

Photonics Forum

“The Ionosphere as Earth System Sensor”

Professor Josh Semeter, Boston University

March 26, 2014

*11:45 a.m. — 1:15
p.m.*

9th Floor

Colloquium Room

Photonics Center

*8 Saint Mary's
Street*

*Lunch will be
served!*

We live in a plasma bubble. The Earth and its life-supporting atmosphere are shrouded by a layer of free electrons and ions maintained by the absorption of ionizing radiation (solar X-ray and UV, energetic particle precipitation, cosmic rays). The existence of the ionosphere is evidence of a shielding mechanism that has allowed life to evolve on our planet. In addition to this most fundamental role, the ionosphere is worthy of study for several other reasons. It presents a “plasma laboratory without walls,” allowing us to explore the most prevalent state of matter in the universe without the complications of artificial boundaries. It is electrically conducting, and so affects our ability to transmit and receive information from space. It is a mediating element in the transfer of solar wind energy to the neutral atmospheric gas. And, finally, by virtue of its low density and electromagnetic properties, the ionosphere provides a sensitive diagnostic of events happening below. This was exemplified by a tomographic analysis of GPS signals recorded during the Tohoku-Oki earthquake, which revealed coherent ionospheric waves emanating from the epicenter. This talk will provide an overview of activities in my lab aimed at advancing our understanding of these roles, with an emphasis on emerging opportunities in distributed sensing, crowd-sourced science, and small satellites.

Dr. Joshua Semeter is Professor of ECE at Boston University, specializing in radar and optical sensing of the near-space environment. After receiving his Ph.D from BU in 1997, he worked as a postdoctoral fellow at the Max Planck Institute for Extraterrestrial Physics until 1999, and then as a Senior Research Engineer at SRI International until 2004 when he joined the faculty of Boston University. From 2009-2011 he served as Director of the BU Center for Space Physics. He has served on a variety of advisory committees to the NSF, NASA, and National Academies, most recently as panel member for the National Research Council’s Decadal Strategy on Solar and Space Physics.

