

INVITED LECTURE

Analysis of Swift XRT X-ray spectra: for estimating the intrinsic hydrogen content

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Gamma-ray bursts (GRBs) are the highest-energy explosions in the universe, emitting short bursts of intense gamma-ray and X-ray radiation. The Swift satellite's rapid response capability allows it to locate bursts instantly with the BAT detector and then start observing the X-ray afterglow within minutes with the XRT instrument. By analysing the XRT spectra, we can measure not only the afterglow emission itself, but also the absorption effects in the intrinsic environment (progenitor environment, interstellar material). The extra absorption in the X-ray spectra can be used to estimate the intrinsic hydrogen column density (N_{Hint}), which provides information on the amount and ionisation state of the matter surrounding the GRB. N_{Hint} typically appears as an additional absorption component above the Galactic absorption in the spectral fit. Measurements based on Swift/XRT data provide important support for understanding the formation environment of GRBs and the physics of the early afterglow. The analysis of these parameters will also contribute to the identification of progenitors of GRBs (e.g. high-mass stars) and to the study of the interstellar material of high-redshift galaxies.

