

## A Bibliography of IUE Atlases and Catalogues, 1978–1988

Patricia S. Pitts  
February 16, 1990

A preliminary list of atlases and catalogues based on IUE data appeared in a previous issue of this Newsletter (Pitts and Imhoff 1989). Since then, I have completed a search through eleven years of references and have compiled a bibliography of 106 items; the complete list is presented on the following pages.

As before, articles not specifically titled “catalogue” or “atlas” are included if they contain five or more plots (usually flux vs. wavelength) derived from IUE data. If a work contains plots which are too small to see in detail or have inconsistent units as labels, the article is usually not listed. Several papers with line identification lists are also included. I attempted to be liberal in my choices and looked particularly for studies in areas not heavily represented in the first bibliography (e.g., variable stars and solar system objects). Publication of an atlas covering a missing category would no doubt be appreciated by many researchers.

Thanks are due to those who brought articles to my attention or who have communicated their intention to compile an atlas. Please keep us informed of your progress.

### Reference:

Pitts, P.S., and Imhoff, C.L. 1989, *NASA IUE Newsletter*, **37**, 1.

Part I. IUE Atlases and Catalogues by Category

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|                  | UV Interstellar Extinction toward Stars in the Orion Nebula & toward HD 147889  | Bohlin           | O, B dwarfs<br>nebula-associated stars       | 18   |
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|                  | The Interstellar Absorption-Line Spectrum of $\mu$ Ophiuchi                     | Cardelli         | B dwarfs                                     | 20   |
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|                  | Third Spectra of Rare Earth Elements in Chemically Peculiar Stars: IUE Spectra  | Cowley, C.       | Ap stars                                     | 22   |
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|                  | UV Line List for O Star Spectra   | Dean             | O dwarfs/<br>sub-dwarfs                      | 22   |

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|                   | UV & Visual Variability of $\theta$ CrB during a Normal B-Phase Following a Shell Phase                          | Doazan           | Be stars  | 23   |
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|                   | IUE Observations of Stars in 30 Dor: Extinction & Stellar Continua   | Fitzpatrick      | O, B stars<br>Wolf-Rayet stars<br>nebula-associated stars       | 27   |
|                   | Highly Ionized Stellar Winds in Be Stars: The Evidence for Aspect Dependence                                     | Grady            | B dwarfs/giants<br>Be stars                                     | 28   |
|                   | Line Profile Variations in $\delta$ Ori A, $\iota$ Ori A, & 15 Mon   | Grady            | O dwarfs/giants   | 29   |

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|                   | The UV Gallium Stars   | Jaschek          | B dwarfs/giants                               | 30   |
|                   | UV Spectra of the Central Stars of Large Planetary Nebulae   | Kaler            | nebula-associated stars                       | 31   |
|                   | UV Observations of Be Stars. II. Superionization in Be Stars of Different SpTs                           | Marlborough      | Be stars<br>O, B dwarfs/<br>sub-giants/giants | 32   |
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|                   | UV Observations of Extensive Variability in the Stellar Wind of $\xi$ Persei                             | Prinja           | O giants                                      | 35   |
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|                   | IUE Atlas of O-Type Spectra from 1200 to 1900 Å   | Walborn          | O dwarfs/giants/<br>supergiants<br>Wolf-Rayet stars   | 42   |

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|                          | Outer Atmospheres of Cool Stars. II. Mg II Flux Profiles & Chromospheric Radiative Loss Rates  | Basri            | G, K, M dwarfs/<br>giants/<br>supergiants | 16   |
|                          | The Spectra of Late-Type Dwarfs & Sub-Dwarfs in the Near UV. I. Line Identifications           | Beckman          | A, F, G dwarfs/<br>sub-dwarfs             | 16   |
|                          | Chromospheric Mg II Emission in A5 to K5 Main Sequence Stars from High Resolution IUE Spectra  | Blanco           | A, F, G, K dwarfs                         | 17   |

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|                    | UV Fluxes of Pop II Stars  | Cacciari         | A, F, G, K, M<br>dwarfs/giants                      | 19   |
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|                    | A Survey of Mg II <i>h</i> & <i>k</i> Emission in Near-Solar-Type Stars  | Doherty          | F, G dwarfs   | 24   |
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|                    | Distribution of Mg II in the Local ISM towards 8 Cool Giants   | Molaro           | G, K giants   | 34   |

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|                           | The UV Spectrum of UW CMa   | Drechsel         | O supergiants<br>eclipsing binaries                 | 24   |
|                           | IUE Observations of RCB Stars during Extinction Minima  | Evans            | R CrB stars   | 25   |



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|                                | Interstellar Extinction<br>Variations in the LMC                                     | Fitzpatrick      | O, B supergiants   | 27   |
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## Part II. List of Atlases and Catalogues

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| Abbreviations: <i>A. &amp; A.</i> | Astronomy and Astrophysics                              |
| <i>A. &amp; A. Supp.</i>          | Astronomy and Astrophysics Supplement                   |
| <i>Ap.J.</i>                      | Astrophysical Journal                                   |
| <i>Ap.J. Supp.</i>                | Astrophysical Journal Supplement                        |
| <i>M.N.R.A.S.</i>                 | Monthly Notices of the Royal Astronomical Society       |
| <i>P.A.S.P.</i>                   | Publications of the Astronomical Society of the Pacific |

Aiello, S., Barsella, B., Chlewicki, G., Greenberg, J. M., Patriarchi, P., and Perinotto, M.  
*A. & A. Supp.*, **73**, 195, 1988

### Interstellar Extinction

#### “Atlas of the Wavelength Dependence of Ultraviolet Extinction in the Galaxy”

The authors use short- and long-wavelength pairs of IUE low-dispersion spectra (plus six OAO-2 spectra of bright comparison stars for completeness) to derive 115 extinction curves, which are made available on a microfiche supplied with the article. Areas of the sky covered include dense clouds such as the Carina, Orion, and  $\rho$  Ophiuchi complexes, local and adjacent spiral arms, and other more distant spiral features. Six extinction curves for stars which are part of OB associations appear in the body of the article.

