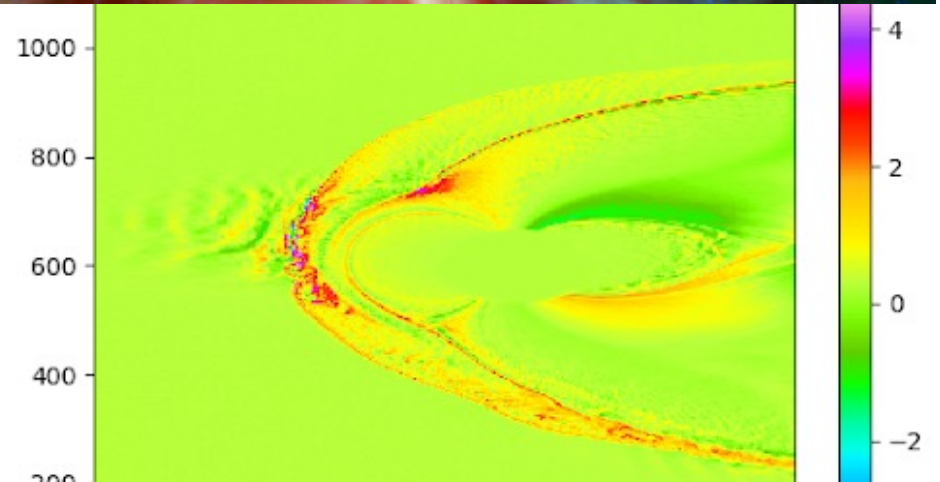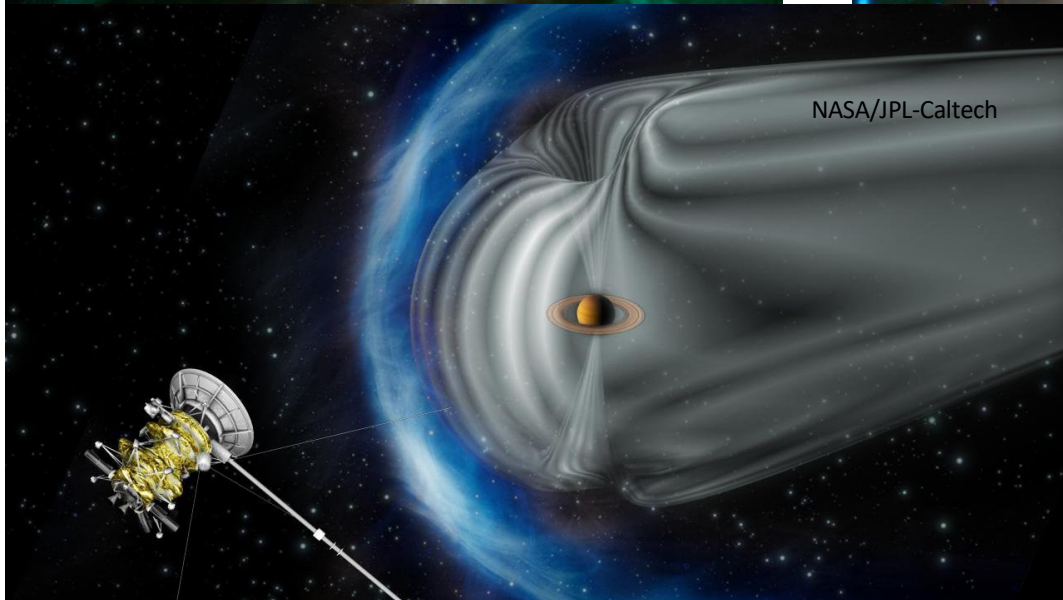#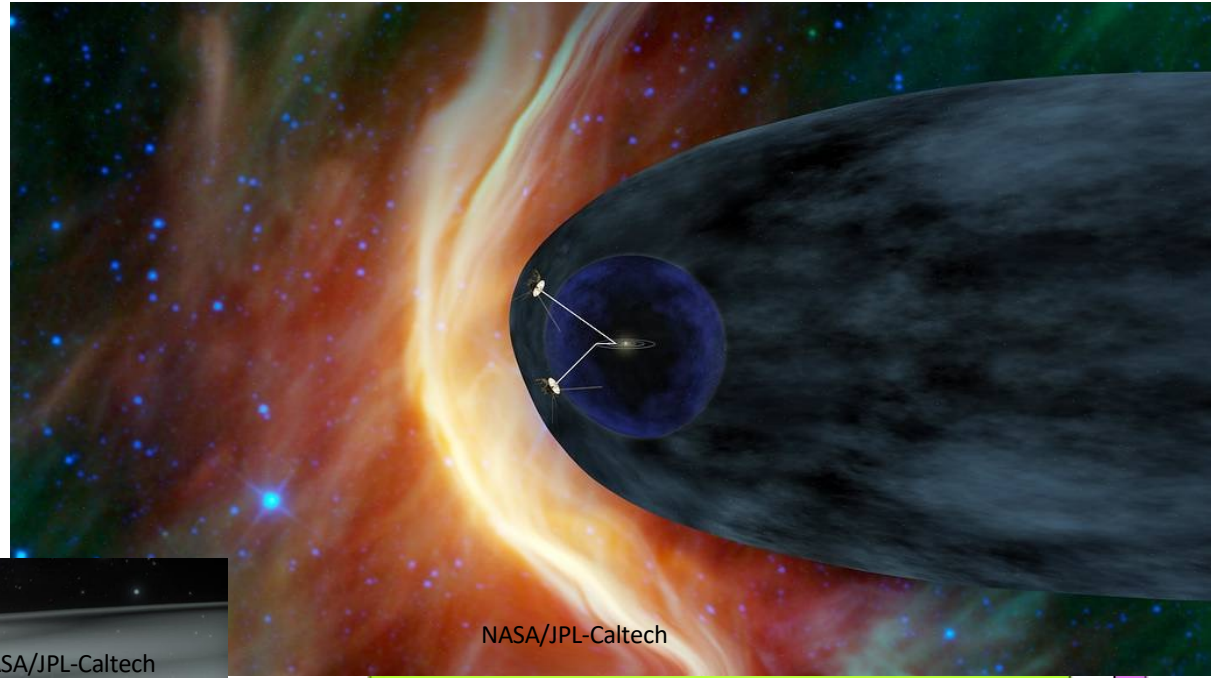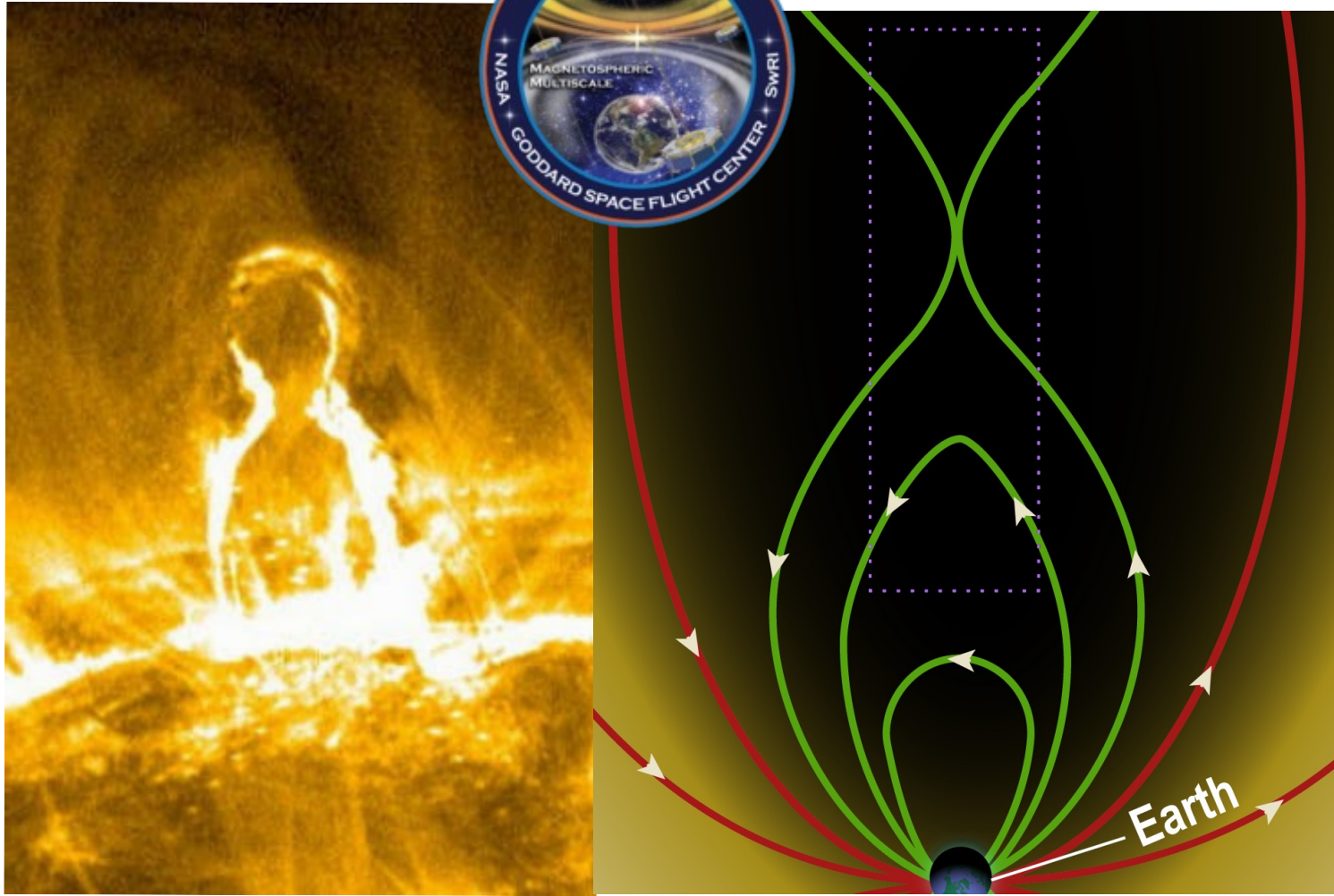 A reconnection EDR in the temperature ramp of a bow shock: implications on how reconnection modifies the bow shock structure

