

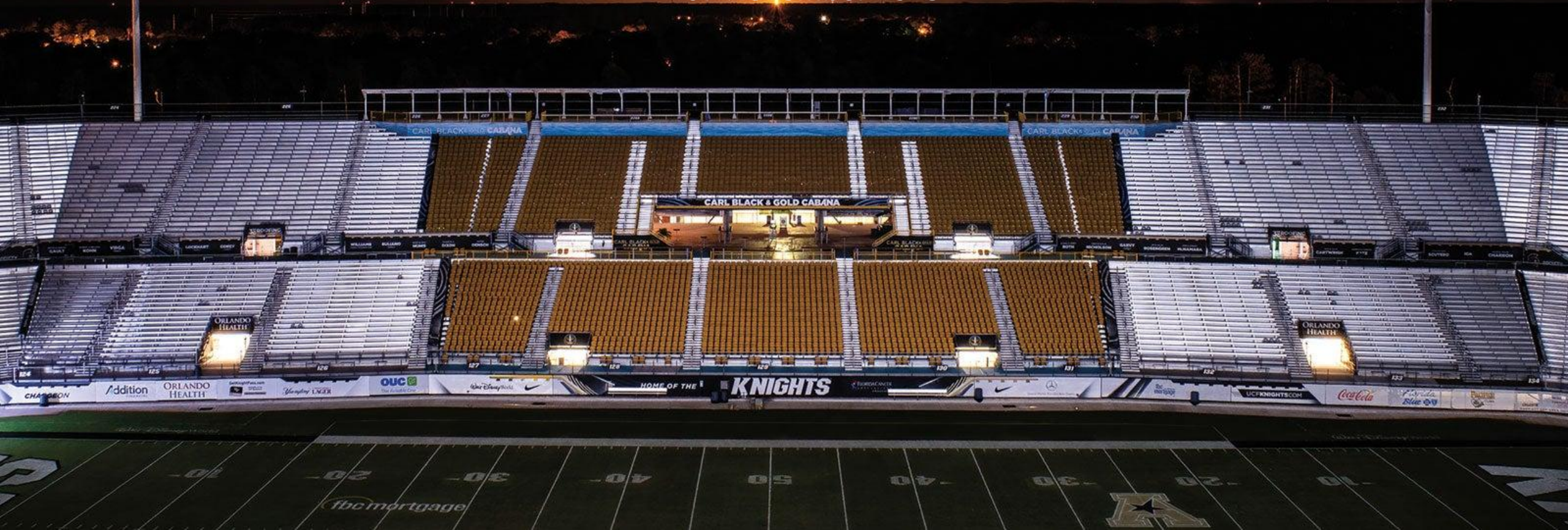
UCF Space Photonics

Prof. Stephen S. Eikenberry

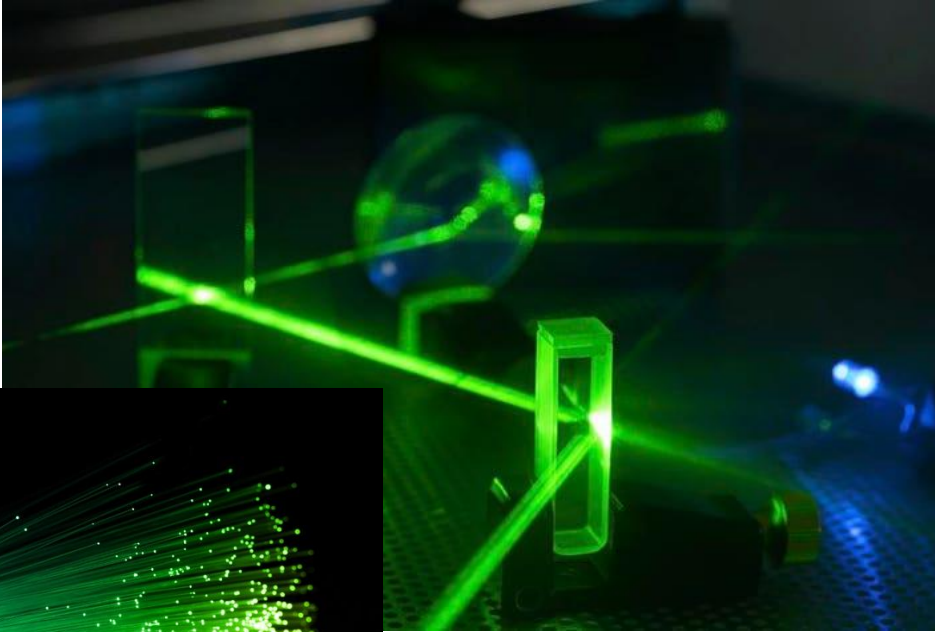
College of Optics & Photonics (CREOL)