Aller, L. H., Keyes, C. D., Maran, S. P., Gull, T. R., Michalitsianos, A. G., and Stecher, T. P.  
*Ap.J.*, **320**, 159, 1987

### Hot Stars; Interstellar Matter, Nebulae, and Related Objects; Extragalactic Objects

#### “Physical Parameters for 12 Planetary Nebulae and Their Central Stars in the Magellanic Clouds”

Nebular and central star parameters and elemental abundances of C, N, O, Ne, S, and Ar are presented for six SMC and six LMC planetary nebulae, based on low-dispersion SWP and LWR spectra. Plots of flux vs.  $\lambda$  are shown for three representative planetaries in each galaxy, with some spectral features identified. Tables of elemental abundances for each cloud are included.

Appenzeller, I., Chavarria, C., Krautter, J., Mundt, R., and Wolf, B.  
*A. & A.*, **90**, 184, 1980

### Cool Stars

#### “UV Spectrograms of T Tauri Stars”

LWR and SWP low-dispersion spectra of four T Tauri stars are examined. The paper includes plots of flux versus wavelength (1200–3200 Å) with many features identified. There is also a list of emission and absorption lines which gives laboratory wavelength, species identification, and whether or not the feature appears in each star’s spectrum. An observing log is included.

Ayres, T. R., Marstad, N. C., and Linsky, J. L.  
*Ap.J.*, **247**, 545, 1981

#### Cool Stars

“Outer Atmospheres of Cool Stars. IX. A Survey of Ultraviolet Emission from F–K Dwarfs and Giants with IUE”

The authors study low-dispersion SWP spectra of thirteen F–K dwarfs and giants. They discuss comparisons of chromospheric and transition-region emission-line strengths and broad-band coronal soft-X-ray fluxes. The flux ratio  $f_{\lambda}/\lambda_{bol}$  is plotted against wavelength (1150–2000 Å) for each star. The paper includes a short observing log.

Barker, P. K., and Marlborough, J. M.  
*Ap.J.*, **288**, 329, 1985

#### Hot Stars

“Carbon IV Absorption Troughs in the Ultraviolet Spectra of Be Stars: Gone with the Wind?”

This study of the variability of C IV  $\lambda\lambda 1548, 1550$  absorption troughs includes plots of relative flux versus wavelength of five Be stars, taken from SWP high-dispersion images. Data are plotted at nine epochs for the star 66 Oph and at two epochs for 105 Tau,  $\lambda$  Eri, HR 7739, and 6 Cep. The authors' discussion includes a table of parameters of the shifted narrow components at C IV and Si IV in 66 Oph at each date.

Baschek, B., Heck, A., Jaschek, C., Jaschek, M., Köppen, J., Scholz, M., and Wehrse, R.  
*A. & A.*, **131**, 378, 1984

#### Hot Stars

“The Ultraviolet (IUE) Spectra of the Lambda Bootis Stars”

Data were obtained from low- and high-resolution SWP and LWR spectra of nine Lambda Boo stars or Lambda Boo candidates. Some normal A stars were also observed. The paper includes plots of low-dispersion spectra ( $\log F_{\lambda}$  vs.  $\lambda$ ) in the range 1200–3200 Å for five standards and three Lambda Boo stars. There are also high-dispersion spectra of the C I  $\lambda\lambda 1656-58$  multiplet and the A III  $\lambda 1671$  resonance line in three Lambda Boo stars and a standard star. The high-dispersion SWP spectrum of Lambda Boo itself is examined.

Basri, G. S., and Linsky, J. L.  
*Ap.J.*, 234, 1023, 1979

Cool Stars

“Outer Atmospheres of Cool Stars. II. Mg II Flux Profiles and Chromospheric Radiative Loss Ratios”

The Mg II  $\lambda\lambda 2796, 2803$  lines in fourteen stars of types G2–M2 are examined on LWR high-dispersion spectra. Chromospheric radiative loss rates in these lines are compared with the corresponding rates in Ca II lines. The authors also discuss the behavior of the ratio of Mg II surface fluxes to total fluxes. In particular, this paper includes plots for each star in the wavelength interval 2790–2810 Å.

Beckman, J. E., Crivellari, L., and Selvelli, P. L.  
*A. & A. Supp.*, 47, 295, 1982

Cool Stars

“The Spectra of Late-Type Dwarfs and Sub-Dwarfs in the Near Ultraviolet. I. Line Identifications”

This study employs LWR high-resolution spectra of six main-sequence and near-main-sequence stars from types A5–G8. The authors identify 250 absorption features in the interval 2700–2900 Å. The table of identifications includes wavelengths in air, ion, multiplet, and scaled intensity. The log of observations includes image number, exposure time, and aperture used.