MMS Bow Shock Crossing   2016-01-10

Reconnection electron jet
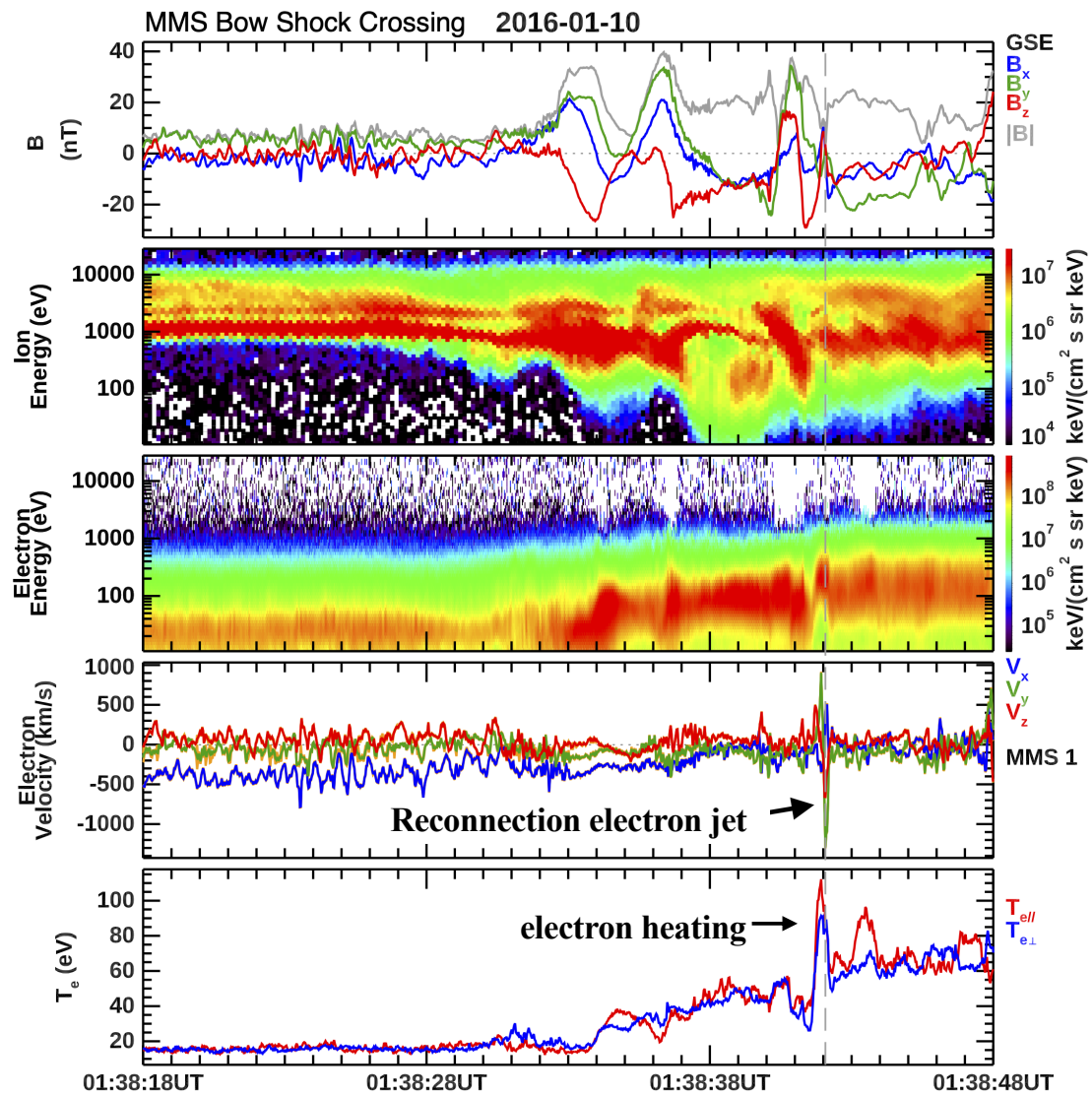
electron heating

