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Investigating the connection between the X-ray plateaus and flares in Gamma-ray Bursts light curves

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Gamma-ray bursts (GRBs) are one of the most energetic explosions known in the Universe. Even though many GRBs have been observed since their discovery more than 50 years ago, and despite the success of the “fireball” model, there are still many open questions and unexplained observations. The origin of the plateau phase observed in the early X-ray light curve of GRBs (up to thousands of seconds) has been debated since its discovery in 2005. In our recent paper, we show that the observed plateau phase can be explained within the classical GRB model by considering an expanding stellar shell with initial jet Lorentz factors of tens. In the early study, while we excluded any flare feature, in this study, we fit the Swift-XRT light curves (including flares and plateaus) of several GRBs by using the MultiNest fitting method and considering theoretical afterglow models (Wind & ISM). In this talk, I will discuss if there is any link between the plateaus and flares seen in the vast majority of the early X-ray light curves of GRBs, and its origin is still a debated topic. Our discussion is carried out in the environments of the GRBs in the fireball model.

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