

# Astrophysics Seminar

## Monday, October 27, 2014

### Short-Duration Gamma-Ray Bursts and the Electromagnetic Counterparts of Gravitational Wave Sources

**Edo Berger**

*Harvard University*

*Harvard-Smithsonian Center for Astrophysics*

### Abstract:

Gamma-ray bursts are the most luminous and energetic explosions known in the universe. They appear in two varieties: long- and short-duration. The long GRB result from the core-collapse of massive stars, but until recently the origin of the short GRBs was shrouded in mystery. In this talk I will present several lines of evidence that point to the merger of compact objects binaries (NS-NS and/or NS-BH) as the progenitor systems of short GRBs. Within this framework, the observational data allow us to determine the merger rate of these systems as input to Advanced LIGO, to infer the electromagnetic properties of gravitational wave sources, and to study r-process nucleosynthesis.

### Next Week

- *Charlie Lada*  
*Center for Astrophysics*
- Schmidt's Conjecture and  
Star Formation  
in GMCs and Galaxies



# Space Physics Seminar

## Thursday, October 30, 2014

### HOPE measurements on Van Allen probes

**Elizabeth MacDonald**

*NASA's Goddard Space Flight Center*

**3:00 pm**

Refreshments  
CAS Room 500

**3:30 pm**

Seminar  
CAS Room 502

#### Next Week

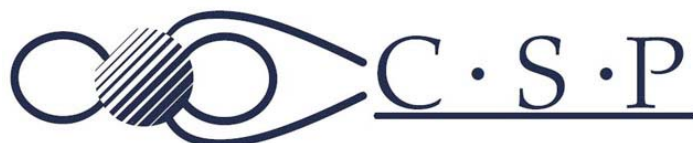
- Bruce Campbell  
*Smithsonian*
- SHARAD Studies of Mars:  
From the Base of the Ice  
Caps to the Ionosphere



[http://www.bu.edu/csp/  
edoutreach/seminar/](http://www.bu.edu/csp/edoutreach/seminar/)

#### Abstract:

This talk will have four major segments focusing on the HOPE instrument design, the use of HOPE for studying the radiation belts, the use of multipoint Van Allen Probes observations, and introducing the Aurorasaurus citizen science platform. The goal will be to provide a broad overview of both recent science and the instrument design of the Helium, Oxygen, Proton, and Electron (HOPE) Spectrometers on the Van Allen Probes. Each HOPE instrument consists of a top-hat electrostatic analyzer followed by a time of flight mass spectrometer with CEM detectors. The thermal plasma measured by the HOPE instruments contributes significantly to wave-particle interactions with high-energy radiation belt particles. I will discuss recent HOPE work in this area, e.g. enhanced whistler mode waves produced by anisotropic hot plasma-sheet electrons outside the storm-time plasmopause have been suggested as one mechanism for accelerating relativistic outer-belt electrons in the aftermath of geomagnetic storms. I will also discuss a fortuitous set of multipoint storm-time observations which can help constrain and assess magnetic field models by examining the topological location of the field lobes relative to the dual spacecraft. The Van Allen Probes encountered unusual low-latitude flank-side open field lines during the Nov. 14 2012 geomagnetic storm. Both spacecraft entered the lobes five times over several hours in the main phase of the storm. I will present the HOPE low energy plasma observations during these encounters. The electron and ion fluxes were significantly diminished during the lobe crossings coincident with a stronger, more highly stretched magnetic field. Significant accelerated field aligned oxygen signatures were measured on both closed and apparently open field lines, along with strong Alfvénic waves. Lastly, as a separate topic I will introduce the unique interdisciplinary project called Aurorasaurus which is a new technology platform to capitalize on the first solar maximum with social media. I will discuss how the data that include tweets and citizen science reports can be used to improve now-casting of the auroral oval for the public and space scientists.



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