

Anisotropies of electrons and protons in the cold plasma sheet on the duskside: Geotail observations

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In order to obtain clues towards the understanding of the cold plasma sheet formation under northward IMF, we study the temperature anisotropies of electrons and protons in the cold plasma sheet on the duskside, focusing on intervals when two-component protons are apparent. Protons in the plasma sheet on the duskside under northward IMF occasionally consist of cold and hot components, and these two proton components are thought to have separate origins: the hot component is of magnetospheric origin, and the cold component is of direct solar wind origin. Our recent study of the Geotail data is revealing that both electrons and protons have parallel anisotropy in the dusk tail-flank plasma sheet with the two-component protons under northward IMF, and that the parallel anisotropy of the electrons is stronger than that of the cold proton component. By inspections of electron phase space density in detail, we find that some fraction of the parallel anisotropy of electrons is attributed to the bi-directional (field-aligned) electron beams whose energy is as low as 60-100 eV. We discuss possible mechanism that can lead to the observed temperature anisotropies as well as low-energy bi-directional electron beams under northward IMF.