Electron dynamics surrounding the X-line in magnetopause-type asymmetric reconnection

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Electron dynamics surrounding the X-line in magnetopause-type asymmetric reconnection is investigated using a two-dimensional particle-in-cell (PIC) simulation. We study electron properties of three characteristic regions in the vicinity of the X-line. The fluid properties, velocity distribution functions (VDFs), and orbits are studied and cross-compared. In the low-beta side of the X-line, the normal electric field enhances the electron meandering motion from the high-beta side. The motion leads to a crescent-shaped component in the electron VDF, in agreement with recent studies. In the high-beta side of the X-line, the magnetic field line is highly stretched in the third dimension. As a result, its curvature radius is comparable with a typical electron Larmor radius. The electron motion becomes chaotic, and therefore the electron idealness is no longer expected to hold. Around the middle of the outflow regions, the electron nonidealness is coincident with the region of the nonadiabatic motion.

Reference:
- Zenitani, S., H. Hasegawa, and T. Nagai, submitted to *J. Geophys. Res.* (MMS special issue)

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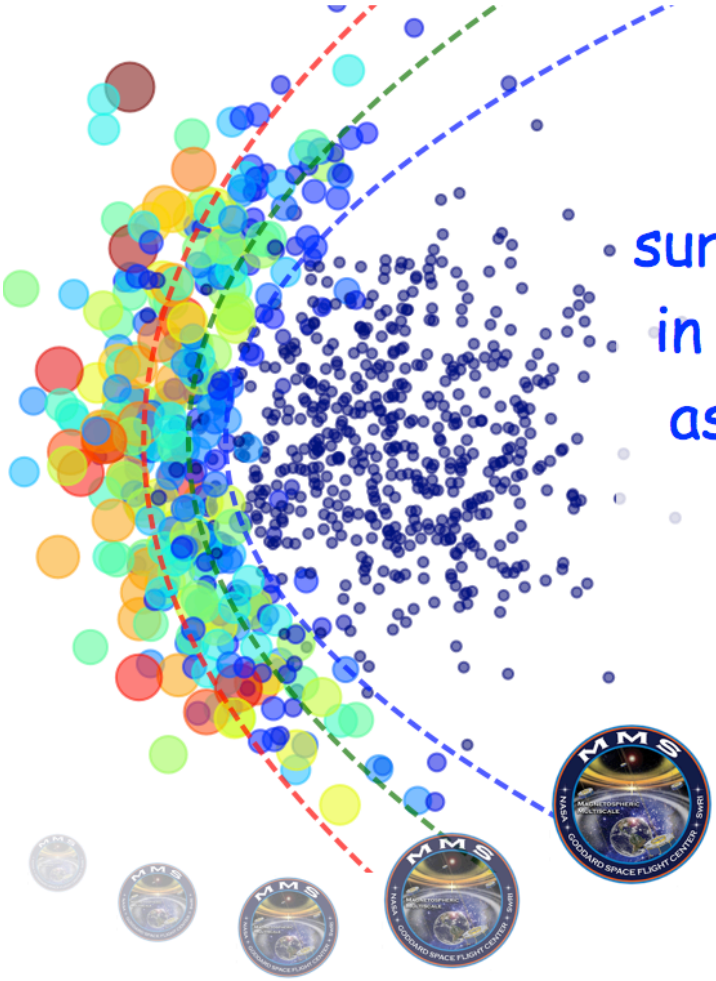

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