University of Central Florida

07 November 2025



What is “Photonics”?



Classical Optics:

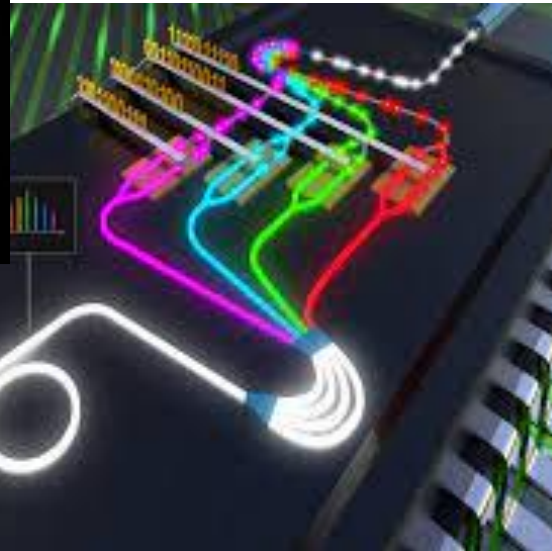
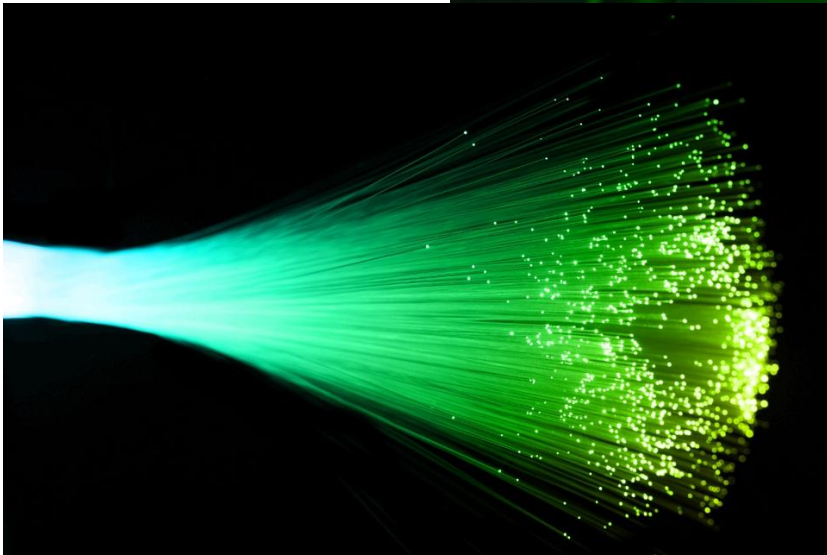
- Lenses
- Mirrors
- Gratings
- Etc.

Photonics:

- Lasers
- Fiber optics
- Quantum optics
- Etc.

Photonics applications:

- Directed energy
- Telecommunications
- Quantum Computing
- Imaging
- Spectroscopy
- LIDAR
- Super-resolution microscopy
- Etc.



UCF/CREOL in the photonics ecosystem:

“Big Three” optics programs:

- UCF/CREOL
- University of Rochester Institute for Optics
- University of Arizona Optical Science Center

US News & World Reports optical physics rankings:

1. Harvard University
2. California Institute of Technology
3. Stanford University
4. Massachusetts Institute of Technology
5. UC Berkeley
6. UCLA
7. UCF/CREOL



Space Photonics Team @CREOL

CREOL Participating Faculty:

Rodrigo Amezcua-Correa
Enrique Antonio-Lopez
Miguel Bandres
Robert Bernath
Peter Delfyett
Stephen Eikenberry
Sasan Fathpour
Darren Hudson
Guifang Li
Sean Pang
Kathleen Richardson
Martin Richardson
Axel Schulzgen
Eric Vanstryland

