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

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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 cosmolog- ical 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 ΛCDM model, in which dark energy is the cosmological constant Λ, 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.

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