Connection between the Star Formation Rate and the Gamma-Ray Bursts

Attila Mészáros[1], Zsolt Bagoly[2], Lajos G. Balázs[3] and István Horváth[4]

[1]Faculty of Mathematics and Physics, Astronomical Institute, Charles University, V Holešovičkách 2, CZ 180 00 Prague 8, Czech Republic, email: meszaros@cesnet.cz;
[2]Department of Physics of Complex Systems, Eötvös University, H-1117 Budapest, Pázmány P. s. 1/A, Hungary;
[3]Konkoly Observatory, H-1505 Budapest, POB 67, Hungary;
[4]Department of Physics, Bolyai Military University, H-1581 Budapest, POB 15, Hungary

Abstract. It is remarkable that the long gamma-ray bursts, as objects connected with the supernovae - i.e. with the end of the massive stars, trace the star formation rate. This connection is discussed in this contribution. The presentation is in essence a recapitulation of the article Mészáros A. *et al. A&A*, 2006, 455, 785.

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1. Overview of the article Mészáros *et al.* (2006)

The BATSE instrument on the Compton Gamma Ray Observatory detected 2704 gamma-ray bursts (GRBs). From this data set it follows that there are two physically different subgroups of GRBs, "short" and "long" ones (Balázs *et al.* 2003); further subgroups may also exist (see Řípa *et al.* 2012 and the references therein).

The question is the following: Can the redshifts of GRBs be distributed in accordance with other objects arising in star formation regions (Madau 1995 and Dahlen *et al.* 2004)? In addition, this question should be answered separately for any subgroup.

The method is the following: We assume for a given subclass of GRBs that it is distributed in accordance with the redshift distribution of the objects in star formation regions. Then we compare this theoretical expectation with the observational data from the BATSE Catalog.

The answer is that the redshift distribution of the long bursts may be proportional to star-formation rate (SFR). For the short bursts this can also happen, but the proportionality is less evident. The connection of the eventual third subgroup and of the SFR was not studied yet. All these results are independent on the models of GRBs, and also on the cosmological parameters.

References

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