UCF Participating Faculty:

Scott Branting
Julie Brisset
Josh Colwell
Anish Damodoran
Paula Do Vale Pereira
Kerri Donaldson-Hanna
Addie Dove
Yan Fernandez
Joe Harrington
Richard Jerousek
Theodora Karalidis
JaeSung Lee

Postdocs & Grad Students:

Ameer Batarseh
Swati Bhargava
Rob Conwell
Tara Crowe
Caleb Dobias
Jenny Markees
Jordan Richey
Miguel Romer
David Smith
Intouch Srijumnong
Ema Vo

>20 Undergrads (!!)

www.astrophotonics.us



Space Photonics Research @ CREOL

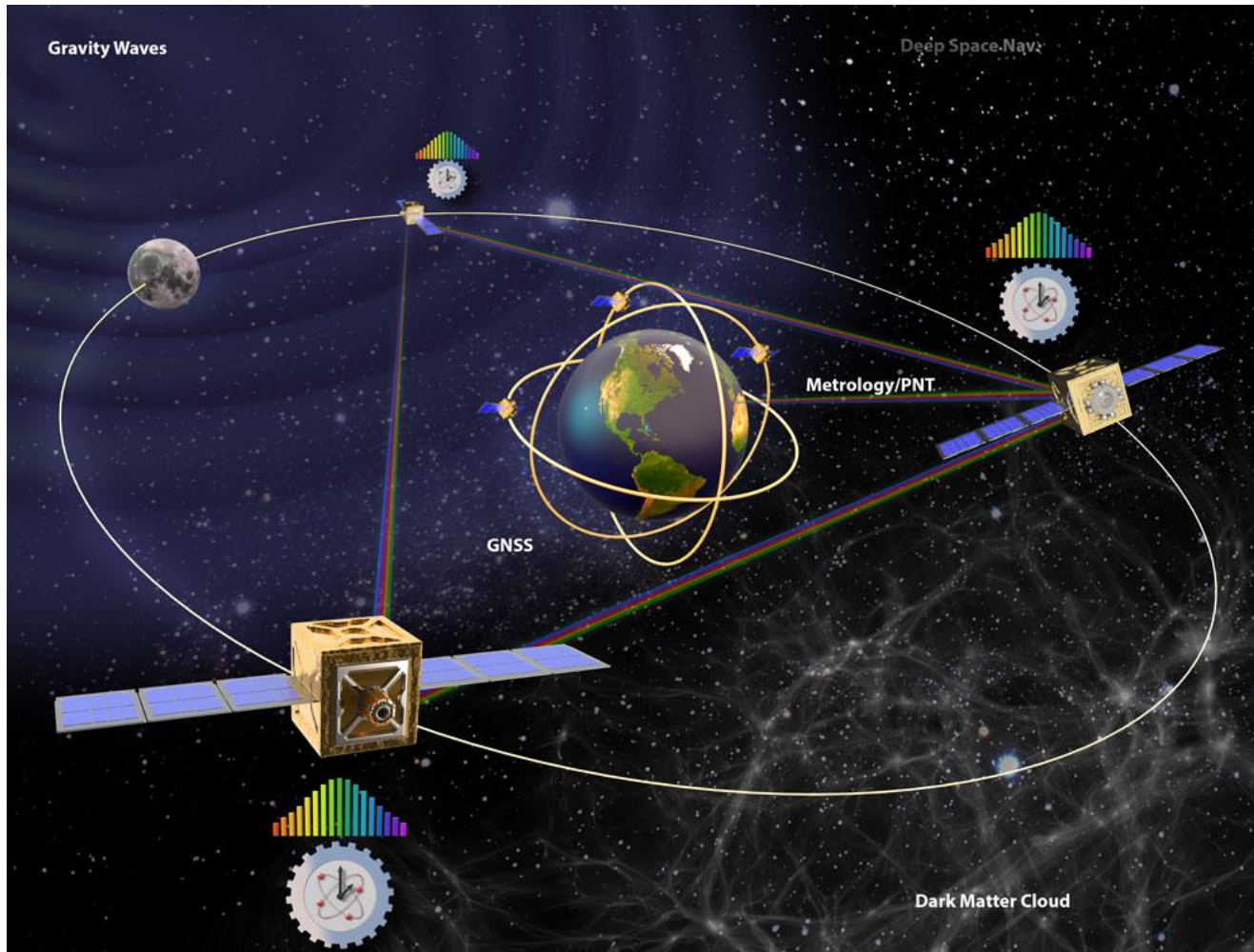


Directed Energy

CREOL Participating Faculty:

