
| <b>2:00</b>  | Touchless Charge Control of Neighboring Spacecraft in Geostationary and Cislunar Space   | Hanspeter Schaub, Colorado |
| <b>2:30</b>  | <b>BREAK</b>   |                            |
| <b>3:00</b>  | Autonomous Distributed Angles-Only Orbit Determination using Multiple Observers  | Simone D'Amico, Stanford   |
| <b>3:30</b>  | High-resolution Imaging in Heterogeneous Media   | Alexei Novikov, Penn St.   |
| <b>4:00</b>  | Atomically precise exfoliation of single-crystalline oxide thin-films and its pyroelectric properties                                      | Jeewan Kim, MIT            |
| <b>4:30</b>  | <b>MEETING ADJOURN</b>   |                            |