Li-Jen Chen, Jason Shuster, Richard Denton, Yi Qi, Brandon Burkholder, Jonathan Ng, Naoki Bessho, Rachel Rice, Craig Pollock, Daniel Gershman, Roy Torbert, Kevin Genestreti, Jim Burch

Spitzer Space Telescope

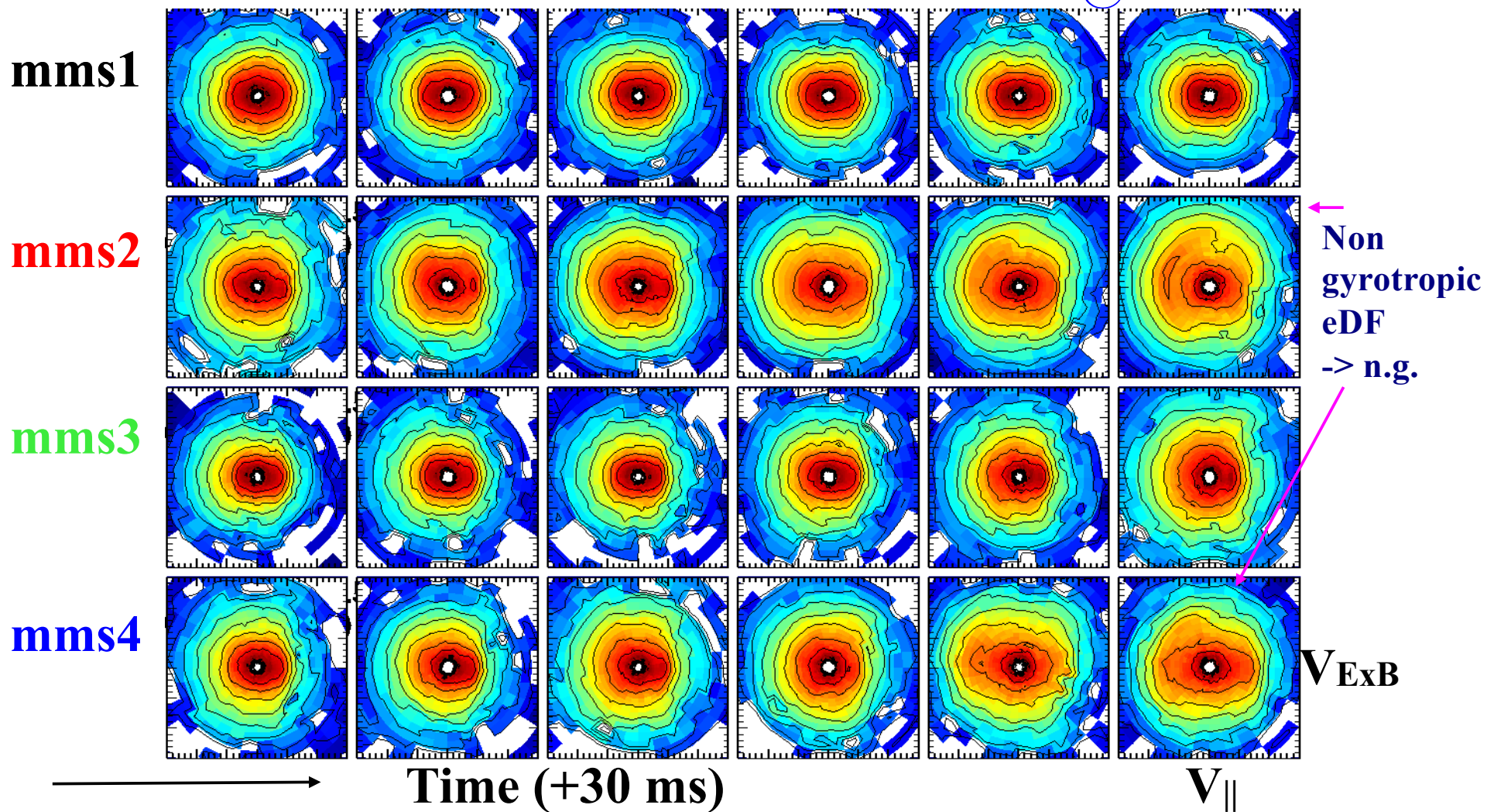NASA/JPL-Caltech
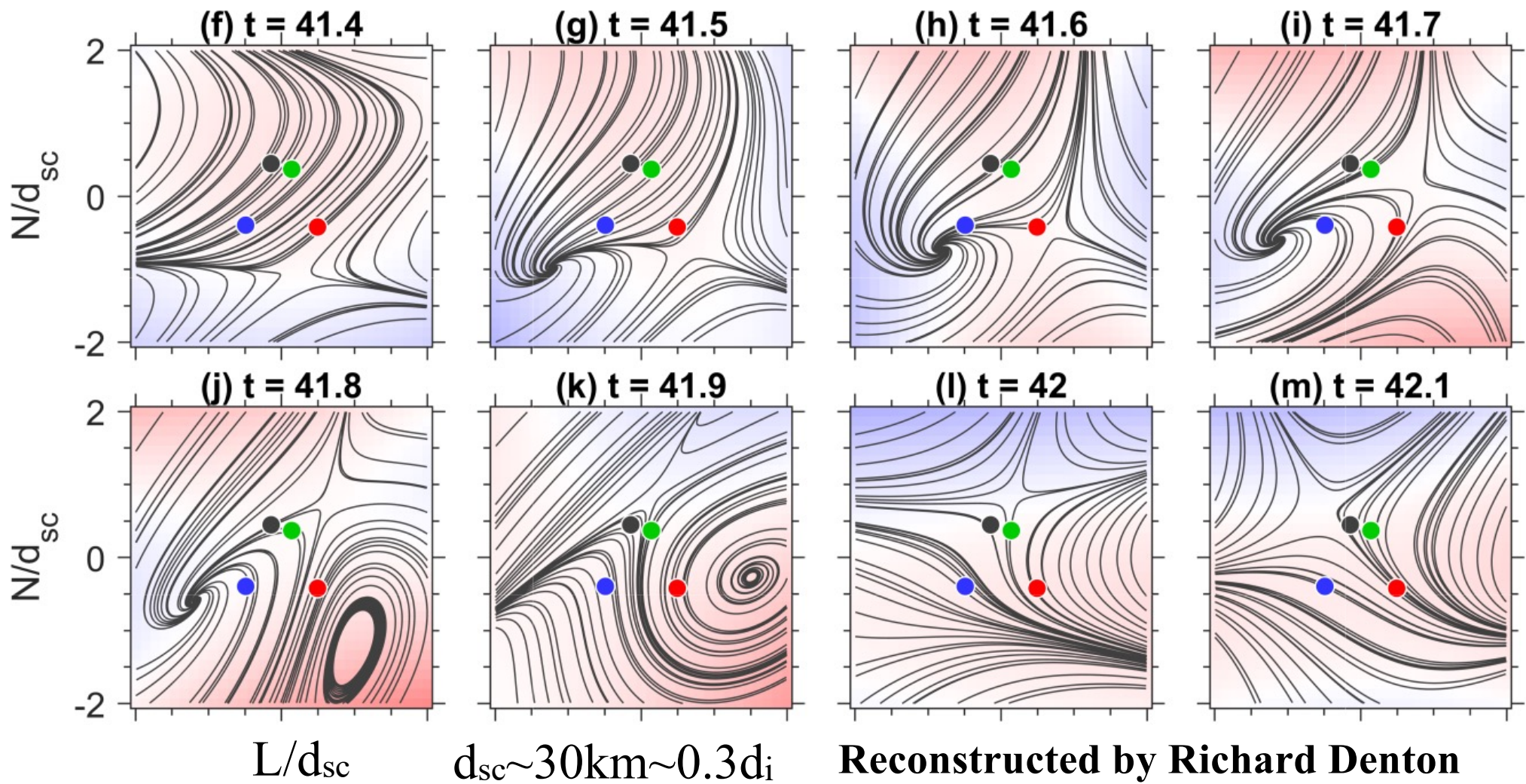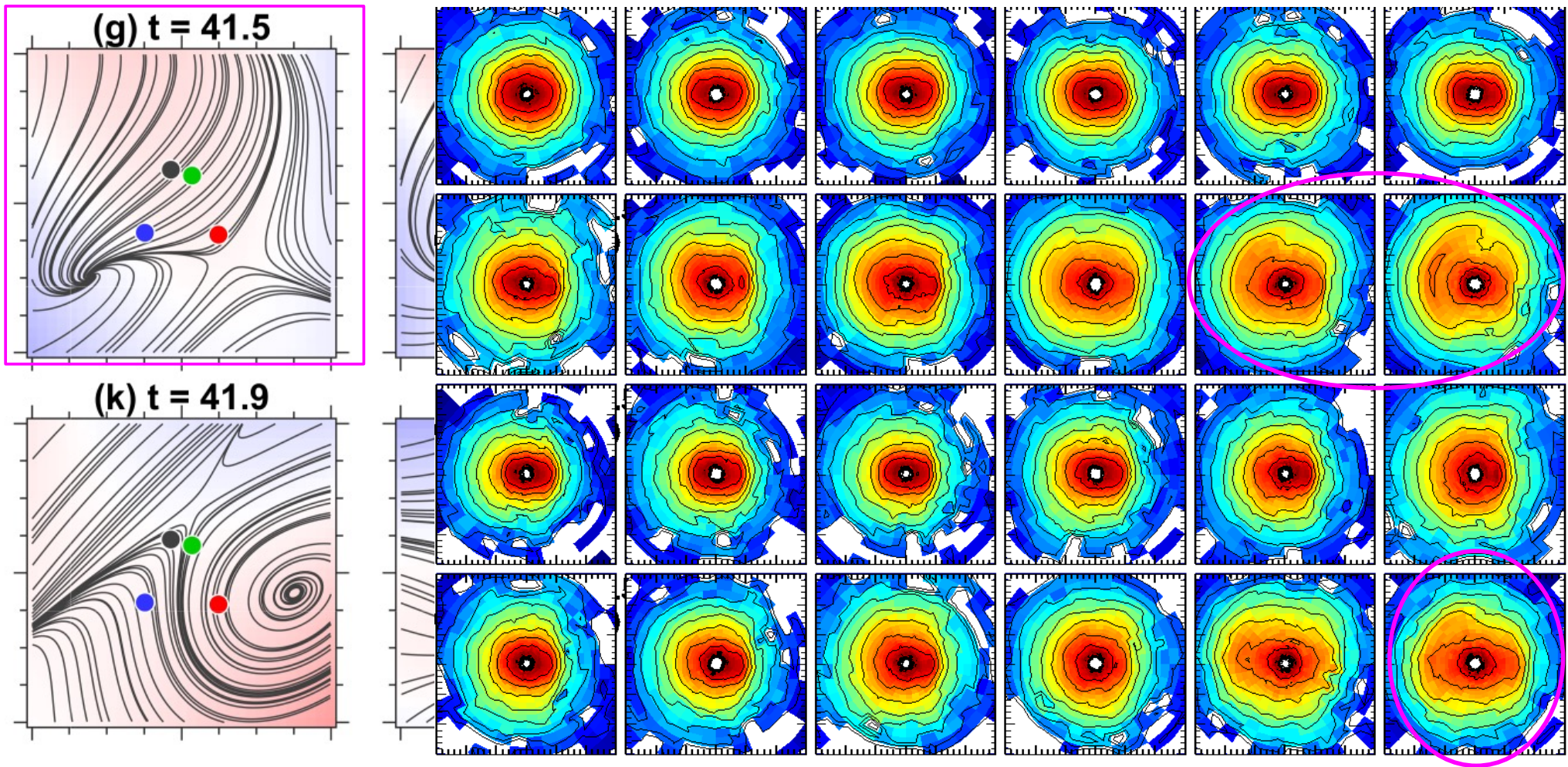

