



Publication Year	2016
Acceptance in OA	2020-09-07T11:07:03Z
Title	VizieR Online Data Catalog: GRBs Ep and Fourier PDS slope correlation (Dichiara+, 2016)
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Publisher's version (DOI)	10.26093/cds/vizier.35890097
Handle	http://hdl.handle.net/20.500.12386/27170
Journal	VizieR Online Data Catalog



J/A+A/589/A97 GRBs Ep and Fourier PDS slope correlation (Dichiara+, 2016)

Correlation between peak energy and Fourier power density spectrum slope in gamma-ray bursts.

Dichiara S., Guidorzi C., Amati L., Frontera F., Margutti R.
 <Astron. Astrophys. 589, A97 (2016)>
 =[2016A&A...589A..97D](#) (SIMBAD/NED BibCode)

ADC_Keywords: Gamma rays ; Combined data

Keywords: gamma-ray burst: general - methods: statistical

Abstract:

The origin of the gamma-ray burst (GRB) prompt emission still defies explanation, in spite of recent progress made, for example, on the occasional presence of a thermal component in the spectrum along with the ubiquitous non-thermal component that is modelled with a Band function. The combination of finite duration and aperiodic modulations make GRBs hard to characterise temporally. Although correlations between GRB luminosity and spectral hardness on one side and time variability on the other side have long been known, the loose and often arbitrary definition of the latter makes the interpretation uncertain.

We characterise the temporal variability in an objective way and search for a connection with rest-frame spectral properties for a number of well-observed GRBs.

We studied the individual power density spectra (PDS) of 123 long GRBs with measured redshift, rest-frame peak energy $E_{p,i}$ of the time-averaged νF_ν spectrum, and well-constrained PDS slope α detected with Swift, Fermi and past spacecraft. The PDS were modelled with a power law either with or without a break adopting a Bayesian Markov chain Monte Carlo technique.

Description:

We report in the table the parameters resulting from the power density spectrum analysis of a sample of 123 long GRBs with measure of redshift. The PDS best-fit parameters are listed together with the isotropic-equivalent energy and spectral rest-frame peak energy values. Uncertainties are 1 sigma confidence.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
table1.dat	92	143	PDS parameters of a sample of 123 long GRBs
refs.dat	75	104	References

See also:

[J/ApJ/777/132](#) : A search for progenitors of short GRBs (Dichiara+, 2013)
[J/A+A/589/A98](#) : Swift GRBs individual power density spectra (Guidorzi+, 2016)

Byte-by-byte Description of file: [table1.dat](#)

Bytes	Format	Units	Label	Explanations
1- 7	A7	---	GRB	GRB name (YYMMNNA)
9- 15	A7	---	Exp	Experiment use for detection and spectroscopy (1)
17- 22	F6.4	---	z	Redshift
24- 29	F6.3	[10+45J]	log(E52)	logarithmic value of Eiso (isotropic-equivalent radiated energy) (in 10^{52} erg)
31- 35	F5.3	[10+45J]	e_log(E52)	logarithmic error related to Log(E52) (in 10^{52} erg)
37- 41	F5.3	[keV]	log(Epi)	logarithmic value of $E_{p,i}$ (peak energy of the νF_ν spectrum)
43- 47	F5.3	[keV]	e_log(Epi)	logarithmic error related to Log(Epi)
49- 54	F6.1	s	tstart	Time interval used for the PDS extraction: start time (2)
56- 60	F5.1	s	tstop	Time interval used for the PDS extraction: stop time (2)
62- 66	F5.3	---	alpha	PDS power-law index
68- 72	F5.3	---	e_alpha	alpha error
74- 79	F6.3	[Hz]	logfb	? logarithmic break frequency of PDS (3)
81- 85	F5.3	[Hz]	e_logfb	? logarithmic error related to logfb
87- 88	I2	---	r_z	[1-70]? References for redshift values, in refs.dat file

Note (1): Fer+Swi indicates that both Fermi and Swift data gave acceptable results for that GRB. The values are reported in two consecutive lines, referring to Fermi and Swift, respectively.

Note (2): Times (in seconds) are referred to the trigger time.

Note (3): Only for the GRBs whose PDS are best fit with a bent power-law model.

Byte-by-byte Description of file: [refs.dat](#)

Bytes	Format	Units	Label	Explanations
1- 3	I3	---	Ref	Reference ocde
5- 23	A19	---	BibCode	BibCode
25- 48	A24	---	aut	Atuhor's name
51- 75	A25	---	Com	Comments

Acknowledgements:
Simone Dichiara, [dichiara\(at\)fe.infn.it](mailto:dichiara(at)fe.infn.it)

(End) Simone Dichiara [Univ. Ferrara], Patricia Vannier [CDS] 17-Mar-2016

The document above follows the rules of the [Standard Description for Astronomical Catalogues](#); from this documentation it is possible to generate *f77* program to load files [into arrays](#) or [line by line](#)