

SOCIETY OF PHYSICS STUDENTS (SPS) SEMINAR

Optics and imaging applications for microgravity flow studies aboard the International Space Station

Jeffrey R. Mackey, PhD, CSP
Vantage Partners, LLC
c/o NASA Glenn Research Center

Many experimental space-based studies require visual data collection from high frame rate cameras and/or imaging systems. Long-duration space based studies present many challenges due to radiation exposure as well as the experimental volume, mass, and power constraints. Such constraints affect the illumination envelope as well as the spatial and temporal resolutions required to capture and store image data of sufficient quality to accomplish the underlying scientific goals. A PCIe/104 camera-link imaging system capable of operating two high-speed cameras simultaneously has been assembled and functionally tested at NASA Glenn Research Center and radiation susceptibility tested at the Indiana University Cyclotron facility. The high-speed imaging system is for the Flow Boiling and Condensation Experiment (FBCE) to be conducted aboard the International Space Station (ISS) Fluids Integration Rack (FIR) in 2017. This imaging system shall be employed to acquire and store images of flow boiling processes at over 2,000 frames per second and condensation processes at over 4,000 frames per second. Higher frame rates are possible with reduced vertical pixel readout. Our research examines the performance, capabilities, and cosmic radiation susceptibility of a compact, moderately high frame rate digital imaging system suitable for a wide variety of research studies aboard the ISS.



WHERE: SR - 151

WHEN: Noon- 1pm

**Thursday, October
16th, 2014**