NASA/JPL-Caltech

Earth

MMS Bow Shock Crossing   2016-01-10
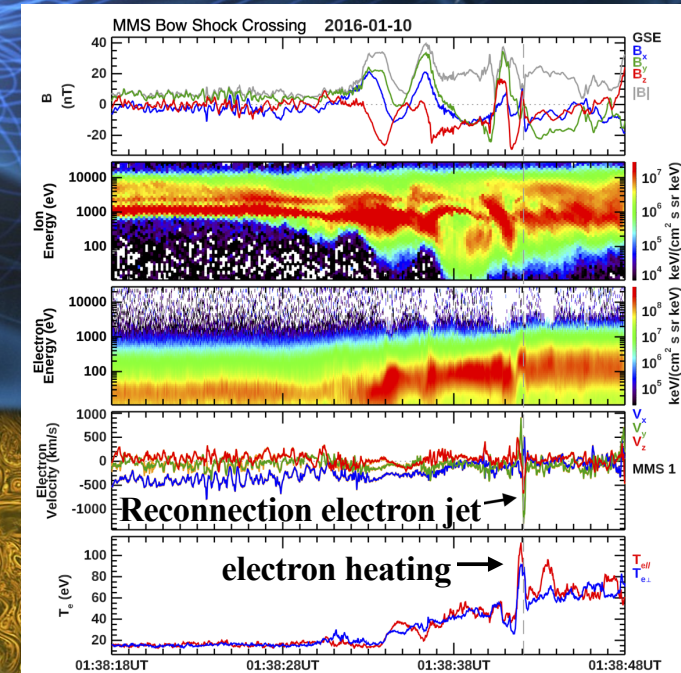
Rare: Electron DFs from shock reconnection ~ eDFs @ MP EDR

mms1
mms2
mms3
mms4

Time (+30 ms)

Non gyrotropic eDF -> n.g.

V_{ExB}

$V_{||}$

(f) t = 41.4 (g) t = 41.5 (h) t = 41.6 (i) t = 41.7

(j) t = 41.8 (k) t = 41.9 (l) t = 42 (m) t = 42.1

L/d_{sc} $d_{sc} \sim 30km \sim 0.3d_i$ **Reconstructed by Richard Denton**
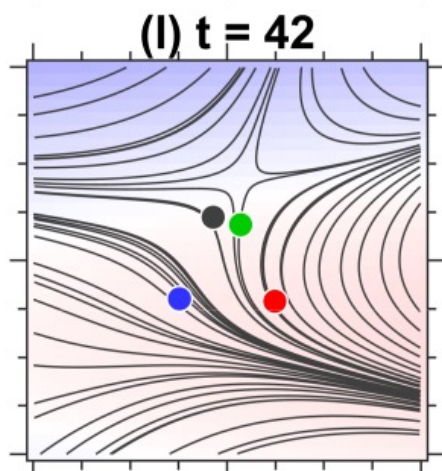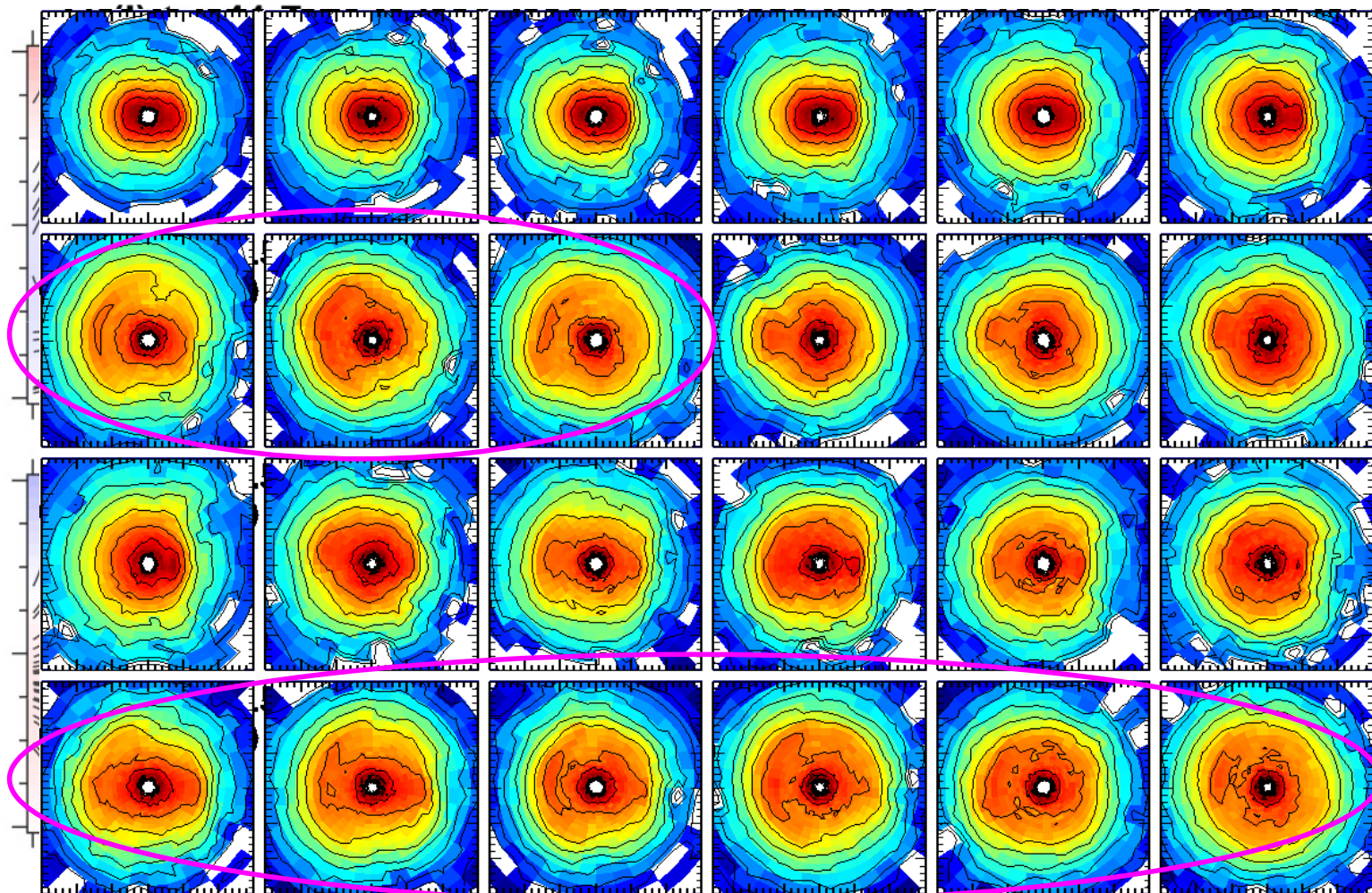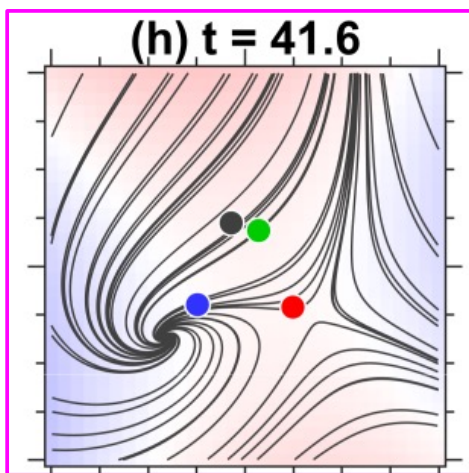
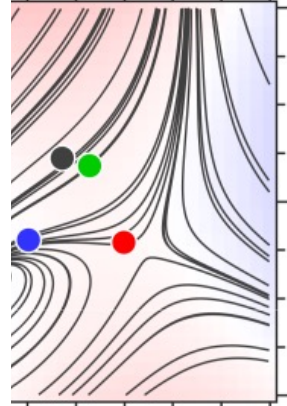# Electron DFs from shock reconnection: m2 enters the n.g. region, followed by m4

