

ASTROPHYSICAL COLLISIONLESS SHOCKS IN WEAKLY MAGNETIZED PLASMAS

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Violent astrophysical phenomena (e.g., GRBs, SN, AGN jets) are accompanied by shocks. Most if not all our knowledge about the underlying physics comes from telescope observations of radiation emitted by these shocks at various photon energies, from gamma-rays through optical and radio waves. However, a fair question arises: Do we really understand what we are observing? Until very recently our understanding of collisionless unmagnetized relativistic shocks was very limited. In this talk we will present important theoretical ideas in the field of strong collisionless shocks and link them to practical aspects — observations and data analysis. In particular, we will discuss the internal structure of the shocks, the role of the Weibel instability, particle acceleration/heating, radiation processes and the physics jitter radiation, and the effects relativistic kinematics on the observed spectra.