MI SE Coupling in Diffuse Aurora

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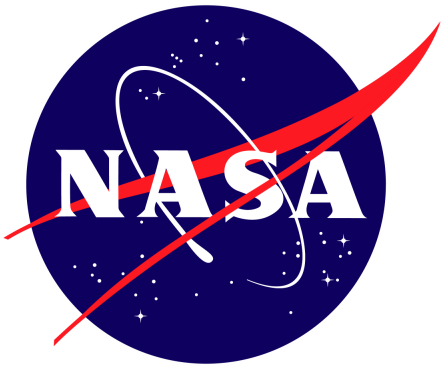
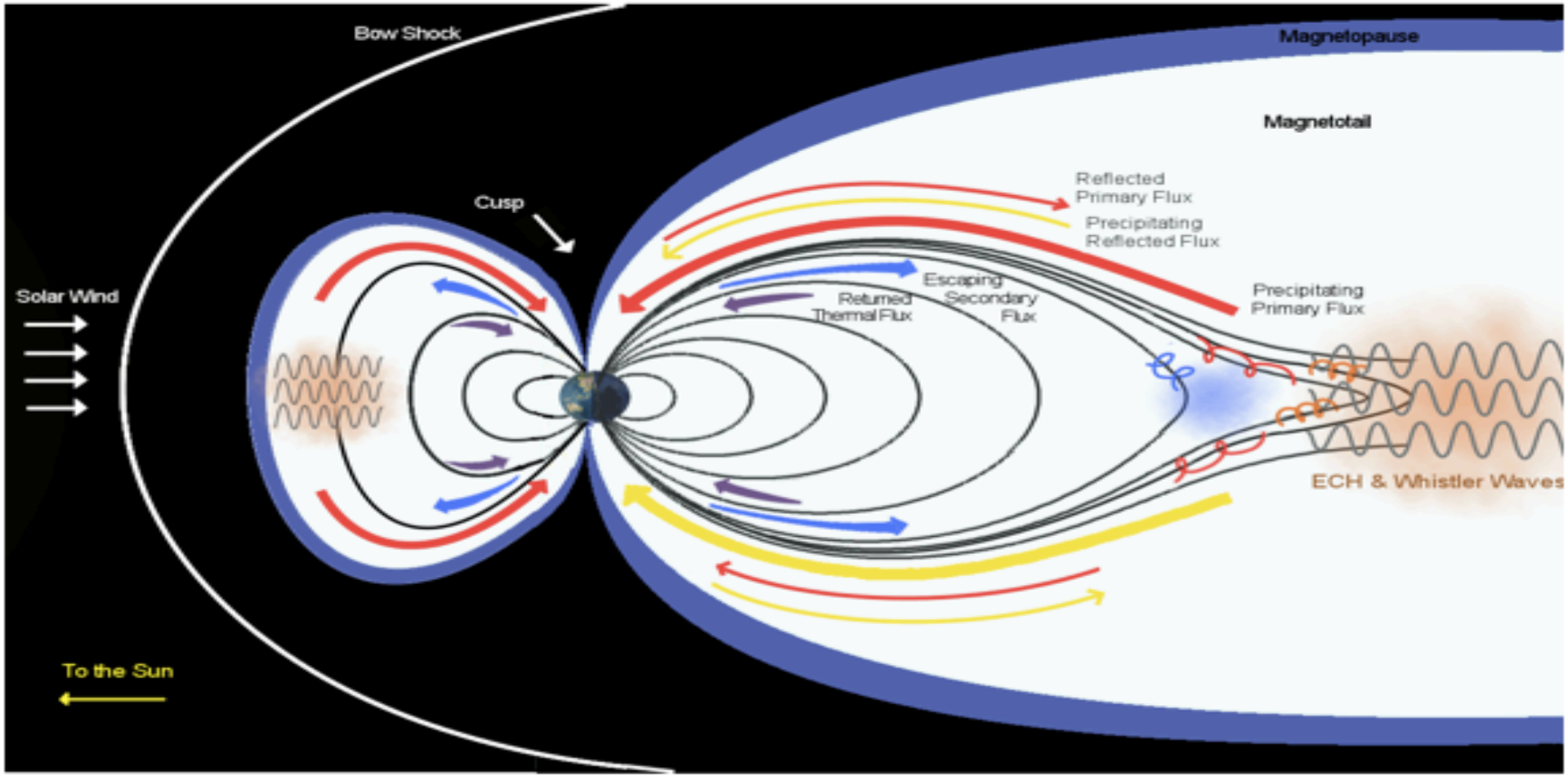
Tomorrow, June 23, talk by Khazanov at Joint CEDAR-GEM Superthermal Particle Session