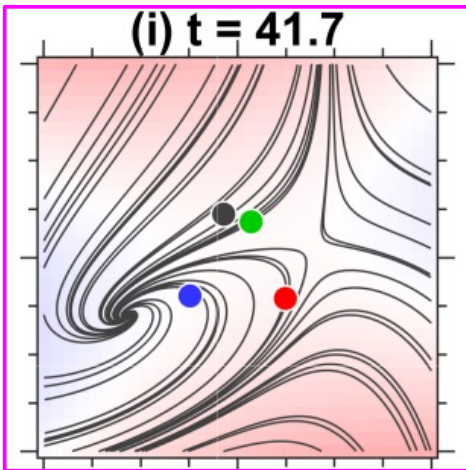# Electron DFs from shock reconnection: m2 and m4 in the n.g. region

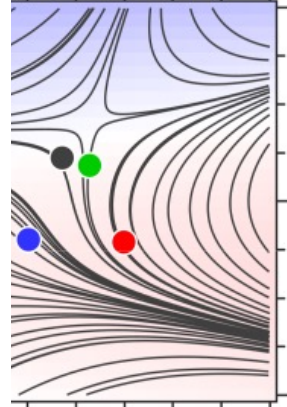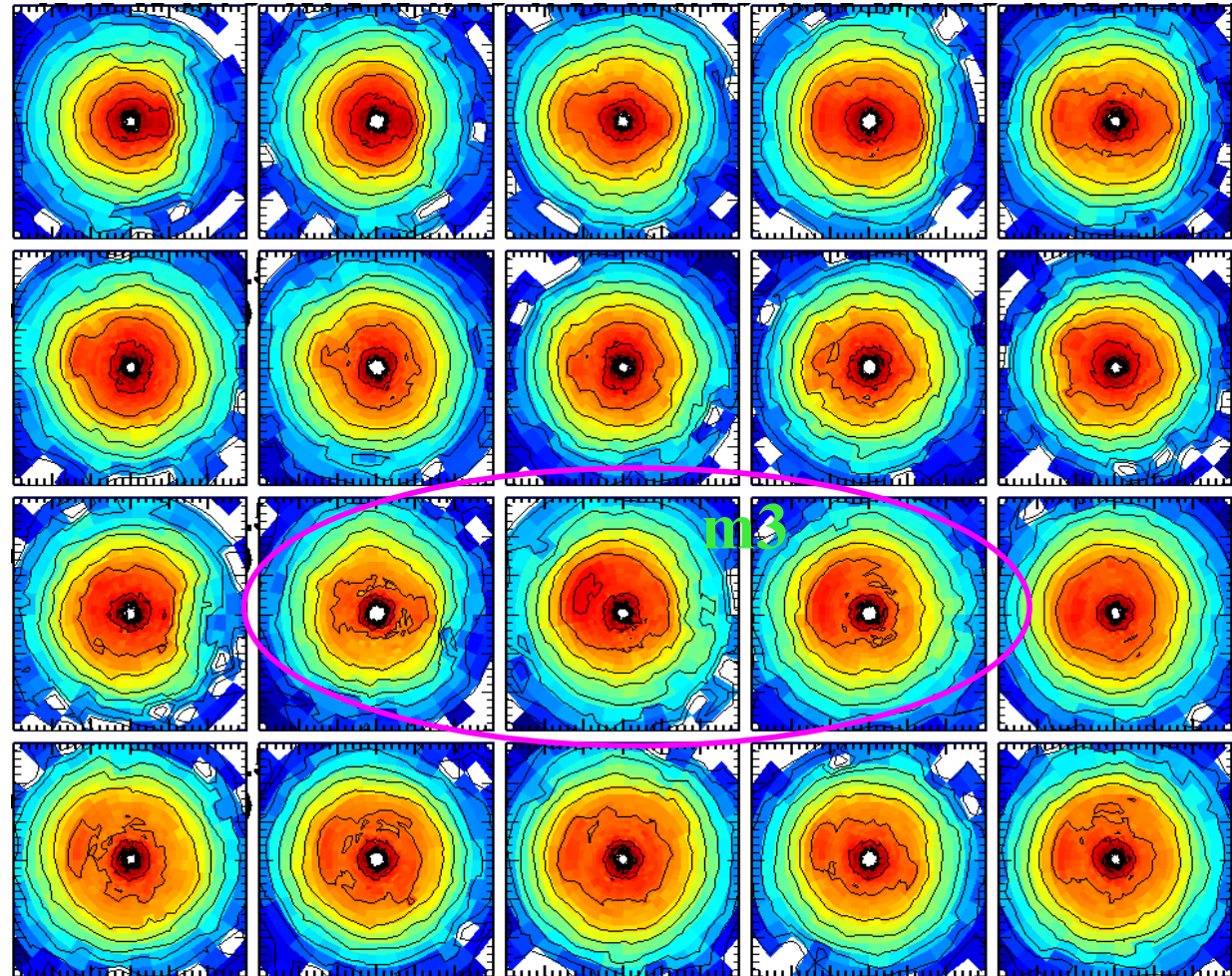# Electron DFs from shock reconnection: m3 entering the n.g. region; m2 exiting
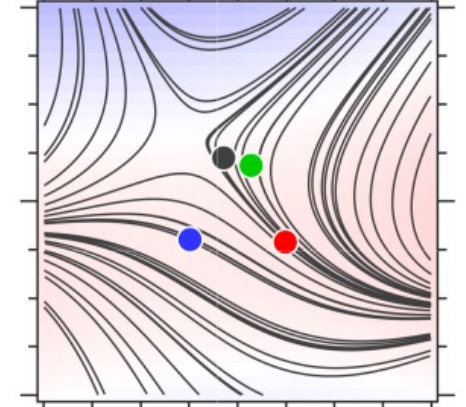
Electron DFs from shock reconnection: m1 in the n.g. region; m2 outside

