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Radiation-mediated shocks in gamma-ray bursts observed by Fermi

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Radiation-mediated shocks (RMSs) below the photosphere may play an important role in the prompt emission of gamma-ray bursts (GRBs). However, fitting an RMS model to data has been infeasible due to the computational cost of simulating such shocks. We bridge the gap between theory and observation by creating an approximate but accurate model called the Kompaneets RMS approximation (KRA). In this talk, I present the first-ever fit of a prompt GRB spectrum with an RMS model by using Fermi data. Furthermore, we study the observational properties expected from RMSs in GRBs by generating synthetic KRA spectra. We find that the spectra often exhibit an additional break in X-rays, thus resembling a double broken power-law function with an exponential cutoff at high energies. When the synthetic KRA spectra are fitted with a cutoff power-law function, we find that the catalogue distribution of low-energy slopes are naturally reproduced.

Track

GRBs

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