Contribution ID: **1296** Type: **Talk**

Electron-beam instabilities in the foreshock of high Mach number oblique shocks

Friday 16 July 2021 13:15 (12 minutes)

Motivated by simulations of non-relativistic high Mach number shocks in supernova remnants, we investigate the evolution of relativistic electron beams in the extended foreshock of oblique shocks. The instabilities mainly responsible for heating and scattering of shock-reflected electrons are identified in two-dimensional particle-in-cell simulations of the foreshock region.

In their early stage, the observed electrostatic and electromagnetic electron-beam instabilities agree very well with the predictions of linear dispersion theory for a wide range of angles between the background magnetic field and the shock velocity. The subsequent nonlinear evolution of the simulations allows us to develop a detailed model of the isotropisation of the reflected electron beams in the foreshock and estimate how far the electron foreshock region reaches into the upstream depending on shock obliquity and Mach number.

Keywords

supernova remnants; plasma instabilities; cosmic rays

Collaboration

other Collaboration

Subcategory

Theoretical Results

Primary author: WEIDL, Martin (IPP Garching)

Co-authors: BOHDAN, Artem (Z_THAT (Theoretische Astroteilchenphysik)); Dr MORRIS, Paul (DESY); Prof. POHL, Martin (DESY, 15738 Zeuthen, Germany; Institute of Physics and Astronomy, University of Potsdam, 14476 Potsdam, Germany)

Presenter: WEIDL, Martin (IPP Garching)

Session Classification: Discussion

Track Classification: Scientific Field: CRI | Cosmic Ray Indirect