

FACULTY RESEARCH TALKS

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Zoom talk | Friday, Jan. 24, 2025 | Noon to 1 p.m.



PRESENTER 1:

WAYESH QARONY

Assistant Professor
Electrical and
Computer
Engineering; Physics

Quantum Light Sources in Silicon for Scalable Quantum Networks

This talk presents novel telecom-band quantum light sources in silicon. Dr. Qarony's team demonstrated an all-silicon quantum light source achieving near-unity atom-cavity coupling efficiency, leading to 30-fold emission enhancement and 8-fold acceleration. They unveiled the programmable creation of silicon-based single-photon emitters with tailored optical and spin properties. These breakthroughs enable scalable, integrated quantum photonic devices for advancing quantum communication and information processing.

Dr. Qarony's iQ-Lab focuses on advancing quantum technologies through the development of novel silicon-based quantum systems for scalable quantum networks and quantum information processing. Their research encompasses the exploration of telecom-band novel quantum light sources in silicon, including their fundamental properties and integration into quantum circuits, photonics systems and spin-photon interfaces. The lab also develops high-performance nanophotonic single-photon detectors operating at telecom wavelengths, achieving significant improvements in detection efficiency, dark current, and timing resolution at elevated temperatures.



PRESENTER 2:

DAVID MITCHELL

Associate Professor
Materials Science
and Engineering;
Mechanical and
Aerospace Engineering

Developing Advanced Materials and Advanced Manufacturing Processes for Application in Extreme Environments

Extreme environment materials are required for many applications, such as hypersonic propulsion and thermal protection systems, aircraft engine and power generation gas turbines, nuclear fission and fusion energy, concentrated solar power generation, and industrial manufacturing. The inherent properties and capability of extreme environment materials result in great challenges in manufacturing. Dr. Mitchell will discuss applications requiring extreme environment materials, the challenges with regards to fabricating components using them, and the research and development his lab will be performing to create the next generation of extreme environment materials and advanced manufacturing processes.

Dr. Mitchell is an internationally recognized expert in extreme environment materials. Prior to joining UCF as part of the Center of Excellence in Hypersonic and Space Propulsion, he created a broad portfolio of advanced materials, fabrication processes and components/systems at GE Research, Boeing Research, Siemens Energy and Oak Ridge National Laboratory. Dr. Mitchell has authored more than 50 patents worldwide and is creating the XTREMES lab in the new HyperSpace center at UCF to develop advanced materials and processes for extreme environment materials.



PRESENTER 3:

RAL BIELAWSKI

Assistant Professor
Mechanical and
Aerospace Engineering

Shock and Detonation Driven Breakup of Liquid Droplets for Propulsion Applications

In this presentation, Dr. Bielawski will discuss his research on utilizing high-fidelity numerical simulations to study the shock driven breakup of liquid droplets. He will present the key findings from these high-fidelity studies and the insights they provide on the dominant process driving the breakup. Next, he will provide an overview of the modeling and propulsion implications of these results.

Dr. Bielawski studies high speed reacting and multiphase flows for propulsion applications, and runs the Numerical Multiphase Combustion lab. His areas of research are numerical methods, hypersonic propulsion concepts, detonation engines, multiphase flows, aerodynamics breakup of droplets and liquid fueled detonations.