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Space Photonics Research @ CREOL

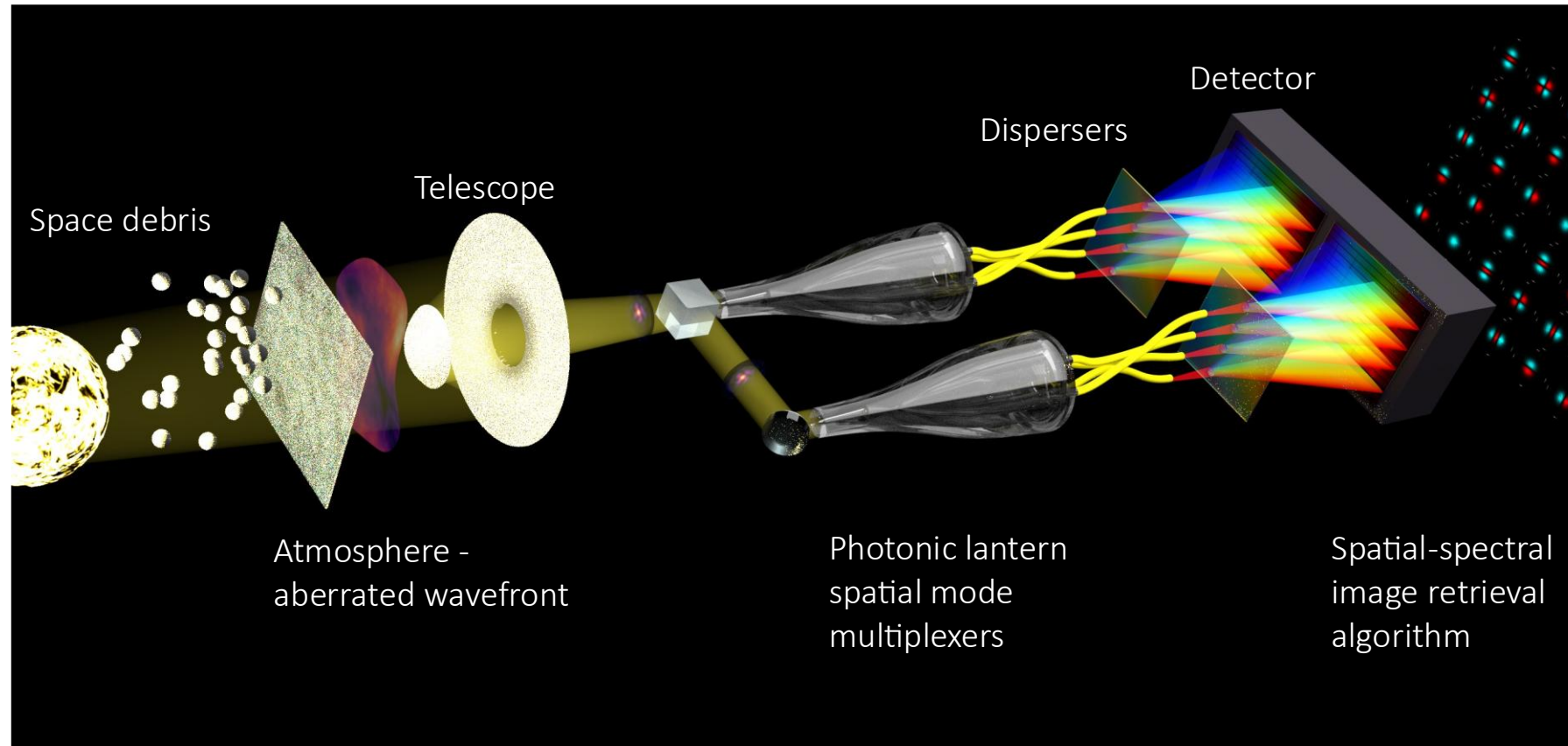


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Integrated Frequency Combs, Clocks for PNT & Comms

