CDROM/APJS/V99/P223 IUE UV Observations of SN 1987A (Pun+ 1995)

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Ultraviolet Observations of SN 1987A with the IUE Satellite

Chun S.J. Pun, Robert P. Kirshner, George Sonneborn, Peter Challis, George Nassiopoulos, Richard Arquilla, D. Michael Crenshaw, Chris Shrader, Terry Teays, Angelo Cassatella, Roberto Gilmozzi, Antonio Talavera, Willem Wamsteker, Claus Fransson, & Nino Panagia

<1995, ApJS, 99, 223>
=1995ApJS...99..223P

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Abstract:

Ultraviolet (lambda: 1150-3300 A) observations of SN 1987A with the IUE satellite provide a unique data set. Observations started the day after discovery, 1987 February 24 (day 1.6), and a total of 751 spectra were obtained through 1992 June 9 (day 1567). The data have been processed to generate a complete catalog of SN 1987A ultraviolet spectra. The data reduction procedure includes careful line-by-line extraction, removing hits and hot pixels, and, most importantly, a scrupulous subtraction of the contribution from stars near SN 1987A within the IUE aperture. In addition to processing the data, we have also extracted light curves, and combined them with the ground-based optical data and HST observations (day 1278 to 2431) to extend the study in both wavelength and time. The data-processing procedures of our IUE study produce results that are consistent with the HST data where they overlap, but not with the IUE study by Sanz Fernandez de Cordoba (1993, A&A, 276, 103) because of its incorrect background subtraction. The IUE data are consistent with the ground-based Walraven VBLUW photometry, while we found that flux scale of the Soviet ASTRON satellite spectroscopic data is low by ~15%. The UV flux plummeted during the earliest days of observations because of the drop in the photospheric temperature and the increase in opacity. However, after reaching a minimum of 0.04% on day 44, the UV flux increased by 175 times in its contribution to 7% of the total UVOIR bolometric luminosity at day 800. A revised set of bolometric data has been constructed which includes the contribution of UV from day 1 to day 1352. Studies of the UV colors show that the supernova started to get bluer in UV around the time when dust started to form in the ejecta. Our results are consistent with the possibility that the dust condensed may be metal-rich.

Keywords: ultraviolet: stars -- stars: individual (SN 1987A)

Description:

The data for this paper were supplied in five UNIX tar files containing the FITS images for (1) the IUE LWP background, (2) LWP data, (3) SWP background, (4) SWP data, and (5) optical observations. Tables 2(a), 2(b), 3(a), and 3(b) containing the journal of IUE observations were also included. The FITS files contained in the tar files had names such as 'lwp.18792.bgd.fits'. These names are not compatible with the ISO 9660 CD-ROM file system standard. The files were renamed first by placing each of the files from the five tar files into their own subdirectory, e.g. 'lwpbgd', and renaming the files to ISO 9660-style names, e.g. 'l18792.fit'. The tables containing the journals of observations include the new file names so that the user can correlate the FITS files to the proper observations. The author-supplied README file has been included to provide further explanations of the data.

File Summary:

File Name	Lrecl	Records	Explanations
readme.dat	80	65	Author-supplied description of data files
table2a.dat	60	6	Journal of observations: swpbgd FITS files
table2b.dat	60	11	Journal of observations: lwpbgd FITS files
table3a.dat	60	158	Journal of observations: swpdata FITS files
table3b.dat	60	322	Journal of observations: lwpdata FITS files
swpbgd/*	.	.	Short wavelength spectra (1150 - 1975 A) averaged for background subtraction
lwpbgd/*	.	.	Long wavelength spectra (1975 - 3300 A) averaged for background subtraction
swpdata/*	.	.	IUE SWP camera (1150 - 1975 A) observations of SN 1987A
lwpdata/*	.	.	IUE LWP camera (1975 - 3300 A) observations of SN 1987A
optfits/*	.	.	Combined IUE and CTIO spectra of SN 1987A

Byte-by-byte Description of file: readme.dat

Bytes	Format	Units	Label	Explanations
1-80	A80	---	Text	Text of the README file

Byte-by-byte Description of file: table2a.dat

Bytes	Format	Units	Label	Explanations
1-12	A12	---	File	Name of FITS file in swpbgd directory
13	1X	---	---	Blank
14-16	A3	---	CAM	IUE camera, always SWP
17	1X	---	---	Blank
18-22	I5	---	IMG	IUE image number
23-24	2X	---	---	Blank
25-44	A20	UT	Date	Date of observation
45-51	F7.2	day	Day	Day number of SN 1987A
52-54	3X	---	---	Blank
55-60	A6	---	Exp	Exposure time. Trailing 's' for sec, 'm' for min

Byte-by-byte Description of file: table2b.dat

Bytes	Format	Units	Label	Explanations
1-12	A12	---	File	Name of FITS file in lwpbgd directory
13	1X	---	---	Blank
14-16	A3	---	CAM	IUE camera, always LWP
17	1X	---	---	Blank
18-22	I5	---	IMG	IUE image number
23-24	2X	---	---	Blank
25-44	A20	UT	Date	Date of observation
45-51	F7.2	day	Day	Day number of SN 1987A
52-54	3X	---	---	Blank
55-60	A6	---	Exp	Exposure time. Trailing 's' for sec, 'm' for min

Byte-by-byte Description of file: table3a.dat

Bytes	Format	Units	Label	Explanations
1-12	A12	---	File	*Name of FITS file in swpdata directory
13	1X	---	---	Blank
14-16	A3	---	CAM	IUE camera, always SWP
17	1X	---	---	Blank

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  18-22   I5     ---      IMG       IUE image number
  23-24   2X     ---      ---       Blank
  25-44   A20    UT       Date      Date of observation
  45-51   F7.2   day      Day       Day number of SN 1987A
  52-54   3X     ---      ---       Blank
  55-60   A6     ---      Exp       Exposure time.  Trailing 's' for sec, 'm'
                                    for min
--------------------------------------------------------------------------------

Notes for file: table3a.dat
--------------------------------------------------------------------------------
File:
  If this field is blank, the rest of the fields are continuations of
  the previous record.  No FITS file was included for IUE image SWP
  36171; in this case, the File field is all dashes.
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Byte-by-byte Description of file: table3b.dat
--------------------------------------------------------------------------------
   Bytes Format  Units    Label     Explanations
--------------------------------------------------------------------------------
   1-12   A12    ---      File     *Name of FITS file in lwpdata directory
  13      1X     ---      ---       Blank
  14-16   A3     ---      CAM       IUE camera, always LWP
  17      1X     ---      ---       Blank
  18-22   I5     ---      IMG      *IUE image number
  23-24   2X     ---      ---       Blank
  25-44   A20    UT       Date      Date of observation
  45-51   F7.2   day      Day       Day number of SN 1987A
  52-54   3X     ---      ---       Blank
  55-60   A6     ---      Exp       Exposure time.  Trailing 's' for sec, 'm'
                                    for min
--------------------------------------------------------------------------------

Notes for file: table3b.dat
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File:
  If this field is blank, the rest of the fields are continuations of
  the previous record.

IMG:
  For LWP 10189, spectrum saturated for 2650 - 3000 A
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(End)                                            Lee Brotzman [ADS] 29-Aug-95
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