Benvenuti, P., Sanz Fernandez de Cordoba, L., Wamsteker, W., Macchetto, F., Palumbo, G. C., and Panagia, N.  
*European Space Agency Special Publication #1046*, 1982

Supernovae

An Atlas of UV Spectra of Supernovae

This atlas displays three type-I and three type-II supernovae from the years 1978–1982. There is a detailed journal of observations and plots of individual SWP and LWR spectra for each supernova, chronologically arranged, with color photographs of the line-by-line images above each spectrum. Also included are flux tables and a few combined short- and long-wavelength spectra.

Bernat, A. P.  
*Ap.J.*, 252, 644, 1982

Hot Stars

“International Ultraviolet Explorer Observations of Alpha Scorpii”

The author discusses observations of the absorption spectrum of  $\alpha^2$  Scorpii (B2.5 V), using six SWP and six LWR high-dispersion spectra. Of primary interest is a list of line identifications, including equivalent widths and absolute oscillator strengths. Hydrogen column densities and a comparison of IUE and BUSS equivalent widths are included.



Blades, J. C., Wheatley, J. M., Panagia, N., Grewing, M., Pettini, M., and Wamsteker, W.  
*Ap.J.*, **334**, 308, 1988

Supernovae; Interstellar Matter, Nebulae, and Related Objects

“An Ultraviolet Spectral Atlas of Interstellar Lines toward SN 1987A”

Taken during the first few days after the discovery of SN 1987A, six SWP and six LWP high-resolution spectra extending from 1250 to 3200 Å are presented in the first part of this atlas. The second part is a table of observed absorption lines which lists equivalent widths, laboratory wavelengths, *f*-values, and observed velocities. The third part is a sequence of velocity profiles of most of the identified species. An observing log is included in the article.

Blanco, C., Bruca, L., Catalano, S., and Marilli, E.  
*A. & A.*, **115**, 280, 1982

Cool Stars

“Chromospheric Mg II Emission in A5 to K5 Main Sequence Stars from High Resolution IUE Spectra”

This study involves observations of the emission cores of the Mg II resonance doublet at  $\lambda 2800$  in eleven main sequence stars (types A5–K5) and for Alpha Tau (K5 III) and Alpha Aqr (G2 Ib). Chromospheric radiative losses from the *h* and *k* lines are discussed. The authors have included plots of flux versus wavelength (2792–2806 Å) from LWR high-dispersion spectra of all thirteen stars. There is also a detailed observing log.

Boggess, A., Feibelman, W. A., and McCracken, C. W.  
*NASA Conference Publication*, #2171, 663, 1980

Interstellar Matter, Nebulae, and Related Objects

“An Atlas of Emission Line Fluxes of Planetary Nebulae in the 1150–3200 Å Region”

Emission line fluxes are presented for twenty-eight planetary nebulae in four excitation classes. Data were derived from low-dispersion spectra taken with the nebula centered in the large aperture.

Bohlin, R. C., and Savage, B. D.  
*Ap.J.*, **249**, 109, 1981

Hot Stars; Interstellar Matter, Nebulae, and Related Objects; Interstellar Extinction

“Ultraviolet Interstellar Extinction toward Stars in the Orion Nebula and toward HD 147889”

Ultraviolet interstellar extinction toward the Orion nebula is examined from low-dispersion SWP and LWR images of the four Trapezium stars ( $\theta^1$  Ori A, B, C, and D) and of  $\theta^2$  Ori A and B. A highly-reddened star and several unreddened standard stars are also measured. Stars range in type from O9.5 to B3 and are of luminosity classes IV and V. Fluxes are plotted for all ten stars in the interval 1200–3200 Å. Absolute energy distributions are given in a table where fluxes are binned in 25 Å intervals over the same wavelength range.

Brandi, E., and Gosset, E.  
*A. & A. Supp.*, **68**, 283, 1987

Hot Stars

“The Ultraviolet Spectrum of the Peculiar Emission-Line Star GG Carinae: The Line Identifications”

Three high-resolution SWP and LWR images are used to identify absorption, emission, and P Cygni lines in the spectrum of the Bep star GG Car. Features appearing between 1232 and 3196 Å are catalogued in a table which gives observed wavelength, type of line, contributing element, UV multiplet number, and laboratory wavelength.

Brosch, N., Greenberg, J. Mayo, Rahe, J., and Shaviv, G.  
*A & A*, **135**, 330, 1984

Extragalactic Objects

“Ultraviolet Spectrophotometry of Isolated Galaxies”

The nature of the ultraviolet excesses and continuum emission in “isolated” galaxies is discussed in this article. Low-dispersion LWR and SWP images, centered on the nuclei of these objects, are used to derive plots of flux versus wavelength over the range 1400–3200 Å for four galaxies and over 2000–3200 Å for a fifth.

Buss, Jr., R. H., and Snow, Jr., T. P.  
*Ap.J.*, **335**, 331, 1988

Cool Stars; Variable Stars; Interstellar Extinction

“Hot Components and Circumstellar Grains in M Supergiant Syncretic Binaries”

Ultraviolet spectra and infrared data are used to study grains in cool star plus hot star syncretic (VV Cep) type binaries. The authors include an observing log of the SWP, LWP, and LWR low-dispersion images taken. Plots include flux versus wavelength (1170–3230 Å) for nineteen stars. Another series of plots for the 1150–2500 Å region illustrates important chromospheric lines with unreliable regions indicated. There are also extinction curves plotted for several stars and grouped according to type (giant or dwarf), and whether the extinction is circumstellar or not. Spectral variability is illustrated for the dusty star HD 81137 and the peculiar star HD 208816.

