Geophysical Research Abstracts
Vol. 12, EGU2010-3527, 2010
EGU General Assembly 2010

Electron acceleration at the reconnection outflow shock during flares

Gottfried Mann
Astrophysikalisches Institut Potsdam, Potsdam, Germany (Gmann@aip.de, +49 331 7499 292)

During solar flares a large amount of energy is suddenly released and partly transfered into energetic electrons. They are of special interest since a substantial part of the energy released during a flare is deposited into the energetic electrons. They can be observed as an enhanced emission of nonthermal radio and X-ray radiation. RHESSI observations, e.g. of the solar event on October 28, 2003, show that 10^{36} electrons with energies > 20 keV are typically produced per second during large flares. They are related to a power of about 10^{29} W. It is a still open question in which way so much electrons are accelerated up to high energies during a fraction of a second. Within the framework of the magnetic reconnection scenario, jets appear in the outflow region and can establish standing fast-mode shocks if they penetrate with a super-Alfvénic speed into the surrounding plasma. It is the aim to show that this shock can be the source of the energetic electrons produced during flares. The electrons are regarded to be energized by shock drift acceleration. The process is necessarily treated in a fully relativistic manner. The resulting distribution function of accelerated electrons is a loss-cone one and allows to calculated the differential electron flux, which can be compared with RHESSI. The theoretically obtained fluxes of energetic electrons agree with the observed ones as demonstrated for the solar event on October 28, 2003.