



Characteristics of electron flat-top distribution observed by Cluster

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We surveyed isotropic flat-top electron distribution in the phase space using Cluster PEACE data obtained in the magnetotail. They are observed in the vicinity of the X line associated with fast plasma flows which mostly exceed 600 km/s and low plasma density. They are found to be clearly associated with Hall quadrupole-like magnetic B_y field and large B_z intensity, but independent of B_x in the plasma sheet, indicating the location is around the outer edge of the ion diffusion region where ions are most accelerated and the normal component of the magnetic field starts to be piled up. Highest energy of the flat-top range is mostly between 3-8 keV, up to 10 keV. In some cases, flat-top distributions are associated with highly accelerated electron parallel beams into the X line with the same energy as the upper edge of the flat-top distribution, suggesting the close relation in their generation mechanisms. We discuss generation mechanisms of such distributions by examining their characteristic ion distributions as well as magnetic and electric fields, and examine spatial signatures using the simultaneous 4-points measurements.