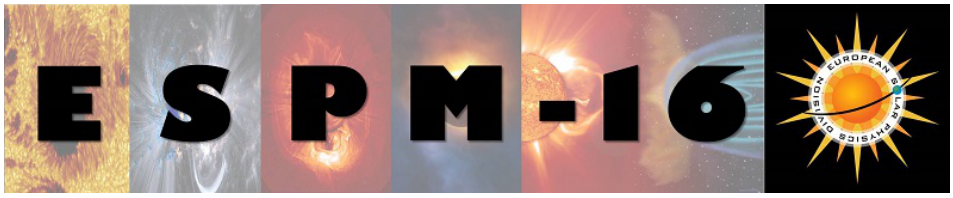

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Electron acceleration by Langmuir turbulence at an open magnetic trap

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Fast electron streams in the plasma of the solar corona propagating along the magnetic field lines are able to drive Langmuir turbulence. The further resonant interaction of electrons with turbulent spectrum can lead to acceleration to high energies forming tails of a suprathermal distribution. Similar phenomena are observed in experiments at open magnetic traps with electron beams. An open magnetic trap for plasma confinement, to put it simply, is a magnetic configuration in which magnetic field lines are not closed and plasma can flow freely along them. Among other approaches, electron beams are used to create and heat plasma. Consequently, such a configuration may be interesting not only from the point of view of plasma confinement, but also for modeling some astrophysical phenomena occurring in the solar corona. In particular, the results of one such experiments at Gas Dynamic Trap (GDT) facility [1] are reported. In the experiment, electrons accelerated to energies an order of magnitude higher than the initial beam energy are observed. For the obtained results to be interpreted, the series of numerical particle-in-cell simulations with a continuously injected electron beam are carried out. It is demonstrated that with injection of a 30 keV electron beam in a plasma accelerated electrons achieve about 100 keV energies, power-law distribution of a suprathermal component are obtained. An interpretation of the presented results is given.
[1] Ivanov, A. A., Prikhodko, V. V. (2013). Plasma Physics and Controlled Fusion, 55(6), 063001.

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