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Fluence Distribution of TGFs Observed by Fermi GBM

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We present work on an estimation of the fluence distribution of TGFs using data obtained from Fermi GBM. A sample of 100 TGFs (10 triggered/90 untriggered) was selected from Nov 2010 - Oct 2011. The sample was picked pseudo randomly to minimise any seasonal/location bias.

The observed fluence distruibution by GBM is distorted by instrumental/observational effects. The most significant instrumental effect is detector deadtime whereby counts are lost during a pre-set intrument off time after the detection of a count (currently set to 2.6 microsec). This decreases the amount of counts observed in each TGF and thus skews the fluence distribution towards fainter TGFs. To account for this, simulations using a statistical deadtime correction were applied to each individual TGF in the sample. Using this process, the general effects of deadtime on a sample of GBM TGFs can also be observed. The most significant observational effect is the detection efficiency of TGFs by the instrument and the detection software. This decreases the number of lower fluence TGFs relative to higher fluence TGFs. To account for this, a TGF was simulated 1000 times and analysed by the detection software. These simulations were then performed for a range of pulse types and parameters to model the detection efficiency for any TGF.

By applying the deadtime and detection efficiency corrections, an estimate of the true fluence distribution of TGFs is obtained.