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Backscattered electrons from the plasma sheet diffuse aurora

A. Åsnes (1), M. G. Taylor (1), and C. Simon (2)

(1) European Space Agency, D-SRE, Noordwijk, Netherlands (mtaylor@rssd.esa.int), (2) BIRA/IASB, Bruxelles, Belgium

The PEACE instrument on Cluster observers a secondary population of bidirectional low energy (Ĩ00 eV) electrons 80% of the time within the magnetotail plasma. These field-aligned electrons coexist with the hot plasma sheet electron population. The low energy field aligned (LEFA) electron population is most likely backscattered (secondary) electrons from the precipitation of the main plasma sheet population [Evans, 1979], based on a correlation in temperature between the two populations, and indications that the source of LEFA is at low altitude. Subsequent diffusion in pitch angle is required to spread the cold electrons out of the loss cone to form a trapped population in the plasma sheet. The LEFA electron population may be useful as a tracer of the diffuse aurora, in a region where the precipitation loss cone cannot be distinguished with current instrumentation. In fact, the prevalence of LEFA electrons in the plasma seems to imply a continuous precipitation of the main electron population from the plasma sheet.