Space Physics Seminar

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Auroral electron acceleration by Alfven waves

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The auroral zone is one of the most intriguing regions in the Earth's magnetosphere. A variety of plasma physics processes occur on auroral field lines, from large-scale MHD phenomena to the microphysics of plasma instabilities, solitary waves, and radio emissions. Field-aligned potential drops associated with the field-aligned currents cause the field-aligned acceleration of electrons related to the formation of the aurora.

The electron acceleration of discrete aurora can be attributed to quasi-static electric field and parallel electric field carried by Alfven waves. About one third of electron energy deposited in the ionosphere is due to Alfvenic acceleration. When the perpendicular wavelengths become comparable to either ion acoustic gyroradius or electron inertial length, Alfven waves carry a parallel electric field that can directly accelerate electrons leading to aurora.

A drift kinetic model is developed to simulate electron acceleration by inertial Alfven waves. The model results show that in the topside ionosphere, the sharp gradient of plasma density of electrons from ionosphere and the temperature difference between cold electrons of ionospheric origin and hot electrons from magnetosphere would modulate the electron acceleration by Alfven waves.

C·S·P

4:00pm in CAS 502. *Refreshments served at 3:45pm in CAS 500.*

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Next Week

Ying Zou

Boston University/UCLA