US Air Force Research Laboratory Grand Challenge: Quantum-Inspired Imaging

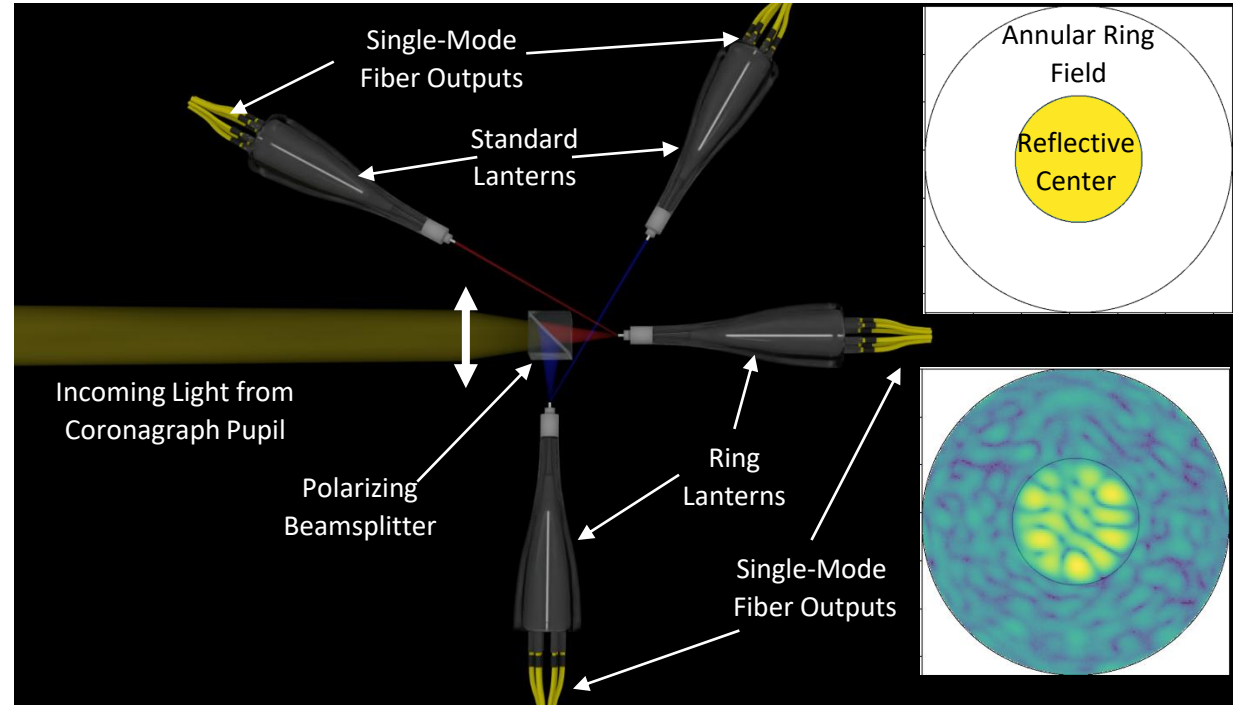
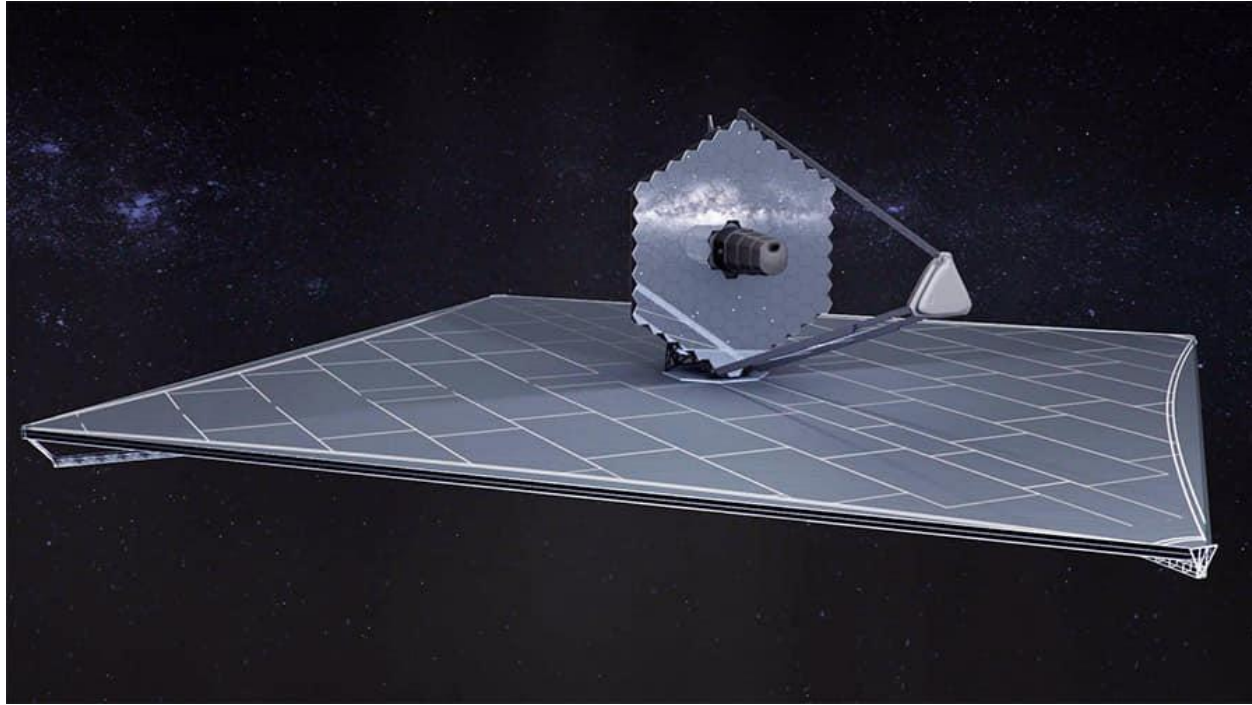