m1

m2

(I) t = 42
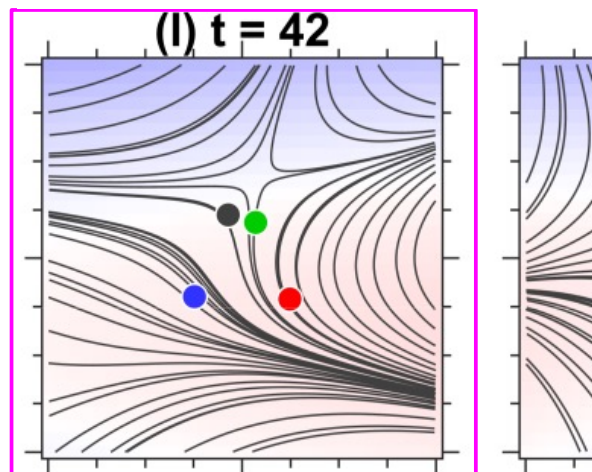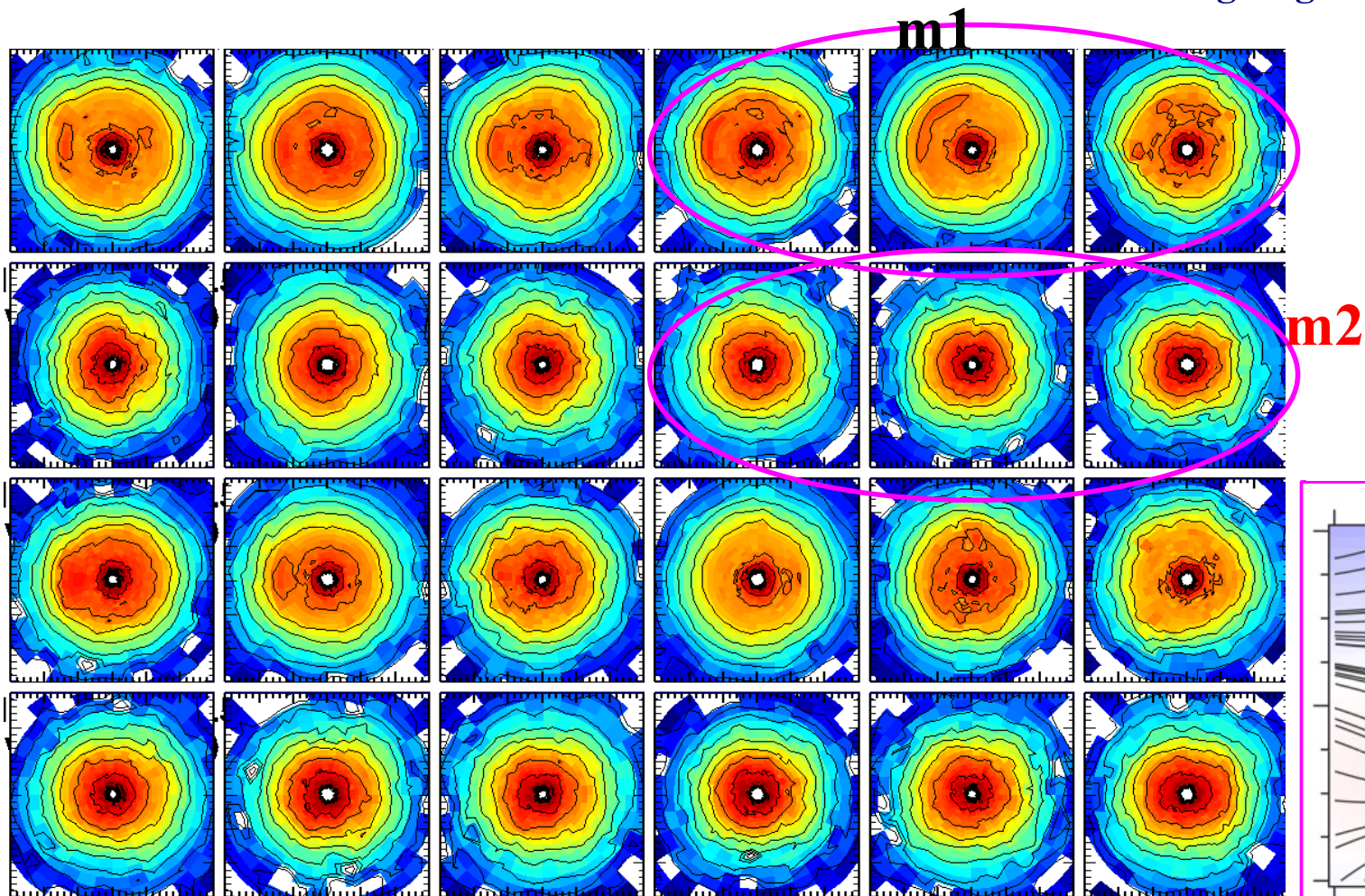
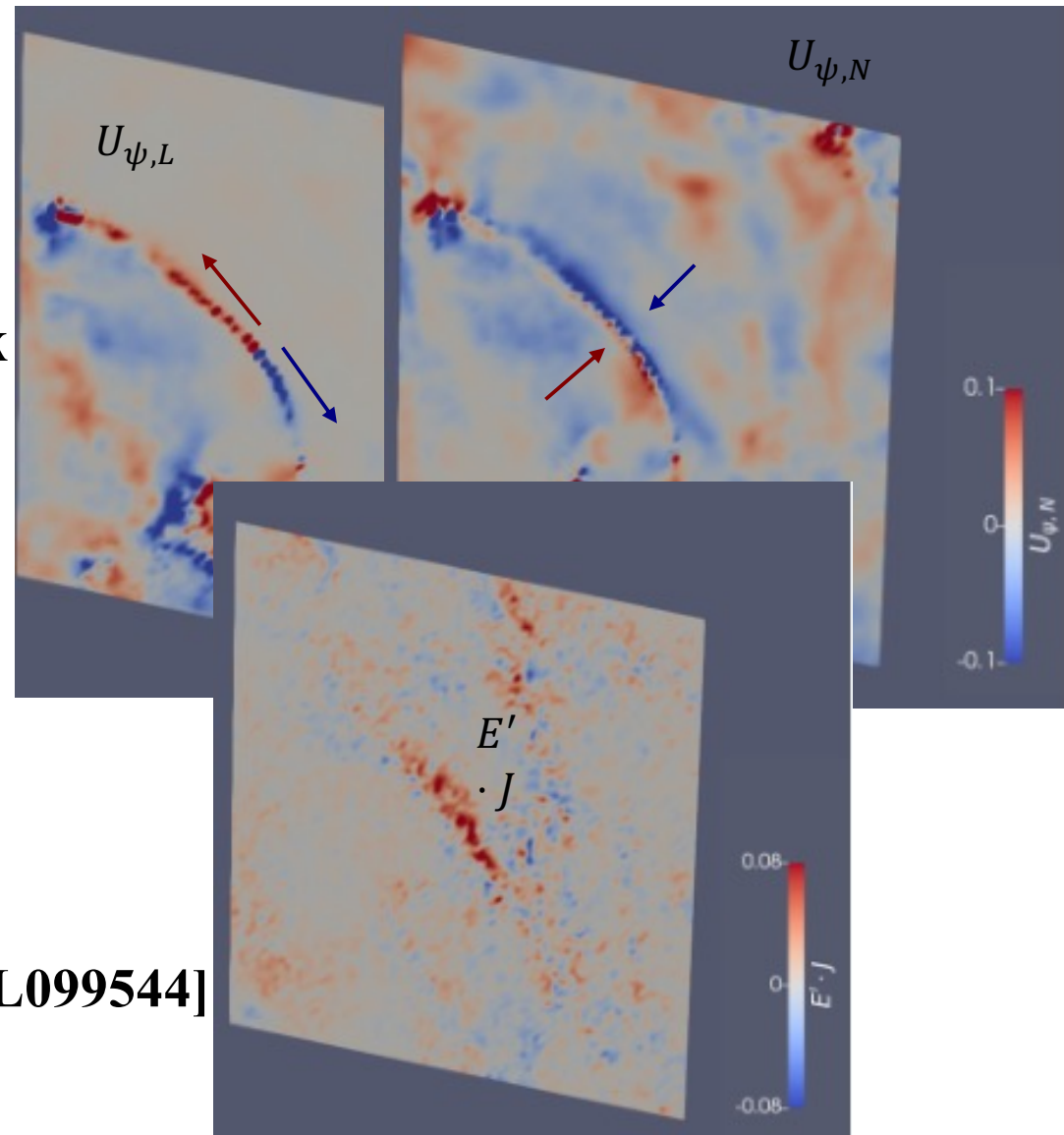# Reconnecting cs in 3D shock Turbulence (PIC)

