

Comparison study of particle acceleration in the Earth's magnetotail and solar corona

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One of the most famous rapid energy conversion mechanisms in space is a magnetic reconnection. The general concept of a magnetic reconnection is that the rapid energy conversion from magnetic field energy to thermal energy, kinetic energy or non-thermal particle energy. The understanding of rapid energy conversion rates from magnetic field energy to other energy is the fundamental and essential problem in the space physics. One of the important goals for studying magnetic reconnection is to answer what plasma condition/parameter controls the energy conversion rates. Earth's magnetotail has been paid much attention to discuss a magnetic reconnection, because we can discuss magnetic reconnection characteristics in detail with direct in-situ observation. Recently, solar atmosphere has been focused as a space laboratory for magnetic reconnection because of its variety in plasma condition. So far considerable effort has been devoted toward understanding the energy conversion rates of magnetic reconnection, and various typical features associated with magnetic reconnection have been observed in the Earth's magnetotail and the solar corona.

In this talk, we first introduce the variety of plasma condition/parameter in solar corona and Earth's magnetotail. Later, we discuss what plasma condition/parameter controls the energy conversion from magnetic field to especially non-thermal particle. To compare non-thermal electron and ion acceleration in magnetic reconnection, we used Hard X-ray (electron) /Neutron monitor (ion) for solar corona and Geotail in-situ measurement (electron and ion) for magnetotail. We found both of electron and ion accelerations are roughly controlled by reconnection electric field (reconnection rate). However, some detail point is different in ion and electron acceleration. Further, we will discuss what is the major difference between solar corona and Earth's magnetotail for particle acceleration.

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