

2024 Joint Physics of Sensing and Astrodynamics Program Review

Dr. Michael Yakes and Andrew Sinclair | November 4-8, 2024 | Arlington, VA -hybrid

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

Agenda Day 1 | Monday, November 4, 2024

Time	Topic	Speaker
11:30	In-person check-in/Virtual login	
12:00	Data-Driven Spacecraft Trajectory and Behavior Prediction in Cislunar Space	Natasha Bosanac, University of Colorado at Boulder
12:30	Remote sensing via multi-path optical interference of reflected light	Lauren Zarzar, UC Berkeley
13:00	Laser Guide Star Assisted Extreme Adaptive Optics	Lauren Schatz & Jeff Richey, AFRL
13:30	Optimizing Entanglement to attain Quantum Limit of Long-Baseline Imaging	Saikat Guha, University of Maryland
14:00	BREAK	
14:30	Breaking the "Launch Once Use Once" Paradigm (SURI)	Howard Choset, Carnegie Mellon University
15:00	Fundamental Bounds of Information in Photon Starved Passive Multidimensional Imaging and Recognition in the Presence of Environmental Degradation	Bahram Javidi, University of Connecticut
15:30	Sensing with Fractal, Diffraction-encoded Beams	Luat Vuong, UC Riverside
16:00		
16:30	REVIEW END FOR THE DAY	

Agenda Day 2 | Tuesday, November 5, 2024

Time	Topic	Speaker
8:00	In-person check-in/Virtual login	
8:30	Photonic nanocomposite films made by pulsed laser deposition	Abdalla Darwish, Dillard University
9:00	TBD	Brandon Fetterolf, TBD
9:30	Distinguishing UAVs from birds in 3D LiDAR point clouds	András Majdik, Hungarian Computation Science and Automatization Institute
10:00	BREAK	
10:30	Autonomous Space Situational Awareness in Complex Environments (LRIR)	Alex Soderlund, AFRL Space Vehicles Directorate
11:00	Spectral NLOS imaging: towards photo-realistic NLOS reconstructions	Andreas Velten, University of Wisconsin
11:30	Structured Terahertz Beams Containing Orbital Angular Momentum for Agile Aerial Sensing	Yasaman Ghasempour, Princeton University
12:00	LUNCH	
13:30	TBD	Maj Sean Allen, Space Systems Command
14:00	Characterizing Highways & Automated Navigation in Cislunar Environment (CFIRE)	Kathleen Howell, Purdue University
14:30	Non-imaging advanced scene characterization	Nick Vamivakas, Rochester Institute of Technology
15:00	BREAK	
15:30	Understanding and addressing the dynamic coupling between robotic arms and base spacecraft to enable challenging in-space operations	Donghoon Kim & Ou Ma, University of Cincinnati
16:00	Unravelling dependencies on turbulence strength and propagation geometry in models of optical scintillation.	Jeremy Bos, Michigan Technological University
16:30	REVIEW END FOR THE DAY	
16:30	Networking/Social at Bronson Bier Hall	

Agenda Day 3 | Wednesday, November 6, 2024

Time	Topic	Speaker
8:00	In-person check-in/Virtual login	
8:30	Ultra-broadband speckle imaging for space domain awareness	Stuart Jeffries, Georgia State University
9:00	Representations, Theory, and Algorithms for Autonomous Space Domain Awareness in the Cislunar Regime (CFIRE)	Kyle DeMars, Texas A&M University
9:30	Improved BRDF Measurement and Modeling with Out of- Plane and Wavelength Dependence	Todd Small, Air Force Institute of Technology
10:00	BREAK	
10:30	The Science of Non-Resolved Space Object Signatures for Space Domain Awareness (SURI))	Miguel Velez-Reyes, University of Texas at El Paso
11:00	Leveraging Polarized Light Curves to Characterize High Altitude Objects	John Crassidis, University at Buffalo
11:30	Color Resolved Spacecraft Observations as a Tool for Sensing Material Identity and Chemical State	Ryan Hoffman, AFRL Space Vehicles Directorate
12:00	LUNCH	
13:00	Poster Session (see list below)	
15:00		
15:30	On the Problem of Deep Turbulence: Expanding the Field of View, Bandpass, and Observing Conditions of the Fresnel WFS	Justin Crepp, University of Notre Dame
16:00	High Contrast Wavefront Sensing for Space Domain Awareness	Mala Mateen, AFRL
16:30	REVIEW END FOR THE DAY	