Transport of in-plane magnetic flux

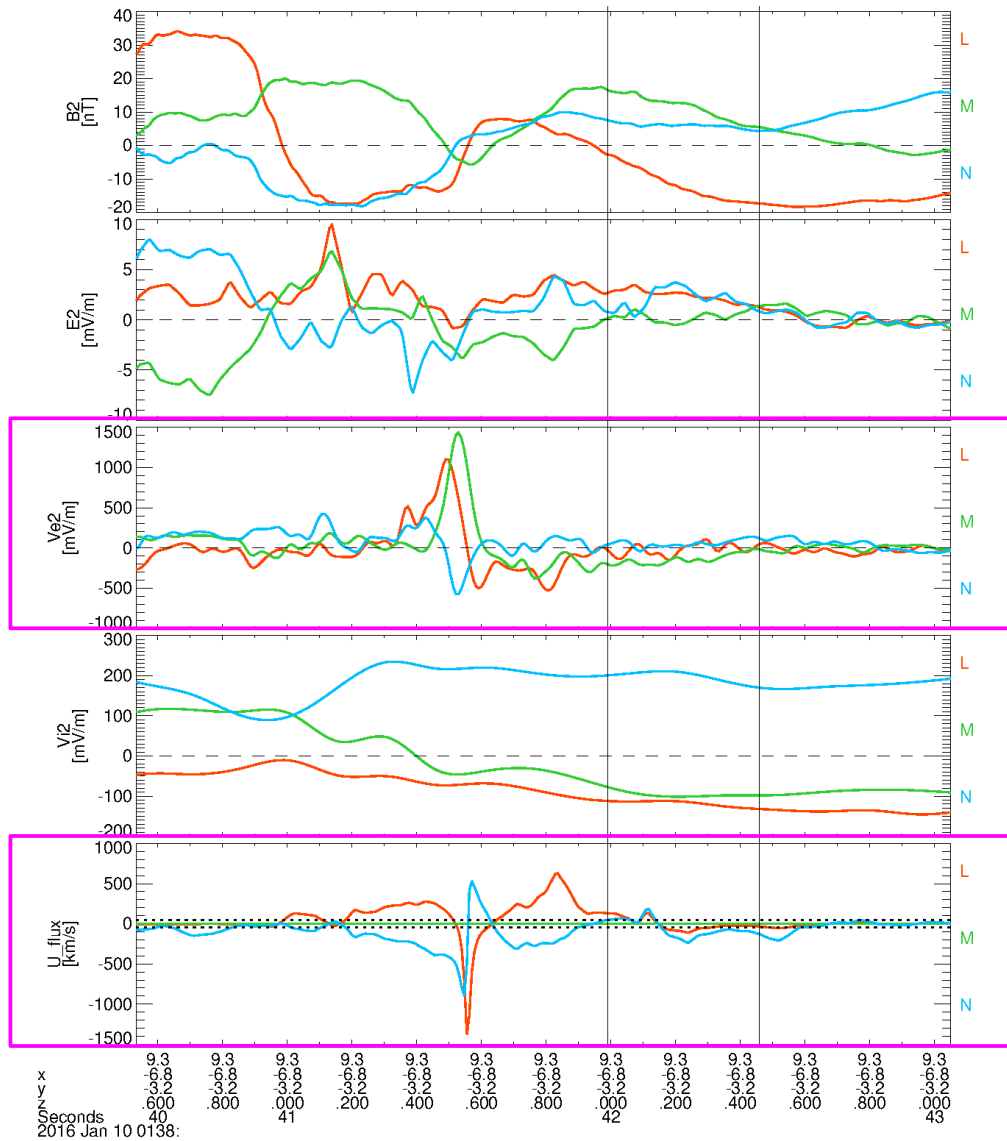Using the **magnetic flux transport diagnostic** (Li et al 2021; Qi et al., 2021)

Flux transport consistent with outflows in L; Inflows in N

Enhanced energy conversion E' dot J in the current layer

[Ng et al., e2022GL099544]

mms2

Using the Magnetic Flux Transport method in [Qi et al., 2021]

Analysis by Yi Qi

Earth