MAGIC

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Short-GRBs from Shock Collisions Driven by Magnetic Reconnection in Cosmic String Wakes

We study the generation of short-duration Gamma-Ray Bursts (s-GRBs) resulting from magnetic reconnection in the magnetized wakes of cosmic strings. Magnetic reconnection occurs at multiple sites along the wake, releasing substantial energy over short timescales. These events produce shock waves with varying velocities that collide and give rise to brief but intense bursts of radiation. We model the resulting light curve from multiple shock collisions and analyze how key parameters such as magnetic field strength, plasma density, and redshift influence the observed emission. Our findings show that these factors significantly affect the burst duration, peak flux, and temporal structure of the GRB lightcurve. In particular, we examine the occurrence of short-duration GRBs at high redshifts and find that our model yields lightcurves consistent with several experimentally observed high-redshift GRBs. These results suggest that magnetic reconnection in cosmic string wakes may provide a plausible origin of such GRBs in the early universe.

Keywords: cosmic string wakes, magnetic reconnection, Gamma-Ray Bursts.

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