

Local and global observations of magnetic reconnections driven by electron dynamics

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Electron dynamics is considered to be important as the triggering mechanism of magnetic reconnection. The NASA's MMS mission has revealed local electron dynamics in the Earth's magnetosphere [1]. However, it is highly challenging to observe global information in addition to local information in space plasmas. Since both local and global information is simultaneously observable in laboratories, we have conducted experiments on electron-scale magnetic reconnection using high power lasers. We generated the state where only electron motion is directly coupled with a magnetic field [2]. The results of global imaging show plasmoid and cusp moving at the electron Alfvén velocity [2]. We observed local electron outflow with collective Thomson scattering and time evolution of magnetic field with the magnetic induction probe. We show the first local and global observations of electron-scale magnetic reconnections in laser produced plasmas.

References

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