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J/A+A/580/A139 GRB 130606A VLT/X-shooter spectroscopy (Hartoog+, 2015)

VLT/X-shooter spectroscopy of the afterglow of the Swift GRB 130606A.
Hartoog O.E., Malesani D., Fynbo J.P.U., Goto T., Kruhler T.,
Vreeswijk P.M., De Cia A., Xu D., Moller P., Covino S., D'Elia V.,
Flores H., Gondoni P., Hjorth J., Jakobsson P., Krogager J.-K., Kaper L.,
Ledoux C., Levan A.J., Milvang-Jensen B., Sollerman J., Sparre M.,
Tagliaferri G., Tanvir N.R., de Ugarte Postigo A., Vergani S.D.,
Wiersema K., Datson J., Salinas R., Mikkelsen K., Aghanim N.
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[=2015A&A...580A.139H](#)

ADC_Keywords: Gamma rays ; Spectra, infrared ; Spectroscopy

Keywords: gamma-ray bursts: individual: GRB 130606A - cosmology: observations -
dark ages, reionisation, first stars - ISM: abundances

Abstract:

The reionisation of the Universe is a process that is thought to have ended around $z \sim 6$, as inferred from spectroscopy of distant bright background sources, such as quasars (QSO) and gamma-ray burst (GRB) afterglows. Furthermore, spectroscopy of a GRB afterglow provides insight in its host galaxy, which is often too dim and distant to study otherwise.

For the Swift GRB 130606A at $z=5.913$ we have obtained a high S/N spectrum covering the full optical and near-IR wavelength region at intermediate spectral resolution with VLT/X-Shooter. We aim to measure the degree of ionisation of the intergalactic medium (IGM) between $z=5.02-5.84$ and to study the chemical abundance pattern and dust content of its host galaxy.

We estimated the UV continuum of the GRB afterglow using a power-law extrapolation, then measured the flux decrement due to absorption at $\text{Ly}\alpha, \beta$, and γ wavelength regions. Furthermore, we fitted the shape of the red damping wing of $\text{Ly}\alpha$. The hydrogen and metal absorption lines formed in the host galaxy were fitted with Voigt profiles to obtain column densities. We investigated whether ionisation corrections needed to be applied.

Description:

Reduced visual (VIS) and Near-IR (NIR) VLT/X-shooter spectra (before normalization) of the afterglow of GRB130606A (Pipeline produced, see headers of the fits files for additional info).

The original data files and calibrations can be found on <http://archive.eso.org/wdb/wdb/eso/xshooter/form> under program 091.C-0934(C) querying the following coordinates:
coord1 = 16 37 35.188
coord2 = +29 47 47.03

Objects:

RA	(2000)	DE	Designation(s)
16 37 35.12	+29 47 46.4		GRB 130606A = GRB 130606A

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
list.dat	162	16	List of fits spectra
fits/*	0	16	Individual fits spectra

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

Bytes	Format	Units	Label	Explanations	
1-	5	I5	---	Nx	Number of pixels along X-axis
	7	I1	---	Nsp	Number of spectra in the file (1)
9-	18	A10	"YYYY-DD-MM"	Obs.date	Observation date (2013-06-07)
	19	A1	---		[T]
20-	32	A13	"h:m:s"	Obs.time	Observation time
34-	40	F7.2	nm	lam.min	[533/1066] Lower value of wavelength interval
42-	48	F7.2	nm	lam.max	[1019/2480] Upper value of wavelength interval
50-	53	F4.2	nm	dlam	[0.02/0.05] Spectral resolution
55-	57	I3	Kibyte	size	Size of FITS file
59-120	A62	---	FileName		Name of FITS file, in subdirectory fits
122-162	A41	---	Title		Title of the file

Note (1): For individual observations (xsn*), spectrum, error and quality.

Acknowledgements:

Olga Hartoog, [olgahartoog\(at\)gmail.com](mailto:olgahartoog@gmail.com)

(End)

Patricia Vannier [CDS] 22-Jun-2015

*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](#)*

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