Butterworth, P. S., and Meadows, A. J.  
*Icarus*, **62**, 305, 1985

Solar System Objects

“Ultraviolet Reflectance Properties of Asteroids”

An analysis of the LWR spectra of twenty-eight asteroids is presented. Along with a detailed observing log, the authors present plots of geometric albedo versus wavelength for twenty-six asteroids, linking the ultraviolet with other wavelength regions up to 10,000 Å. There are also plots of reflectance versus wavelength (2200–3200 Å) for twenty-seven objects, normalized at 3170 Å. The problems of observing asteroids with IUE and possible absorption features observed in the spectra are discussed.

Cacciari, C.  
*A. & A. Supp.*, **61**, 407, 1985

Cool Stars

“UV Fluxes of Population II Stars”

This is a catalogue of IUE UV fluxes and calibrated plots for thirty-six metal-poor field halo stars for which absolute energy distributions in the visual are available elsewhere. It includes a table of fluxes at 5 Å intervals covering  $\lambda\lambda 1155\text{--}3195$  or  $\lambda\lambda 1955\text{--}3195$ , based on low-resolution LWR and SWP spectra. The long- and short-wavelength regions are plotted separately for each star. The catalogue is available on magnetic tape from the Strasbourg Stellar Data Center.

Cardelli, J., and Böhm-Vitense, E.  
*Ap.J.*, **262**, 213, 1982

Hot Stars

“The Interstellar Absorption-Line Spectrum of  $\mu$  Ophiuchi”

Interstellar lines are measured on high-resolution, short- and long-wavelength spectra of the B8 V star  $\mu$  Ophiuchi. Column densities and turbulent velocities are determined for the observed atoms and ions, which are identified in a table which includes equivalent widths and oscillator strengths.

Carpenter, K. G., Wing, R. F., and Stencel, R. E.  
*Ap.J. Supp.*, **57**, 405, 1985

Cool Stars

“Line Identifications, Line Strengths, and Continuum Flux Measurements in the Ultraviolet Spectrum of Arcturus”

The high-resolution spectrum of Arcturus (K2 IIIp) is plotted from 2250–3230 Å on a linear (not absolutely calibrated) intensity scale from high-resolution LWR images. In addition, the low-resolution spectrum is plotted from 1200–1900 Å (SWP camera) with spectral features identified. The article includes tables of line identifications over the range 1150–2900 Å, selected absorption-line strengths, and the UV energy distribution.

Carpenter, K. G., Pesce, J. E., Stencel, R. E., Brown, A., Johansson, S., and Wing, R. F.  
*Ap.J. Supp.*, **68**, 345, 1988

Cool Stars

“The Ultraviolet Spectrum of Noncoronal Late-Type Stars: The Gamma Crucis (M3.4 III) Reference Spectrum”

This work is a guide to the ultraviolet spectrum of M-type giants and supergiants whose outer atmospheres contain warm chromospheres but not coronae. It is to be used in planning high-dispersion observations with the Hubble Space Telescope and as an aid in the analysis of IUE data. The authors have made line identifications and integrated line flux measurements of chromospheric emission features seen in the 1200–3200 Å range of IUE spectra. They discuss major fluorescence processes and identify absorption features which can be used as photospheric radial velocity indicators. Four spectra, one low- and one high-dispersion each from the SWP and LWR cameras, were chosen. The 1200–2700 Å region of the SWP high-dispersion image and the 2435–2485 Å region of the LWR high-dispersion image are plotted with spectral features marked. These features are listed in a table along with their FWHM, peak flux, and net integrated line flux. The two low-dispersion images are also shown, with major emission features labeled.

Cassatella, A., Barbero, J., and Geyer, E. H.  
*Ap.J. Supp.*, **64**, 83, 1987

Extragalactic Objects

“Ultraviolet Observations by the IUE of 31 Clusters of the Large Magellanic Cloud”

Basic ultraviolet properties of clusters in the LMC, mostly globular, are examined in this paper. Among the tables included are a detailed observing log and a list of broad-band fluxes, binned in 50 Å steps from 1200 to 3150 Å. Plots of slit-integrated energy distributions are shown for the same wavelength interval.

Chapman, G. N. F., Geller, M. J., and Huchra, J. P.  
*Ap.J.*, **297**, 151, 1985

Extragalactic Objects

“The Ultraviolet Variability of Seyfert 1 Galaxies”

Multiple SWP and LWR spectra of nine Seyfert galaxies are studied to determine continuum and emission-line variability. Included are plots of flux versus wavelength in the 1200–2000 Å range for all objects and in the 1900–3100 Å range for two objects.

Costero, R., and Stalio, R.  
*A. & A. Supp.*, **58**, 95, 1984

Hot Stars

“P Cygni and Related Profiles in the Ultraviolet Spectra of O-Stars”

Forty stars were observed with the SWP camera at high resolution to study resonance lines of N V, Si IV, and C IV. The object sample includes sub-dwarfs, high-luminosity population II objects, stars which are members of open clusters and/or associations, and stars which are not members. There are two sequences of line profiles: one for Si IV  $\lambda\lambda 1394\text{--}1403$  and one for C IV  $\lambda\lambda 1548\text{--}1551$ . Mass flow, individuality of stars with the same spectral type, and line variability are among the topics discussed.

Cowley, A. P., and Burstein, D.  
*A.J.*, **95**, 1071, 1988

Extragalactic Objects

“The Ultraviolet Spectra of M31 Globular Clusters”

For each of eleven of the brightest clusters in M31, the authors plot the 1200–3200 Å region, omitting a noisy area from 2000–2400 Å. There are two sets of plots: observed flux versus wavelength on a linear scale and extinction-corrected flux normalized to V-magnitude flux and displayed logarithmically. Data are derived from low-dispersion SWP and LWR or LWP spectra.