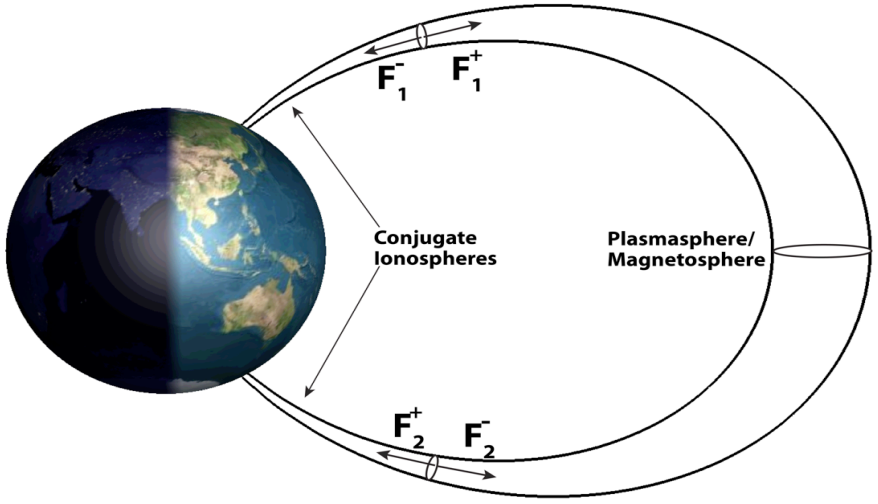
Magnetosphere-Ionosphere SE Coupling in the Diffuse Aurora



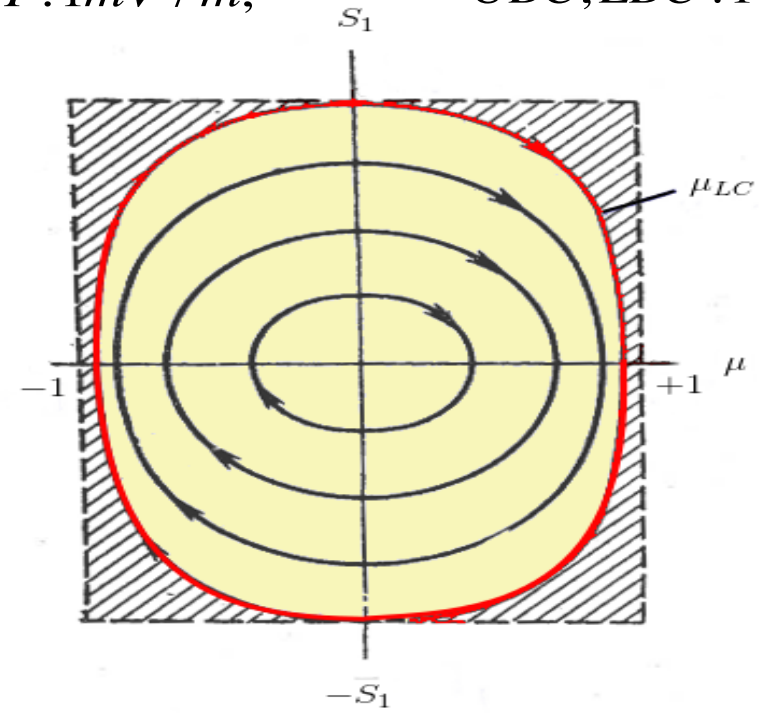
New elements: Initiation precipitation from plasma sheet via WPIP in 2 MC regions, and self-consistent MI coupling.

