

Abstract Submitted
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Collisionless Shocks in GRBs: from Speculations to Physics¹

MIKHAIL MEDVEDEV, University of Kansas — Many violent processes in astrophysics such as gamma-ray bursts, supernova explosions, jet outflows are accompanied by shocks. Most if not all our knowledge about the underlying phenomena 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? It is an unacceptable fact that most data analyzes have been performed using a “classical” hydrodynamic shock model, whereas it is well known that all these astrophysical shocks are collisionless (meaning that the collisional thickness of the shock is many orders of magnitude larger than the size of an object itself). 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.

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