Three main innovations:

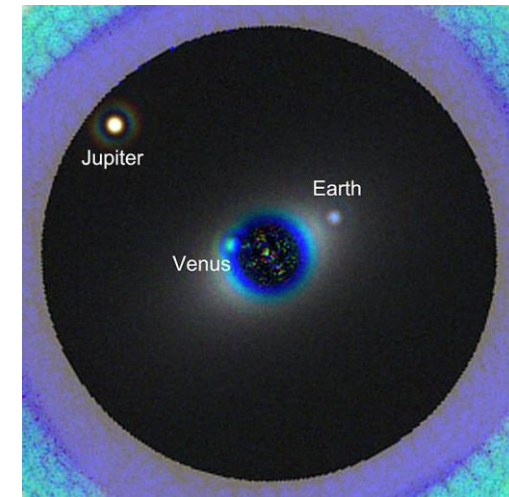
- photonic lantern mode sorters with spatial & spectral diversity
- atmospheric blur removal via mode/wavelength resolution
- machine learning QI image reconstruction techniques

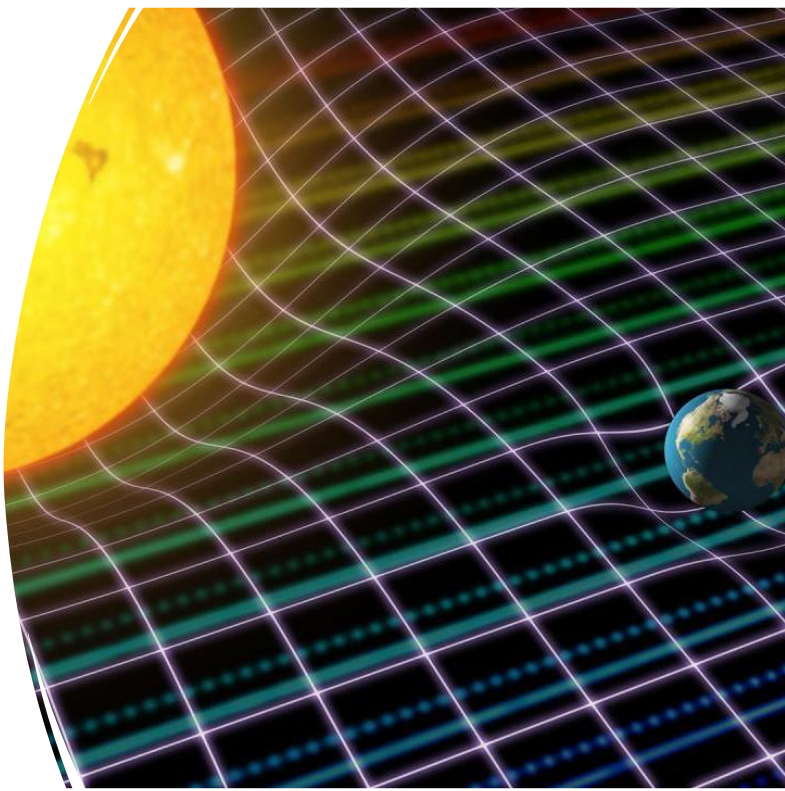
Super-resolution imaging below the classical diffraction limit

