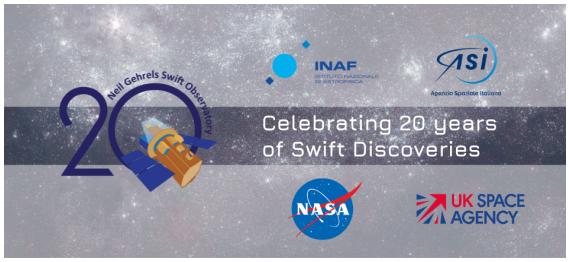

Contribution ID: **73** Type: **Poster**

Modelling gamma-ray burst X-ray afterglow spectra with time-evolving photoionisation

Tuesday 25 March 2025 14:29 (1 minute)

Long gamma-ray bursts are produced by the collapse of a massive star at the end of its life. Typically, LGRB spectra are found to be absorbed by a significant amount of gas within their host galaxy. We can estimate the amount of this gas through broadband spectroscopy. X-ray spectra provide the most complete estimate as they probe the total amount of material along the line of sight compared to optical spectra, which can only probe the relatively neutral gas and miss dust contribution. When optical and X-ray inferred column densities have been compared for the same GRB, they typically differ by up to an order of magnitude. This is referred to as the missing gas problem since it is expected to arise from a column of very highly ionised material near the GRB. We fit a flux-selected sample of seven GRB X-ray spectra using a newly developed time-dependent ionised absorber to model the GRB photoionised medium. We find that the time-dependent ionised absorber fits improve upon a standard neutral absorber model fit for six out of seven bursts in our sample, providing evidence for the presence of the missing highly ionised gas. Furthermore, for all six of these, the corresponding best-fit parameters predict a region of size ~ 10 pc with typical number densities of ~ 10^3 cm^{-3}, consistent with the expected properties of a star-forming region-like environment.

Primary authors: Dr THAKUR, Aishwarya Linesh (Istituto Nazionale di Astrofisica (INAF)); PIRO, Luigi (Istituto Nazionale di Astrofisica (INAF)); LUMINARI , Alfredo (Istituto Nazionale di Astrofisica (INAF)); NICASTRO, Fabrizio (Istituto Nazionale di Astrofisica (INAF))

Presenter: Dr THAKUR, Aishwarya Linesh (Istituto Nazionale di Astrofisica (INAF))

Session Classification: Poster Session