



Contribution ID: 32

Type: Oral Presentation

Pulse fitting and spectral analysis of Fermi -GBM short GRBs with known redshift and comparisons with magnetar giant flares

Tuesday, 4 July 2023 11:20 (20 minutes)

Short gamma-ray bursts (SGRBs) are energetic impulses with emissions that last for less than 2 s and have a hard spectra. They are cosmological entities and they originate from compact binary mergers like binary systems. Moreover, there is evidence that they are also tied to gravitational wave events after the detection of GRB170817A. However, these properties are not unique to them. There are other short gamma-ray transients that possess similar properties called magnetar giant flares (MGFs). They however, originate from magnetars in our galaxy or in nearby star-forming galaxies. When MGFs are observed at great distances only their prominent peaks are observed hence can be confused with the cosmological SGRBs. Typically, their spectra has a prominent peak which is then followed by prolonged fading pulses. Without the detection of the oscillating fading phase, the distinction between SGRBs and MGFs is hindered if the redshift is unknown. MGFs typically have isotropic energy in the range $10^{44} - 10^{47}$ erg whilst SGRBs are highly energetic with isotropic energy around 10^{52} erg. In this work, both transients with prominent peaks were fit with the Norris function to get their pulse rising times at varying energy ranges and the goodness of the pulse fit was measured with the χ^2 value. Their pulse rising times are utilised to make a distinction between the two transients. MGFs possess pulse rising times that last for hundreds of ms whilst for SGRBs it's a few ms. Moreover, spectral analysis was performed in the energy range 10 keV - 40 MeV and data fitting was achieved with the Comptonised and Band model for the brightest detector for each SGRB. The significance of these fits was determined with the Cash-Castor-statistics. The bursts utilised in the spectral analysis have known red-shift and were detected by the Fermi-GBM instrument.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

Primary author: MAHESO, Dimakatso (University of Johannesburg)

Co-author: Prof. RAZZAQUE, Soebur (UJ)

Presenter: MAHESO, Dimakatso (University of Johannesburg)

Session Classification: Astrophysics & Space Science

Track Classification: Track D1 - Astrophysics