POSTER SESSION		
1	Multiscale Astrodynamical Analysis for Improved xGEO Cislunar SDA	Aaron Rosengren, University of California, San Diego & Shane Ross, Virginia Tech
2	Uncertainty Propagation for Maneuvering Objects in Chaotic Systems	Brandon Jones & Ryan Russell, University of Texas at Austin
3	Data-Driven Discovery of Cislunar Transport Mechanisms (D3CTM)	Roshan Eapen, Pennsylvania State University
4	Dynamics near the L3 point of the Earth-Moon system: Invariant manifolds and connections with other libration points (EOARD)	Angel Jorba, Universitat de Barcelona
5	Symplectic methods in space mission design (EOARD)	Augustin Moreno, Universitat Heidelberg
6	Near-linear uncertainty quantification and tracking in the cislunar regime (EOARD)	Davide Amato, Imperial College
7	Multi-Phenomenological, Autonomous, and Understandable SDA and XDA Decision Support (SURI)	Marcus Holzinger, University of Colorado at Boulder
8	A fine-wire sensor array for ground-based and airborne in-situ measurements of optical turbulence in the atmosphere	Andreas Muschinsk,
9	The Science of Non-Resolved Space Object Signatures for Space Domain Awareness	Francis Chun, U.S. Air Force Academy
10	High-resolution Imaging in Heterogeneous Media	Alexei Novikov, Pennsylvania State University
11	Ultrafast Automatic Event Recognition Using Multiphoton Atomic Transitions	Selim Shahriar, Northwestern University
12	The influence of boundary effects and type of environment on turbulence profiles	Miranda Van Iersel, New Mexico State University
13	Super-Resolution Imaging and Sensing with Relative Motion in Structured Illumination and Multiply-Scattered Light	Kevin Webb, Purdue University
14	Touchless Charge Control of Neighboring Spacecraft in Geostationary and Cislunar Space	Hanspeter Schaub, University of Colorado at Boulder
15	Exploring the Imaging Physics of Photonic Lanterns	Steve Eikenberry, University of Central Florida
16	Quantum correlated interferometry for space domain awareness in the extreme sub-wavelength limit	Zubin Jacob, Purdue University
17	Towards Spatially-Selective Lensing for Imaging and Vision	Matthew O'Toole, Carnegie Mellon University
18	Data-Driven Identification of Spacecraft Transport Pathways in Cislunar Space (YIP)	Natasha Bosanac, University of Colorado at Boulder
19	Fast Autonomous Lost-in-space Catalog-based Optical Navigation (FALCON)	Simone D'Amico, Stanford University
20	Space Situational Awareness in Cislunar Space	Daniel Scheeres, University of Colorado at Boulder & Terry Alfriend, Texas A&M University
21	Space Domain Awareness in a Photon-Starved Environment (SURI)	Stuart Jeffries, Georgia State University

22	Space Object Understanding and Reconnaissance of Complex Events (SURI)	John Crassidis, University at Buffalo
23	Picard-Chebyshev Methods for Long Duration Propagation in Chaotic Dynamical Systems (YIP)	David Stanley & Robyn Woollands, University of Illinois at Urbana Champaign
24	Measuring and Controlling the Electronic Transport Properties of BaZrS ₃ Chalcogenide Perovskite Thin Films	Jack Van Sambeek, MIT
25	Thurster Pointing Constrained Optimal Control for Satellite Servicing using Indirect Optimization	Himmat Panag & Robyn Woollands, University of Illinois at Urbana Champaign
26	Optimal multi-agent control and planning strategies for in-space servicing and assembly	Ruthvik Bommena, Kartik Nagpal, Negar Mehr & Robyn Woollands, University of Illinois at Urbana Champaign

Agenda Day 4 Thursday, November 7, 2024		
Time	Topic	Speaker
8:00	In-person check-in/Virtual login	
8:30	Space Domain Awareness in Cislunar Space	Daniel Scheeres, University of Colorado at Boulder & Terry Alfriend, Texas A&M University
9:00	HOTNMS: Harnessing Optomechanical effects for Tailoring Noise properties of Mechanical Sensors	Swati Singh, University of Delaware & Sunil Bhawe, Purdue University
9:30	End-to-End Design of Low-cost Computational Telescopes	Laura Waller, University of California, Berkeley
10:00	BREAK	
10:30	Computationally-driven search for new infra-red absorbing semiconductors with long carrier lifetime	Geoffroy Hautier & Jifeng Liu, Dartmouth University
11:00	Innovative Single-Pixel Imaging Regularized by Event Data (InSPIRED)	Anthony Giljum & Zachry Theis, AFRL
11:30	Statistically Inferred Multi-Modal Photon Information Content Quantification and Assessment Via Quanta Photogrammetry	Moriba Jah, University of Texas at Austin
12:00	LUNCH	
13:30	Adaptive Data-Driven Actionable Intelligence for SSA in an Evidential Framework	Mrinal Kumar, Ohio State University

14:00	Dynamics of Charge and Energy Transport in 2D/3D Mixed-dimensional Heterostructures enabled by Remote Epitaxy and Layer Resolved Splitting	Kyusang Lee, University of Virginia
14:30	Investigations of the tolerance of chalcogenide perovskite semiconductors for point defects	Rafael Jaramillo, MIT
15:00	BREAK	
15:30	Starlift (SURI)	Dmitry Savransky, Cornell University
16:00	Advancing Technologies for Logistics Architectures in Space (SURI)	Koki Ho, Georgia Tech
16:30	REVIEW END FOR THE DAY	
16:30	Networking/Social at Bronson Bier Hall	

Agenda Day 5 Friday, November 8, 2024		
Time	Topic	Speaker
8:00	In-person check-in/Virtual login	
8:30	Autonomous Distributed Angles-Only Orbit Determination using Multiple Observers	Simone D'Amico, Stanford University
9:00	Electromagnetic Field Sensing Through Superradiance in 2D Materials	Shengxi Huang, Rice University
9:30	Atomically precise exfoliation of single-crystalline oxide thin-films and its pyroelectric properties	Jeehwan Kim, MIT
10:00	BREAK	
10:30	Dynamic Vision Sensor for Observing Human-made Space Objects - Detection, Tracking, Characterization	Carolyn Frueh, Purdue University & Thomas Schildneckt (EOARD)
11:00	SHADOW IMAGING: Research in Fundamental Issues for a New Capability in Space Domain Awareness	Peter McMahon-Crabtree, AFRL Space Vehicles Directorate
11:30	Design anomalous Kerr nonlinearity for photonic signal processing and sensing	Linran Fan, University of Texas at Austin
12:00	Wrap-Up	
13:30	REVIEW ADJOURNED	