Astrophotonics @ UCF



Key Components for NASA's Habitable Worlds Observatory







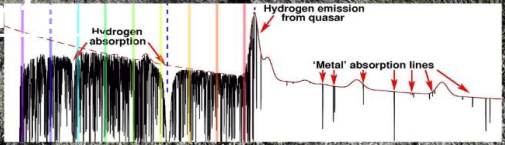
Redshift Drift Experiment

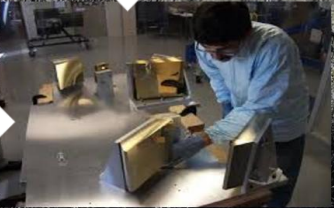
High-Z Quasar Frequency Comb



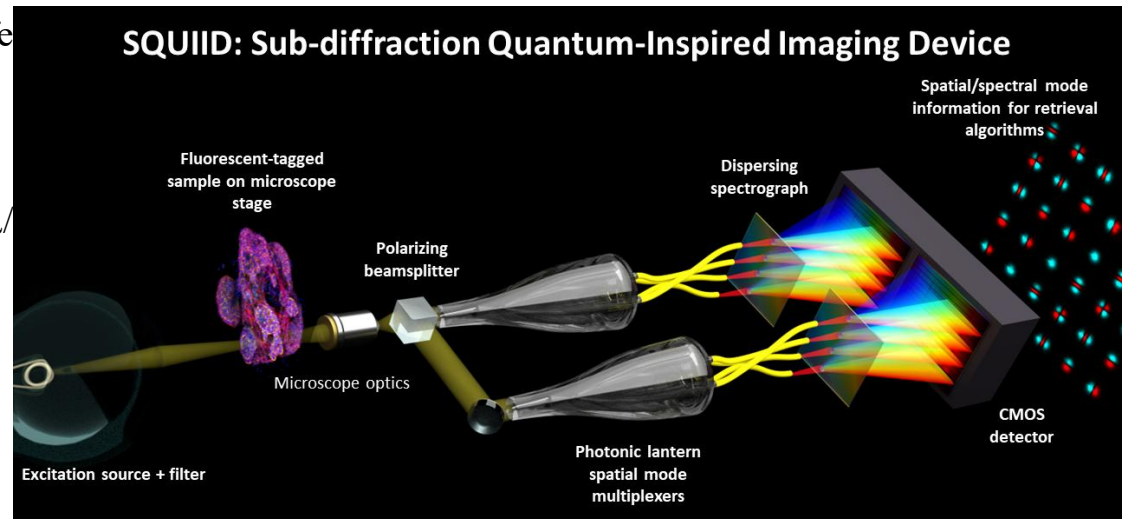
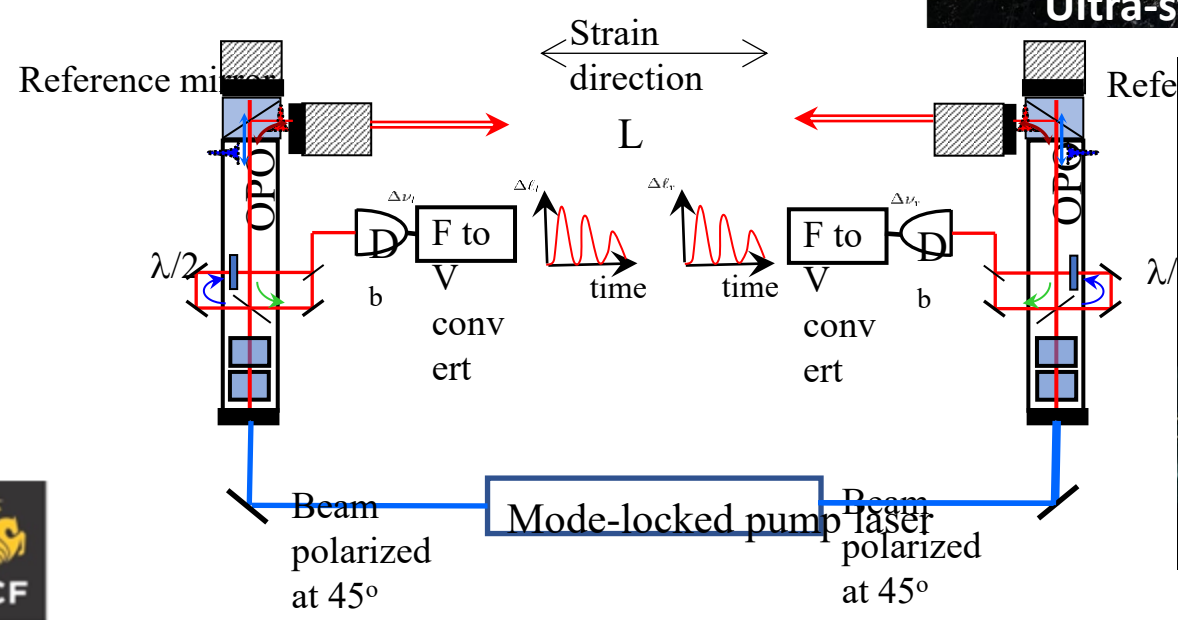