Cowley, C. R., and Greenberg, M.  
*M.N.R.A.S.*, **232**, 763, 1988

Hot Stars

“Third Spectra of Rare Earth Elements in Chemically Peculiar Stars: IUE Spectra”

This is a survey of LWR high-resolution images of the chemically peculiar stars HR 465, HD 51418,  $\alpha^2$  CVn, HD 101065, and  $\beta$  CrB. The authors identify lines of twelve of the fifteen elements of the lanthanide series: La III, Ce III, Pr III, Eu III, Gd III, Er III, Tm III, Yb III, Lu III, Nd III, Sm III, and Ho III. Plots include intensity vs.  $\lambda$  over the range 2443–2448 Å for four stars showing lines of Eu III and over four wavelength ranges for the star HR 465, identifying lines of Sm III.

Danezis, E., and Theodossiou, E.  
*A. & A. Supp.*, **72**, 497, 1988

Hot Stars

“The Far UV Spectrum of the Be Star 88 Herculis”

The Be star 88 Her is a single-lined spectroscopic binary with a period of 87 days. Using a high-resolution SWP image, the authors examine its spectrum from 1100 to 2100 Å and present a complete list of observed absorption lines, including such data as measured wavelength, laboratory wavelength, principal ions, multiplet number, intensity, and radial velocity for each line.

Dean, C. A., and Bruhweiler, F. C.  
*Ap.J. Supp.*, **57**, 133, 1985

Hot Stars

“An Ultraviolet Line List for O Star Spectra”

The authors have used archival SWP high-dispersion spectra (1150–2000 Å) for two O subdwarfs and a sharp-lined main sequence O star to identify over 550 spectral features. Their line list includes line strengths, radial velocity information, comments describing relative blending, and certainty of identification. A list of interstellar lines is included.

Doazan, V., Grady, C. A., Snow, T. P., Peters, G. J., Marlborough, J. M., Barker, P. K., Bolton, C. T., Bourdonneau, B., Kuhl, L. V., Lyons, R. W., Polidan, P. S., Stalio, R., and Thomas, R. N. *A. & A.*, **152**, 182, 1985

Hot Stars

“The Development of the New Be Phase of 59 Cyg in the Visual and in the Far UV in 1978–1983”

The star 59 Cyg has a B1.5 V spectrum in which appear resonance lines of O VI, N V, and C IV, which vary in shape, velocity, and strength during the star's Be phases. The authors began taking visual and high-resolution SWP spectra in 1978 when the last such phase began, and their results are plotted as relative flux versus wavelength (1540–1555 Å and 1231–1245 Å) for several different epochs.

Doazan, V., Marlborough, J. M., Morossi, C., Peters, G. J., Rusconi, L., Sedmak, G., Stalio, R., Thomas, R. N., and Willis, A. *A. & A.*, **158**, 1, 1986

Hot Stars

“Ultraviolet and Visual Variability of  $\theta$  CrB during a Normal B-Phase Following a Shell Phase (1980–1985)”

IUE and visual spectra of  $\theta$  CrB, taken in both shell and normal phases, show variability in the strength, shape, and velocity of C IV, Si IV, and Al III resonance lines and low-excitation Fe III lines. Using thirty-six SWP high-dispersion images, four montages of line profiles are presented: 1) C IV at each epoch (1540–1560 Å), 2) Si IV at five epochs (1385–1401 Å), 3) Al III at 5 epochs (1858–1873 Å), and 4) Fe III at five epochs (1881–1901 Å).

Doazan, V., Morossi, C., Stalio, R., and Thomas, R. N. *A. & A.*, **170**, 77, 1986

Hot Stars

“Far UV Variability of  $\theta$  CrB in 1980–1985. II. Evidence for Variability Patterns and Ionization Dependence”

Evidence of long-term variability patterns in the shape, velocity, and strength of Si IV, Al III, and Fe III lines in the Be star  $\theta$  CrB is investigated. Based on thirty-five high-resolution SWP spectra, several plots of normalized flux vs. wavelength are presented: 1) 1385–1402 Å, showing profile variations of the 1393.8 Å line of the resonance doublet of Si IV at the end of the shell phase and during the normal B phase, 2) 1857–1872 Å, illustrating the line at 1862.8 Å of the resonance doublet of Al III, and 3) 1882–1903 Å, illustrating the line at 1895.5 Å of Fe III multiplet 34.

Doherty, L. R.  
*M.N.R.A.S.*, **217**, 41, 1985

Cool Stars

“A Survey of Mg II *h* and *k* Emission in Near-Solar-Type Stars”

From LWR high-dispersion spectra, the author examines Mg II *h* and *k* emission fluxes in thirty F and G stars on or near the main sequence and compares his findings to Wilson's measurements of Ca II H and K fluxes in these stars. The wavelength region 2790–2808 Å is illustrated for fifteen of the stars.

Drechsel, H., Rahe, J., Kondo, Y., and McCluskey, Jr., G. E.  
*A. & A. Supp.*, **45**, 473, 1981

Variable Stars

“The Ultraviolet Spectrum of UW Canis Majoris”

The eclipsing binary UW Canis Majoris (=29 CMa =HD 57060) is composed of an O7f supergiant and an O-B secondary which has never been observed in the ultraviolet. The period of the system is 4.3934 days. High-dispersion SWP and LWR images taken near phases 0.86 and 0.30 are combined with data from the OAO-3 satellite to produce a table of identifications which includes observed wavelength, contributing ions, multiplet, and laboratory wavelength of photospheric and envelope lines.

