

# LWS FST

## Pathways of Cold Plasma Through the Magnetosphere

Team Leader: Mei-Ching Fok

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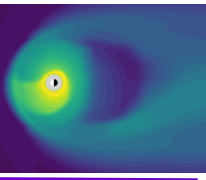
LWS Cold Plasma Team Meeting

MIT Haystack Observatory, Westford, MA 01886

October 30 - 31, 2023



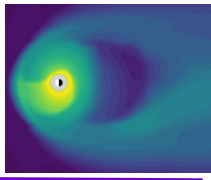
# Schedule: Monday AM



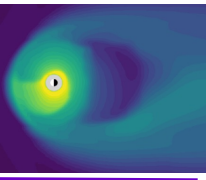
0900-0930am	Introduction and Logistics	Mei-Ching Fok/ Phil Erickson
0930-1015am	Contribution of EMIC waves in the formation of warm plasma cloak and/or ion conics in the Earth's inner magnetosphere: Analysis of the 18 November, 2015 event	Konstantin Gamayunov
1015-1045am	Coffee Break	
1045-1130am	Enhanced H <sup>+</sup> outflow in the lobe due to a jump in the solar wind dynamic pressure: a Cluster event and ANGIE3D simulation	Chih-Ping Wang
1130-1200am	Plasmasphere Erosion and Refilling During the 7-8 September 2017 Magnetic Storm	Joe Huba/Mei-Ching Fok
<b>1200-0130pm</b>	<b>Lunch</b>	



# Schedule: Monday PM



0130-0215pm	Investigation of Recirculation and Energization of the Plasmasphere Fluid with Global Simulation and Data Analysis	Suk-Bin Kang/Cristian Ferradas
0215-0300pm	Progress in understanding the September 2017 storm using machine learning models and physics-based simulations	Xiangning Chu
0300-0330pm	Coffee Break	
0330-0415pm	Warm plasma cloak in the dayside plasma sheet during the 2017 September storm: THEMIS and ANGIE3D simulation	Chih-Ping Wang
0415-0500pm	Midlatitude topside ionospheric variations associated with plasmaspheric erosion and refilling	Phil Erickson
<b>0630pm</b>	<b>Team Dinner at Forge and Vine</b> 128R Main St, Groton, MA 01450	

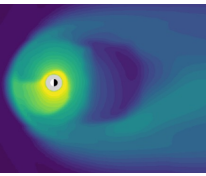


# Schedule: Tuesday

0900-1015am	Plan for Model-Data Comparisons on September 2017 storm and other events	Phil Erickson/Mei-Ching Fok
1015-1045am	Coffee Break	
1045-1200pm	Discussion of new team efforts, team website and next meeting	All
<b>1200-0100pm</b>	<b>Lunch</b>	
0100-0230pm	Haystack Observatory Tour	Phil Erickson
0300-0330pm	Coffee Break	
<b>0330pm</b>	<b>Meeting Adjourned</b>	



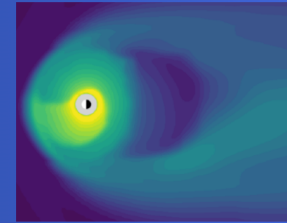
# Team Website



<https://lwstrt.gsfc.nasa.gov/focusedsciencetopics/NNH21ZDA001N/ColdPlasma/>



## LWS Focused Science Topic: Pathways of Cold Plasma through the Magnetosphere



[Overview](#) [Team](#) [Team Meetings](#)

### Overview

#### Target Description

Low-energy ( $< 1$  keV) ions and electrons play significant roles in the magnetospheric system. While this plasma often dominates the number density and mass density of the magnetosphere, it is amongst the least characterized and understood plasma populations, particularly in the very cold  $< 20$  eV energy range, which has always been challenging to measure. Our knowledge of the composition and distribution function characteristics of this cold population is still limited, yet it is this population that plays a crucial controlling role in many magnetospheric processes - from the generation, amplification, damping and propagation of plasma waves that reside in the magnetosphere; to the wave-particle interaction processes that couple between other plasma populations: the ring current, the electron radiation belt, substorm-injected electrons, plasma-sheet ions, and plasma-sheet electrons. Mass-loading effects of this population can also alter dayside reconnection and thus influence solar-wind/magnetosphere coupling.

This FST targets two important plasma populations: the cold plasmasphere and its drainage plume; and the plasma cloak. Our knowledge of the refilling rates for the plasmasphere is still insufficient, while there are basic questions on the plasma cloak's source - where, when, and how much?

Both these populations may play an important role in the recirculation of the plasma into the magnetotail. There are outstanding questions on the recirculation pathways, and the resulting composition, spatial extent and density of these populations along the magnetopause boundary.

Further details on the composition and distribution function of the low-energy and very cold plasma would also allow new investigations on the role these populations play on other magnetospheric processes, including heating, loss and transport of this population itself.

This FST addresses the Decadal Survey Key Science Goal 2 (Determine the dynamics and coupling of Earth's magnetosphere, ionosphere, and atmosphere and their response to solar and terrestrial inputs). This FST further addresses two Key Questions for Future Study in the 2013 Decadal Survey Consensus Report: "How are plasmas produced, lost, and energized in the magnetosphere?" and "How does the ionosphere-thermosphere system regulate the flow of solar energy throughout geospace?" and several LWS Strategic Science Areas including SSA-IV (Variability of the Geomagnetic Environment) and SSA-V (Dynamics of the Global Ionosphere and Plasmasphere).