THE MICROPHYSICS OF MAGNETIC RECONNECTION IN SPACE PLASMAS: IN-SITU OBSERVATIONS AT THE TERRESTRIAL MAGNETOPAUSE AND MAGNETOSHEATH.

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A fundamental problem of plasma physics is how electromagnetic energy is converted into kinetic and thermal energy of charged particles. Magnetic reconnection is a universal energy conversion mechanism that occurs at boundaries in laboratory and astrophysical plasmas. The understanding of reconnection is crucial to explain many fundamental processes in the plasma Universe, such as the heating of plasma to high temperatures and the acceleration of charged particles to high energies. Magnetic reconnection is an inherently multi-scale process, starting rapidly in small regions by microphysical processes and later affecting large volumes of space for long time. Among many open issues on reconnection, the microphysics is one of the most important though yet poorly understood. The best 'laboratory' to study the microphysics of reconnection is the near-Earth space, where simultaneous multi-point spacecraft measurements are available *in-situ*. Here we present recent Cluster multi-spacecraft observations at the terrestrial magnetopause and magnetosheath and discuss our current understanding of the microphysics of reconnection.

Magnetic reconnection, magnetopause, magnetosheath

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