

**BOSTON
UNIVERSITY**

**Boston University College of Arts & Sciences
Center for Space Physics**

2018 - 2019 SPACE PHYSICS SEMINAR SERIES

40 Years of Instrument Development at the Imaging Science Lab at Boston University

A new instrument, the Rapid Imaging Planetary Spectrograph (RIPS), had its “First Light” on the Perkins telescope in March, 2018. This instrument is the latest in a line of spectrographs designed and built here at Boston University to study the Earth’s airglow and planetary exospheres. The design parameters of RIPS (e.g., grating size and type of optical surfaces used) can be traced back over 40 years of activity in the Imaging Science Lab.

A program of instrument development to support various NASA and AFRL programs was begun in 1980. These activities included the building of wide angle (60 deg – 180 deg FOV) cameras to study structures in the Earth’s nightglow and aurora as well as optical emissions from chemical releases in the ionosphere. These cameras used narrow-band (~0.6nm – 1.4nm) interference filters, intensified CCD detectors (developed here at Boston University), and the digitizer/computer systems necessary to take and store the data. These systems were built using mainly commercial off-the shelf (COTS) components.

The optical design of these early imagers was easily adapted to making a nightglow spectrograph, and a plywood prototype was built. This instrument was used in 1989 to discover the extended sodium nebula of Jupiter. Spectrographs of similar design (this time using aluminum instead of plywood!) were built and fielded as the CEDAR Optical Tomographic Imaging Facility (COTIF).

The next generation of spectrographs would use echelle gratings. The prototype instrument used a mosaic of interference filters to select spectral lines of interest. The ~50mm long slit of these instruments led to the development of an “image-slicer” version using a fiber optic bundle of 400 fibers.

RIPS is the latest of these echelle spectrographs to be built. The details of its design as well as “First Light” data taken at Perkins and AEOS on Maui will be shown.



Thursday, February 28th

4:00 - 5:00 p.m.

725 Commonwealth Avenue | Room 502



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