Eaton, J. A., Johnson, H. R., O'Brien, G. T., and Baumert, J. H.  
*Ap.J.*, **290**, 276, 1985

Cool Stars

“Ultraviolet Spectra and Chromospheres of R Stars”

SWP, LWP, and LWR low-dispersion spectra of thirteen normal R stars and two hydrogen-deficient R0 supergiants are examined. Plots include spectra of R0–R3 types in the range 2600–3300 Å, ordered approximately with increasing (IUE–V) color, spectra of R5–R8 types similarly arranged, and two LWR spectra with prominent spectral features identified. Comparison star spectra are also displayed. The authors discuss line identifications, chromospheric emission, and the colors of carbon stars and hydrogen-deficient supergiants.



Evans, A., Whittet, D. C. B., Davies, J. K., Kilkenny, D., and Bode, M. F.  
*M.N.R.A.S.*, **217**, 767, 1985

#### Variable Stars

##### “IUE Observations of RCB Stars during Extinction Minima”

The R CrB stars RY Sgr and MV Sgr were observed with the LWR camera at low dispersion. Simultaneous optical and near-infrared observations enabled the authors to estimate grain dimensions during an extinction event of MV Sgr. The flux curve of RY Sgr is plotted for the wavelength range 2400–3300 Å during deep minimum. Of special interest is a table of identified emission features for RY Sgr.

Fanelli, M. N., O’Connell, R. W., and Thuan, T. X.  
*Ap.J.*, **321**, 768, 1987

#### Hot Stars

##### “Spectral Synthesis in the Ultraviolet. I. Far-Ultraviolet Stellar Library”

This library of mean stellar energy distributions is for use in population synthesis of the UV spectra of active star-forming galaxies and is derived from the ultraviolet spectrophotometry of the IUE Spectral Atlas (Wu et al.). The spectra extend from 1230–1930 Å with a resolution of 6 Å, centered in eighteen wavelength intervals. The library contains eight main sequence groups from O3–A7 V, four giant groups from O5–B9 III, and three supergiant groups from O9–A0 I. Several continuum and spectral line indices are computed and their usefulness as temperature and luminosity discriminants discussed.

Fanelli, M. N., O’Connell, R. W., and Thuan, T. X.  
*Ap.J.*, **334**, 665, 1988

#### Extragalactic Objects

##### “Spectral Synthesis in the Ultraviolet. II. Stellar Populations and Star Formation in Blue Compact Galaxies”

The authors investigate the stellar content and star formation history in seven blue compact galaxies by applying the technique of optimizing population synthesis using their library of far-UV stellar spectra (see previous entry). They include plots of low-dispersion SWP spectra for all seven objects ( $\lambda = 1200\text{--}2000$  Å) with principal line features labeled.

Faraggiana, R., Castelli, F., Morossi, C., Kondo, Y., and van der Hucht, K. A.  
*Ap.J. Supp*, **61**, 719, 1986

Cool Stars

“The Ultraviolet Spectrum of Procyon. I. The Atlas from 2030 to 2371 Å”

The high-dispersion spectrum of Procyon (F5 IV–V) over the interval 2030–2371 Å is analyzed by using BUSS VIII and IUE data. Plots of residual intensity versus wavelength (over small wavelength intervals) are presented in pairs: the upper plot compares BUSS VIII data with a synthetic spectrum, the lower compares BUSS VIII and IUE spectra. Tables include detailed information on lines used to compute the synthetic spectra.

Feibelman, W. A.

*A. & A.*, **122**, 335, 1983

Interstellar Matter, Nebulae, and Related Objects

“Profiles and Intensity Ratios of the C IV  $\lambda$ 1548, 1550 Emission Lines in Planetary Nebulae”

Eleven normal planetary nebulae and three proto-planetary nebulae are studied to determine the range of intensity ratios and line profiles of the C IV resonant doublet. Plots of the 1547–1553 Å region taken from SWP high-dispersion (0.1 Å) images are presented for each nebula.

Feibelman, W. A., and Aller, L. H.

*Ap.J.*, **319**, 407, 1987

Hot Stars; Interstellar Matter, Nebulae, and Related Objects

“The (C III  $\lambda$ 1909/Si III  $\lambda$ 1892) Ratio as a Diagnostic for Planetary Nebulae and Symbiotic Stars”

Values of  $\log R$  [ $F(\lambda 1909 \text{ C III})/F(\lambda 1892 \text{ Si III})$ ] are determined for 118 planetary nebulae to measure the ratio's use as a discriminant for distinguishing planetary nebulae from symbiotic stars and related objects. Observed profiles of these lines (from 1850 to 1950 Å), taken from SWP low-dispersion spectra, are plotted for three planetary nebulae and two symbiotic stars. Accompanying tables give  $\log R$ ,  $T_e$ ,  $N_e$ , and  $N(\text{C III})/N(\text{Si III})$  for the nebulae and  $\log R$  for eighteen symbiotic stars.

