Gamma Ray Bursts and Cosmology

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Given their huge isotropic-equivalent radiated energies, up to more than 10^{54} erg, and their redshift distribution extending up to more than $z = 8$, Gamma-Ray Bursts (GRB) are in principle a powerful tool for measuring the geometry and expansion rate of the Universe. However, they are not standard candles given that their luminosities span several orders of magnitude, even when considering possible collimation angles. In the recent years, several attempts to exploit the correlation between the "peak energy" and the radiated energy (or luminosity) for "standardizing" GRBs and using them as tools, complementary to other probes like SNe Ia, BAO and the CMBR, for the estimation of cosmological parameters have been made. These studies show that already with the present data set GRBs can provide a significant and independent confirmation of Ω_M around ~0.3 for a flat Lambda-CDM universe and that the measurements expected from present and next GRB experiments will allow us to constrain Ω_M, Ω_Λ, and, in particular, to get clues on dark energy properties and evolution.