



## **Carriers of the Field-Aligned Currents in the Plasma Sheet Boundary Layer: An MMS Multi-case Study**

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With the advantage of fast plasma measurements of the Magnetospheric Multiscale (MMS) mission in the magnetotail, we investigate the particle carriers of field-aligned currents (FACs) in the plasma sheet boundary layer for three cases. In all cases, electrons are the main carriers of FACs while the contribution of ions can be neglected. Our results indicate that thermal electrons (energy range from 0.5 Te to 5 Te, where Te is the electron parallel temperature) are the main carrier of the FAC. However, cold electrons (energy less than 0.5 Te) can also significantly contribute to the FACs. In 1 of 3 cases, suprathermal electron (energy greater than 5 Te) only contributes a small portion to the total current. The difference between all cases may depend on the local dynamics in the magnetotail.