

## Infrared Sources and Detectors for Deep-Space Science

Dr. Ryan M. Briggs, Jet Propulsion Laboratory

August 3, 2017 (Thursday), 5:30 pm  
Moore Laboratory of Engineering, Room B270  
California Institute of Technology, Pasadena, CA 91109



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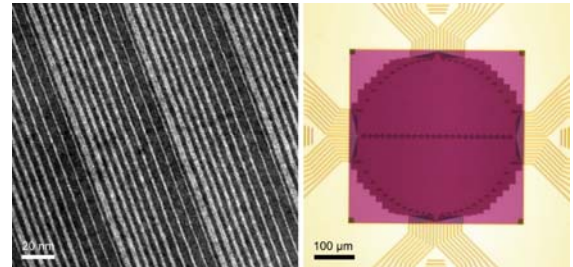
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### AGENDA

5:30 pm – Refreshments/Pizza  
6:00 pm – Announcements  
6:10 pm – Lecture, Dr. Ryan Briggs  
7:00 pm – Discussions  
7:30 pm – Adjournment

### The IEEE Photonics & GRSS chapters special lecture event

This presentation will describe recent progress in two technology areas relevant to space science: mid-infrared lasers for molecular spectroscopy and superconducting single-photon detectors for optical communication.



We have designed and fabricated distributed-feedback quantum cascade lasers for targeted detection of compounds in planetary atmospheres using *in situ* infrared laser absorption spectroscopy techniques. The lasers are designed for use in low-power instruments; therefore, emphasis is placed on minimizing laser operating current and reducing thermal dissipation to ~1 W. Device performance will be discussed for lasers emitting in the 4 to 10 μm wavelength range.

In order to increase communication bandwidth beyond the limits of existing radio-frequency links, NASA continues to support the development of optical communication transceivers for testing on the next generation of planetary science missions. To resolve signals transmitted from spacecraft several astronomical units away from Earth, we have developed superconducting nanowire single-photon detectors for a ground receiver at 1550 nm wavelength. The principle of operation and fabrication techniques for the detectors will be presented, and performance will be discussed for multi-pixel detector arrays developed for the first deep-space optical communication demonstrations.



**Ryan Briggs** received his Bachelor of Science in Engineering Physics from Colorado School of Mines and his PhD in Materials Science from the California Institute of Technology. He joined the Microdevices Laboratory at JPL in 2011. Dr. Briggs has expertise in design and fabrication of integrated photonic devices, antimonide-based interband lasers, quantum cascade lasers, and optoelectronic device packaging. He is currently Principal Investigator for “Low-Power Long-Wavelength Infrared Sources for Tunable Laser

Spectrometers on New Frontiers and Discovery Missions,” under the NASA Planetary Instrument Concepts for the Advancement of Solar System Observations Program.

**Directions and Parking:** Parking on the Caltech campus is accessible from Michigan Avenue, south of Del Mar Avenue. Parking is free after 5 pm. Moore Lab location: <http://www.caltech.edu/map/the-gordon-and-betty-moore-laboratory-of-engineering>

**Reservation:** Please RSVP with your IEEE membership # to [dzt\\_ieee@outlook.com](mailto:dzt_ieee@outlook.com). You are welcome to bring your spouse as a guest. Non-members can go to [www.ieee.org/join](http://www.ieee.org/join), then send your membership number.