turbulence model has been considered as the focus was on fluctuations of Weibel-type. It will be shown that the choice of the wave number dependence is a crucial point leading to differing results regarding the interaction between field and particles.

Marc Swisdak
University of Maryland
The role of the Weibel instability in electron-positron reconnection

The mass symmetry between the two species in electron-positron (pair) plasmas has interesting consequences for collisionless magnetic reconnection because the Hall term, which plays a crucial role in supporting fast reconnection in electron-proton plasmas, vanishes. We perform kinetic simulations of pair reconnection in systems of various sizes, show that it remains fast, and identify the reason why this occurs. For sufficiently large systems a Weibel-like temperature anisotropy instability develops in the outflow from the X-point that causes the current layer to broaden and form a Petschek-like open outflow. We discuss the parameter regimes in which pair reconnection should be fast and the implications for astrophysical pair plasmas.

Fumio Takahara
Osaka University
Buneman and ion two-stream instabitities in the foot of collisionless shocks

Two-dimensional electrostatic PIC simulations as well as linear analysis have been made for double periodic boundary conditions mimicking the shock foot region of supernona remnants. We found that modes propagating obliquely to the beam direction grow fast enough so that no surfing acceleration occurs. We also found that a new type of instability called ion two-stream instability is excited after the Buneman instability saturated instead of the ion acoustic instability. Implications for electron heating are shortly discussed.

Robert C. Tautz
Ruhr-Uni Bochum, Germany
Kinetic instabilities in relativistic plasmas: the Harris instability revisited

Plasma instabilities that generate aperiodic fluctuations are of outstanding importance in the astrophysical context. Two prominent examples are the electromagnetic Weibel instability and the electrostatic Harris instability, which operate in initially non-magnetized and magnetized plasmas, respectively. In this talk, the original formulation of the Harris instability will be reviewed and generalizations will be presented such as the inclusion of (1) relativistic effects, (2) ion effects, and (3) mode coupling. It will be shown that, with these modifications, a powerful method has been developed for the determination of both the existence and the growth rate of low-frequency instabilities. Applications can be found in astrophysical jets, where the rest frame can be used and so no parallel motion is present. At the end of the talk, how the particle composition of gamma-ray burst jets can be predicted using the Harris technique.