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## A new intrinsic intrinsic 3 parameter correlation in Gamma Ray Bursts

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An analysis of 176 GRBs with known redshift observed by Swift which present afterglow plateau revealed a new tri-parameter correlation (Lpeak,Lx,T*a*) *where Lpeak is the peak luminosity in the prompt emission, Lx is the luminosity at the end of the plateau emission and Ta* is the rest frame time at the end of the plateau emission. We have already proven the intrinsic nature of the Lx- T*a* (Dainotti *et al. 2013a*) *and the Lpeak-Lx correlation* (Dainotti *et al. 2015b*) *through the Efron & Petrosian (1992) method.* 

We here show the intrinsic slope of this new correlation whose intrinsic scatter is 10% less than the one for the *Lx-T*a correlation, therefore this new relation can be more useful as a cosmological tool.

In addition, we show how the separation between categories of GRB-SNe, X-ray Flashes and short GRBs with extended emission are displayed in the 3D space. It is advisable to divide the categories before using this correlation for cosmological study.

Finally, we also present the Lpeak-T90 correlation, where T90 is the time where the 90% of the prompt emission is emitted between 5% and 95%. This correlation is weaker than the Lpeak-Ta one, thus favoring the choice of  $T^*a$  as a preferred time as a third parameter in the 3D mentioned correlation.

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