

Space Physics Seminar

Thursday, November 5, 2015

Radio Remote Sensing Plasma with High Frequency Radio Waves

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Abstract:

The rarified gas in the Earth's upper atmosphere, in the interplanetary medium, and the interstellar medium is ionized. For radio waves, the refractive index of such a medium is given by the Appleton-Hartree equation. At typical plasma compositions, the refractive index differs from that of vacuum significantly in the so called high frequency (HF) frequency range, which is approximately between 0 and 30 MHz. To first order, this refractive index depends on the electron density, magnetic field, radio frequency, polarization, and electron collision rate. Because the refractive index at HF frequencies is significantly different from that of vacuum, radio propagation can be used to study the plasma composition, using well known propagation effects, such as Faraday-rotation, absorption, ray-bending, and total reflection. The talk will discuss a novel low power spread spectrum HF radar for ionospheric remote sensing developed at the MIT Haystack Observatory. The talk will also discuss the Cubesat HF Interferometric Array (CHIA) proposal that aims to perform very long baseline interferometry in space to study the heliosphere and the cosmos at this relatively unexplored frequency regime, which isn't otherwise observable from the ground.

3:30 pm

Refreshments
CAS Room 500

4:00 pm

Seminar
CAS Room 502

Next Week

- Tamas Gombosi
University of Michigan
- From Halley to
Churyumov-
Gerasimenko:
My Adventures in
Comet Research



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