

Difficulties in using GRBs as Standard Candles

Gamma-Ray Bursts have been detected uniformly all over the observable universe, ranging in comoving distance from a few hundred Mpc to a few thousand Mpc, representing the farthest observable objects in the universe. This large distance coverage is highly attractive to those who study cosmology and the history of the early universe since there are no other observed objects that represent such a deep and comprehensive probe of the history of the universe. For this reason, there have been extensive studies into the possibility of using GRBs as standard candles much like Type Ia Supernovae, even though little is known about the physical mechanism that produces the observed burst of gamma-rays. We discuss the attempts at defining GRBs as standard candles, such as the search for a robust luminosity indicator, pseudo-redshift predictions, the complications that emission collimation introduces into the estimation of the rest-frame energetics, and the difficulty introduced by the widely varying observed properties of GRBs. These topics will be examined with supporting data and analyses from both Fermi and Swift observations. Problems with current studies using GRBs as standard candles will be noted as well as potential paths forward to solve these problems.