Contribution ID: **315** Type: **Talk**

Constraining emission mechanisms in gamma-ray bursts using spectral width

Monday 14 December 2015 17:35 (20 minutes)

The emission processes active in the highly relativistic jets of gamma-ray bursts (GRBs) remain unknown. The spectra are usually well-fit by the Band function, an empirically motivated smoothly-broken power law, yet this gives little understanding
of the underlying radiation mechanisms. In this talk we propose a new measure to describe spectra: the width of the EFE spectrum, a quantity dependent only on finding a good fit to the data. We apply this to the full sample of peak flux GRB
spectra observed by CGRO/BATSE combined with the 2nd Fermi/GBM catalog. The results from the two instruments are fully consistent. We find that 78% of long GRBs and 85% of short GRBs cannot be explained by standard slow cooling synchrotron from a Maxwellian distribution of electrons, and almost half the spectra are more narrow that monoenergetic synchrotron. Conversely, photospheric emission can explain the spectra if mechanisms are invoked to give a spectrum much broader than a blackbody. We further find that the median widths of spectra from long and short GRBs are significantly
different, and this is thus a new, independent distinction between the two classes. We will discuss the implications of theseresults and the constraints they place on possible emission mechanisms.

Author: AXELSSON, Magnus

Co-author: Dr BORGONOVO, Luis (Stockholm University)

Presenter: AXELSSON, Magnus

Session Classification: 13 - Gamma-ray bursts