Feibelman, W. A., Oliverson, N. A., Nichols-Bohlin, J., and Garhart, M. P.  
*NASA Reference Publication #1203*, 1988

Hot Stars; Interstellar Matter, Nebulae, and Related Objects

International Ultraviolet Explorer Spectral Atlas of Planetary Nebulae, Central Stars, and Related Objects

Low-dispersion spectra (SWP and LWR or LWP) of 176 objects, ordered by right ascension, are presented. The spectra extend from 1200–3200 Å (where available), and are arranged in pairs, the bottom one expanded vertically to show weaker features. The most common planetary nebula emission lines are indicated both in a table of identifications and on a plot which can be used to make a transparent overlay. An observing log is included.

Fitzpatrick, E. L.  
*Ap.J.*, **299**, 219, 1985

Hot Stars; Extragalactic Objects; Interstellar Extinction

“Interstellar Extinction Variations in the Large Magellanic Cloud”

The author investigates the properties of interstellar extinction in the Large Magellanic Cloud using SWP and LWR low-dispersion images of eleven unreddened and nineteen reddened program stars. Included among the figures in this article are plots of log flux versus wavelength (1200–3200 Å) for all objects. The unreddened stars are displayed in order of U–B with the most negative values at the top. Reddened stars are divided into newly-observed and archival, each group arranged in order of decreasing temperature.

Fitzpatrick, E. L., and Savage, B. D.  
*Ap.J.*, **279**, 578, 1984

Hot Stars; Interstellar Matter, Nebulae, and Related Objects; Extragalactic Objects; Interstellar Extinction

“International Ultraviolet Explorer Observations of Stars in 30 Doradus: Extinction and Stellar Continua”

This article describes the authors’ study of ultraviolet extinction in and near the core of the 30 Doradus nebula. Low-dispersion SWP and LWR spectra of nine reddened stars within 80 parsecs of the core and eight unreddened stars from other locations in the LMC were used to derive plots of log flux versus wavelength (1200–3200 Å). Various extinction curves are also illustrated.

Fracassini, M., and Pasinetti, L. E.  
*A. & A.*, **107**, 326, 1982

#### Variable Stars

“Mg II *h* and *k* Line Observations of Delta Scuti Variables”

The seven  $\delta$  Scuti stars examined in this article are A and F giants and dwarfs with periods ranging from 0.03 to 0.141 days. From LWR high-resolution images the authors plot smoothed flux versus wavelength in the interval 2770–2820 Å with interpolated resonant-line profiles, from which equivalent widths of the Mg II *h* and *k* lines were calculated. Data are presented for all the  $\delta$  Scuti stars and for a comparison star.

Franco, M. L., Crivellari, L., Molaro, P., Vladilo, G., Ramella, M., Morossi, C., Allocchio, C., and Beckman, J. E.  
*A. & A. Supp.*, **58**, 693, 1984

#### Cool Stars

“The Spectra of Late-Type Dwarfs and Sub-Dwarfs in the Near Ultraviolet. III. An Atlas of Mg II *h* and *k* Profiles”

The authors use new data extraction routines to analyze a sequence of LWR high-resolution images of six early F to late G dwarfs and sub-dwarfs. They investigate the possibility of long-term variability due to solar-like magnetic activity cycles and point out the advantages of the new extraction process. Their article includes plots of absolute flux versus wavelength (2790–2808 Å) for all the stars and all available spectra for the star  $\beta$  Hyi.

Grady, C. A., Bjorkman, K. S., and Snow, T. P.  
*Ap.J.*, **320**, 376, 1987

#### Hot Stars

“Highly Ionized Stellar Winds in Be Stars: The Evidence for Aspect Dependence”

High-dispersion SWP spectra of sixty-two Be and forty-three normal B stars are examined in this survey of stellar winds. The stars range in type from B0.5–B5 and cover luminosity classes V–III. The effect of  $v \sin i$  on wind strength and variability and on C IV resonance line profiles, and correlations with latitude are discussed. There is a table of equivalent widths of C IV, Si IV, Si III, and N V lines in Be stars. Plots include C IV line profiles (1540–1555 Å) for twelve stars, Si IV line profiles (1385–1410 Å) for twelve stars, and C IV profiles for Zeta Cas (1540–1555 Å) as a function of time for six different dates of observation.

Grady, C. A., Snow, T. P., and Cash, W. C.  
*Ap.J.*, **283**, 218, 1984

Hot Stars

“Line Profile Variations in  $\delta$  Orionis A,  $\iota$  Orionis A, and 15 Monocerotis”

This paper reports results of an IUE and Einstein monitoring program investigating line variability in O dwarfs and giants. Plots derived from SWP high-dispersion images show relative flux vs. radial velocity for N V  $\lambda\lambda$ 1238, 1242 and C IV  $\lambda\lambda$ 1548.2, 1551 for 15 Mon (O7 Vf) and  $\iota$  Ori A (O8.5 III), and for N V, C IV, and Si IV ( $\lambda\lambda$ 1393, 1402) for  $\delta$  Ori A (O9.5 II), each at six different epochs.

Hack, M.  
*A. & A.*, **99**, 185, 1981

Variable Stars

“The Ultraviolet Spectrum of the Eclipsing Binary Zeta Aurigae”

The star  $\zeta$  Aurigae (HD 32068) was observed at phases 0.91 and 0.27 with the SWP and LWR cameras at low dispersion. This K III + B6 V binary has a line spectrum made up of several absorption components, which are discussed along with a model for the continuum. Of special interest is a table of identifications which includes observed ion and wavelength, laboratory wavelength, and excitation potential.

