



Contribution ID: 579

Type: Talk in the parallel session

## Do gamma-ray burst measurements provide a useful test of cosmological models?

*Monday, 5 July 2021 18:20 (20 minutes)*

**Context.** We study eight different gamma-ray burst (GRB) data sets to examine whether current GRB measurements – that probe a largely unexplored part of cosmological redshift ( $z$ ) space – can be used to reliably constrain cosmological model parameters.

**Aims.** We use three Amati-correlation samples and five Combo-correlation samples to simultaneously derive correlation and cosmological model parameter constraints. The intrinsic dispersion of each GRB data set is taken as a goodness measurement. We examine the consistency between the cosmological bounds from GRBs with those determined from better-established cosmological probes, such as baryonic acoustic oscillation (BAO) and Hubble parameter  $H(z)$  measurements.

**Methods.** We use the Markov chain Monte Carlo method implemented in MontePython to find best-fit correlation and cosmological parameters, in six different cosmological models, for the eight GRB samples, alone or in conjunction with BAO and  $H(z)$  data. **Results.** For the Amati correlation case, we compile a data set of 118 bursts, the A118 sample, which is the largest – about half of the total Amati-correlation GRBs – current collection of GRBs suitable for constraining cosmological parameters. This updated GRB compilation has the smallest intrinsic dispersion of the three Amati-correlation GRB data sets we examined. We are unable to define a collection of reliable bursts for current Combo-correlation GRB data.

**Conclusions.** Cosmological constraints determined from the A118 sample are consistent with – but significantly weaker than – those from BAO and  $H(z)$  data. They also are consistent with the spatially-flat  $\Lambda$ CDM model, in which dark energy is the cosmological constant  $\Lambda$ , as well as with dynamical dark energy models and non-spatially-flat models. Since GRBs probe a largely unexplored region of  $z$ , it is well worth acquiring more and better-quality burst data which will give a more definitive answer to the question of the title.

**Primary authors:** Mr KHADKA, Narayan (Kansas State University); Dr LUONGO, Orlando; Dr MUCCINO, Marco; Dr RATRA, Bharat

**Presenter:** Mr KHADKA, Narayan (Kansas State University)

**Session Classification:** Theories of Gravity: Alternatives to the Cosmological and Particle Standard Models

**Track Classification:** Alternative Theories: Theories of gravity: alternatives to the cosmological and particle standard models