Magnetosphere-Ionosphere SE Coupling: STET Code

Khazanov et al. [2014-16]



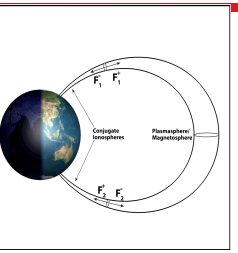
$ECH: 1mV/m, \qquad UBC, LBC: 10pT,$

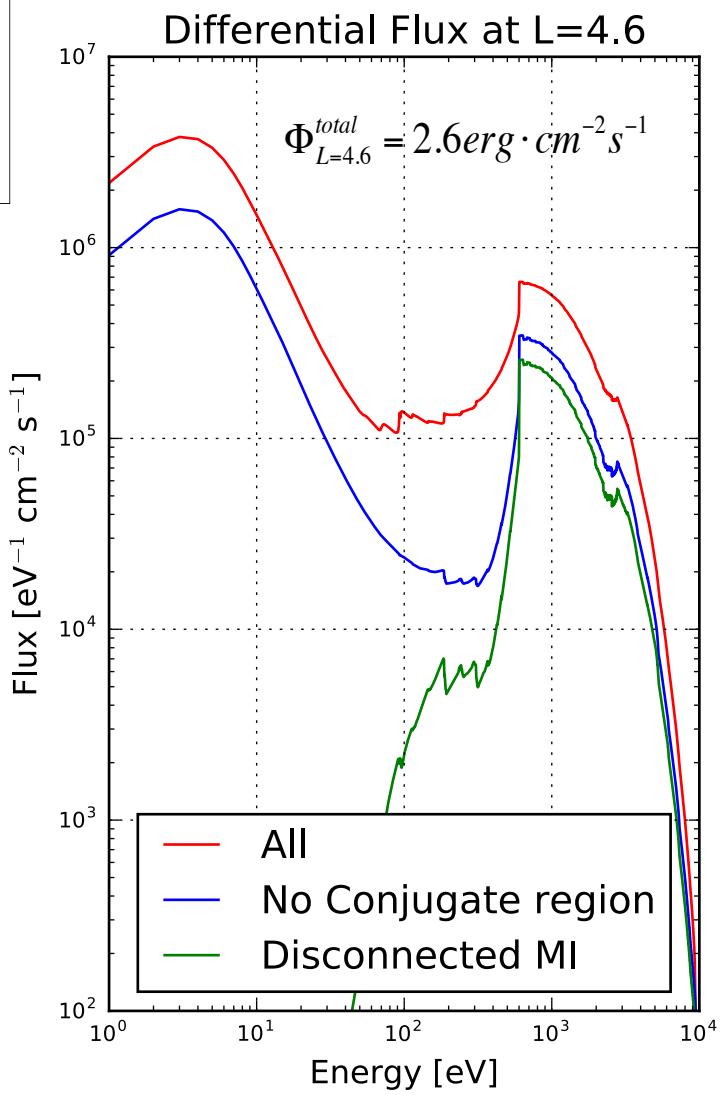


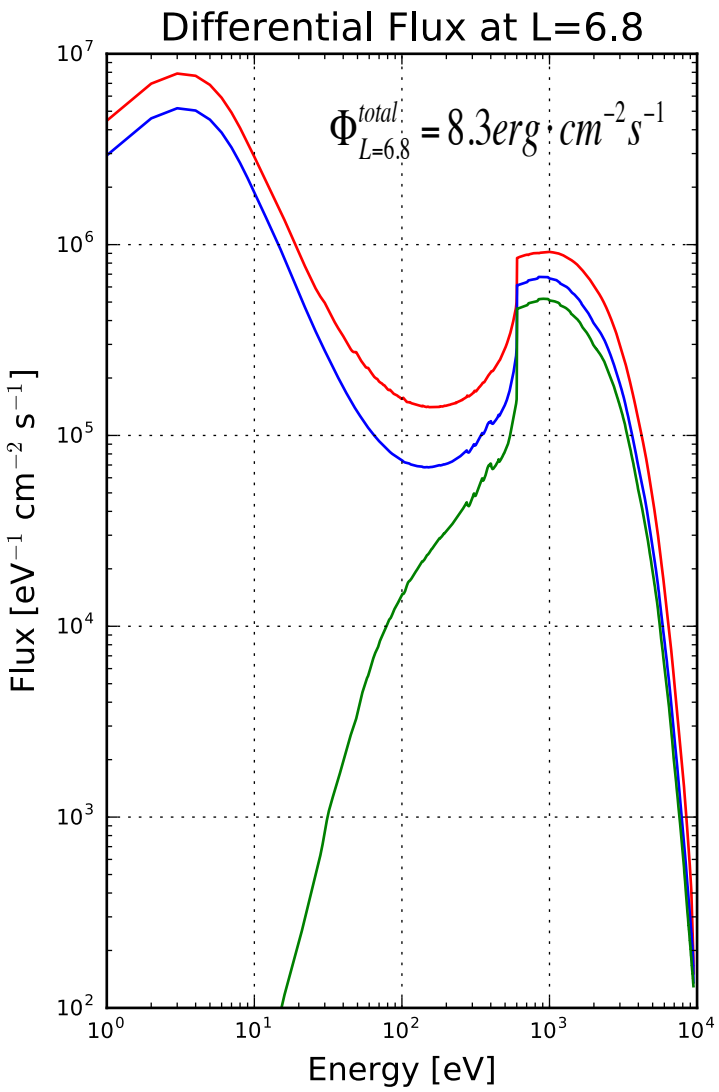
$$\frac{\beta}{\sqrt{E}}\frac{\partial\phi}{\partial t}+\mu\frac{\partial\phi}{\partial s}-\frac{1-\mu^2}{2}\left(\frac{1}{B}\frac{\partial B}{\partial s}-\frac{F}{E}\right)\frac{\partial\phi}{\partial\mu}+EF\mu\frac{\partial}{\partial E}\left(\frac{\phi}{E}\right)=Q+\bar{S}$$

$$S_{ee}=An_e\left\{\frac{\partial}{\partial E}\left[\left(\frac{\phi}{E}\right)+T_e\frac{\partial}{\partial E}\left(\frac{\phi}{E}\right)\right]+\frac{1}{2E^2}\frac{\partial}{\partial\mu}\left[\left(1-\mu^2\right)\frac{\partial\phi}{\partial\mu}\right]\right\};\ S_{ew}=\frac{\partial}{\partial\mu}\left[\left(1-\mu^2\right)\frac{D_{\mu\mu}}{\mathrm{v}}\frac{\partial\phi}{\partial\mu}\right]$$

Downward Fluxes







$ECH: 1 mV/m, \quad \pm 3^o$

$\Phi^{total}_{SD} = 10 erg \cdot cm^{-2} s^{-1}$

$UBC, LBC: 10\,pT, \ \pm 10^o, \pm 15^o$

SUMMARY

A self–consistent approach to SE transport along closed field lines in the inner magnetosphere is used to examine the ionosphere-magnetosphere energy interchange in the region of diffuse aurora.

By ignoring the energy interchange, the current global models can severely underestimate ionospheric conductance, miscalculate ionospheric electric fields and magnetospheric convection, and thus misguide our understanding of MI coupling.

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