



## SPACE PHYSICS SEMINAR

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### The present BUSAT projects: BUSAT2 and ANDESITE

**Thursday, October 17, 2013**

**725 Commonwealth Ave.**

**Refreshments at 3:30pm in CAS 500**

**Talk begins at 4:00pm in CAS 502**

#### Abstract:

The USAF AFRL University Nanosat Program has a two year cycle in which approximately 10 university teams compete in the design and fabrication of small satellites. The CSP has participated in UNP Cycles #5 (2007-2009) and #7 (2011 to 2013) with the design and fabrication of the BUSAT satellite. The scientific mission of the present BUSAT2 is to perform measurements of the precipitating energetic electron fluxes from low Earth orbit over the high latitude auroral zones and to simultaneously image the auroral emissions caused by these electrons. The satellite is built around the concept of pre-defined interfaces which will permit easy integration and therefore fast access to space for spaceflight payloads. Each payload will utilize a cubical structure having a dimension of 10 cm on a side (= a unit or U). BUSAT2 is composed of the equivalent of 27 cubes which are held in compression in a 3x3x3 array. At the Final Qualification Review (FCR) held in Albuquerque in January, the USAF expressed strong interest in the BUSAT2 mission and authorized a second cycle of funding over a two year period. The BUSAT2 team continues to function with Mr. Calvin Patmont taking over the role of Project Manager from Mr. Nate Darling.

The UNP Cycle #8 kick-off was also in January at the FCR for cycle #7. BU CSP submitted a completely different payload concept for Cycle #8 and this satellite concept was selected to compete in this next cycle. This project is known as ANDESITE (or BUSAT3). It is a broad, high-impact constellation project which aims to develop an easy-to-use, rapidly-deployable architecture for dense, low-cost wireless sensor networks in space and planetary science applications. Over the next two years the objectives of the project are threefold: 1) Demonstrate viability of satellite based sensor networks by deploying a 12-node miniature sensor network to study the filamentation of the field aligned currents in the auroral zones of the Earth's magnetosphere. 2) Test the scalability of proposed protocols, including localization techniques, tracking, data aggregation, and routing, for a 3 dimensional wireless sensor network using a "flock" of buoyant motes in storm systems. 3) Construct a 1 U Cube-Sat running the Android OS as an integrated constellation manager and data mule. With the ability to integrate tens to several hundreds of nodes, ANDESITE networks will provide unprecedented resolution for many sensing applications at lower cost per unit mass, and will drastically redefine the concept-to-deployment timescale. The Project Manager is Mr. Steven Yee and the Project Engineer is Mr. Josh Mendez, a student at Georgia Tech.