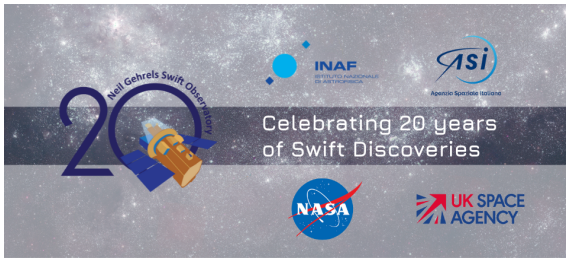

Contribution ID: **136** Type: **Poster**

TeV afterglow emission from a multi-component GRB jet using the kinetic approach

Tuesday 25 March 2025 14:29 (1 minute)

Recent years have seen a growing sample of TeV emission detections in gamma-ray burst afterglows, as well as an increasing role for structured jets in afterglow modelling. Using a kinetic approach, with adiabatic expansion and fully self-consistent IC scattering, we show that the structure of an afterglow jet impacts its TeV emission, with jets where the energy falls off more sharply with angle showing a decrease in Inverse Compton (IC) peak flux relative to synchrotron peak flux at the cooling break.
We compare our results to the semi-analytical code afterglowpy, finding a good agreement with our model across the broadband spectrum except at early times off axis where the effects of baryon loading are important. By using the best fit parameters provided by afterglowpy, we are also able to reproduce the light curves of GRB 170817A in our model.
From comparing electron cooling in the cases where there is no IC cooling, Thomson cooling and an inclusion of Klein-Nishina effects, we find that the synchrotron spectra can only be distinguished in the X-ray band if the Compton potential is significantly increased. The smooth and gradual transition of the self-consistent KN cooling also leads to a disparity in the cooling between our results and semi-analytical solutions based on asymptotic limits.
Finally, we consider the impact of features such as the reverse shock on the forward shock TeV emission using our kinetic approach.

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Session Classification: Poster Session