Photonic Lantern





Ultra-stable



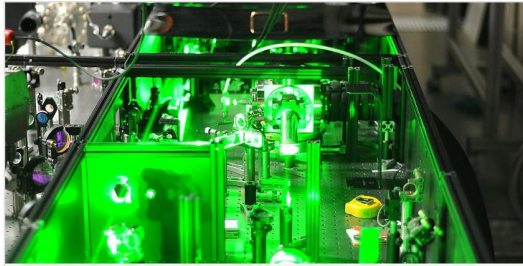
Space Photonics Investment from UCF

- **SPICE AEP Program (PI: Julie Brisset @FSI; co-PI; S. Eikenberry @CREOL)**
- **Dedicated Space Photonics Laboratory**
 - **Specialized fabrication and test equipment for space photonics payloads**
 - **Collaborative integrated optics facility with ficonTec Inc.**
 - **Dedicated environmental simulation/test facility (cryo, thermal, vacuum operation)**
 - **Industry partnerships underway**
- **Dedicated Space Photonics Undergraduate Laboratory**
 - **Hands-on teaching facility**
 - **Prepare next generation for commercial space development**
- **Space Photonics Professor and Lecturer hires underway**
- **More than externally-funded \$3.5M ROI in 2024-2025**

Space-Related Photonics Education at UCF

- Graduate programs

Programs



Graduate Certificate Programs

[LEARN MORE](#)



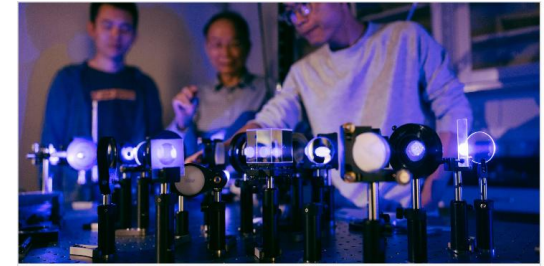
Online Master's Program

[LEARN MORE](#)



Master's Program

[LEARN MORE](#)



PhD Program

[LEARN MORE](#)

- Upcoming graduate certificate in Space Photonics
- Upcoming new B.S. program in Photonics Technology