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Cluster observations of beam – plasma instabilities above the polar cap by northward IMF

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During periods of northward IMF, at 5 to 8 Re altitude above the polar cap, Cluster spacecraft detect narrow and intense electron beams outflowing from the polar ionosphere, very collimated along magnetic field lines. From a careful analysis of PEACE data, we can separate the beam distribution function from the ambient plasma contribution and estimate their characteristics. We show that these beams are accelerated to a few tens of eV and also heated. Moreover, these beams are extremely well correlated to broadband electrostatic emissions. We investigate the plasma-beam interactions and solve the linear wave dispersion relation to determine the instabilities likely to be triggered in this environment. Finally, we discuss the results by comparison with the observations.