



Contribution ID: 219

Type: Poster

## Study of GRB light curve decay indices in the afterglow phase

Saturday, 5 December 2015 17:55 (3 minutes)

In this work we study the distribution of temporal power-law decay indices,  $\alpha$ , in the Gamma Ray Burst (GRB) afterglow phase, fitted for a sample of 164 long GRBs with known redshifts using a power-law form. These indices are compared to the values of characteristic afterglow luminosity,  $L_a$ , the time,  $T_a^*$ , and the analogous decay index,  $\alpha_W$ , derived with global light curve fitting using the Willingale et al. (2007) model. This model fitting yields similar distributions of  $\alpha_W$  to the fitted  $\alpha$ , but for several bursts difference between these indices can be significant. Analysis of the  $(\alpha, L_a)$  distribution reveals a weak correlation of these quantities. However, we discovered a significant regular trend when studying distribution of GRB  $\alpha$  values at the  $L_a$ , vs.  $T_a^*$  (LT) plane, with a differences of the  $\alpha$  parameters below and above the fitted LT correlation line (Dainotti et al. 2008). Study of the presented systematic trend may allow one for constraining the physical models for GRBs. A proposed toy model accounting for this systematics applied to the analyzed GRB distribution results in increasing the LT correlation coefficient.

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**Session Classification:** 13 - Gamma-ray bursts