Haisch, B. M., and Basri, G.  
*Ap.J. Supp.*, **58**, 179, 1985

Cool Stars

“IUE Spectra of G0 V–G5 V Solar-Type Stars”

This atlas of short-wavelength, low-dispersion spectra of fourteen bright G0–G5 V stars summarizes the observational data and physical parameters available for these stars and considers variations in their spectra. The plots of absolutely calibrated surface fluxes versus wavelength (1200–2000 Å) are ordered by increasing temperature, with spectral features identified.

Hartmann, L., Dupree, A. K., and Raymond, J. C.  
*Ap.J.*, **252**, 214, 1982

Cool Stars

“Ultraviolet Observations of Stellar Chromospheric Activity”

In this survey of chromospheric and transition-region line emission in twenty-five late-type stars, the authors discuss correlation of emission with position in the HR diagram, age, and rotation and temperature structures of the stellar envelopes. Plots include flux vs.  $\lambda$  for nine stars over the 1200–2000 Å region and for thirteen stars over the 2790–2810 Å region.

Hartmann, L. W., Huchra, J. P., Geller, M. J., O'Brien, P., and Wilson, R.  
*Ap.J.*, **326**, 101, 1988

Extragalactic Objects

“Lyman- $\alpha$  Emission in Star-Forming Galaxies”

The authors have taken SWP low-dispersion images of five blue, low-metallicity star-forming galaxies sufficiently red-shifted to permit detection of Lyman- $\alpha$ . They provide plots of flux vs. wavelength (1150–1950 Å) for all five and a table of UV continuum and Lyman- $\alpha$  fluxes, the former integrated over 100 Å bins.

Heck, A., Egret, D., Jaschek, M., and Jaschek, C.  
*European Space Agency Special Publication #1052*, 1984

Standard Stars

IUE Low-Dispersion Spectra Reference Atlas. Part I. Normal Stars

The main part of this atlas consists of flux versus wavelength (1150–3200 Å) plots for 229 stars and accompanying flux tables. Tables describe the lines characteristic of O and B stars. A set of thirty-four transparencies for the most representative standard stars allows direct comparison with the spectra.

Holberg, J. B., Wesemael, F., and Basile, J.  
*Ap.J.*, **306**, 629, 1986

Hot Stars

“DA White Dwarf Effective Temperatures Determined from IUE Lyman-Alpha Profiles”

An analysis of Lyman- $\alpha$  profiles of twelve DA white dwarfs provides a measure of effective temperatures between 20,000 and 60,000°K. A by-product of this study is a proposed modification to the IUE calibration over 1150–1350 Å. Plots of flux (normalized at 1335 Å) vs. wavelength (1150–1350 Å) derived from SWP low-dispersion spectra of eight stars are examined. The development of Lyman- $\alpha$  as a function of temperature is illustrated.

Jaschek, M., and Jaschek, C.  
*A. & A.*, **171**, 380, 1987

Hot Stars

“The Ultraviolet Gallium Stars”

From a study of spectra taken from the second part of the IUE Low-Dispersion Spectra Reference Atlas (Hassall *et al.*, in preparation), the authors define a group of UV-peculiar stars of types mid-to late-B, characterized by strong Ga II  $\lambda$ 1414. They look for correlations with rotation and compare the classification of these stars in the ultraviolet, the visual, and on the UBV system. Their article includes plots of flux versus wavelength (1200–2400 Å) for fourteen gallium stars.

Kaler, J. B., and Feibelman, W. A.  
*Ap.J.*, **297**, 724, 1985

Hot Stars; Interstellar Matter, Nebulae, and Related Objects

“Ultraviolet Spectra of the Central Stars of Large Planetary Nebulae”

The authors identify line features, analyze the continuous energy distributions through three flux-ratio indices, and calculate ultraviolet color temperatures for thirty-two planetary nebulae nuclei. The article includes an observing log of the SWP and LWR spectra used, along with plots of various spectral regions: 1200–3200 Å for three objects, 1200–1900 Å for nine objects, 1400–1700 Å for thirteen objects, 1200–1500 Å for three objects, and 2420–2600 Å for one object. The latter three specifically illustrate lines of C IV, He II, N V, and O V. There is also a table of observed central star fluxes and ultraviolet color temperatures.

Kirshner, R. P., Sonneborn, G., Crenshaw, D. M., and Nassiopoulos, G. E.  
*Ap.J.*, **320**, 602, 1987

Supernovae

“Ultraviolet Observations of SN 1987A”

Low-resolution spectra of SN 1987A are presented. They are arranged chronologically in two groups: short-wavelength spectra (1200–2000 Å, eighteen epochs) and long-wavelength spectra (1900–3300 Å, twenty-two epochs). Positioning of the plots is such that changes with time can be easily seen.

Klare, G., Krautter, J., Wolf, B., Stahl, O., Vogt, N., Wargau, W., and Rahe, J.  
*A. & A.*, **113**, 76, 1982

Variable Stars

“IUE Observations of Dwarf Novae during Active Phases”

This work centers around SWP and LWR low-dispersion spectra of AR And and WW Cet during normal outburst, TU Men during a superoutburst, and TZ Per, RX And, and Z Cam at standstill. Continuum flux distributions, nature of mass loss, and characteristics of each star are discussed. Lines are identified on plots of flux vs. wavelength for each star. The plots range from 1300–3200 Å for all except AR And, whose plot covers 1300–1900 Å.

Krautter, J., Klare, G., Wolf, B., Duerbeck, H. W., Rahe, J., Vogt, N., and Wargau, W.  
*A. & A.*, **102**, 337, 1981

Variable Stars

“IUE Spectroscopy of Cataclysmic Variables”

Spectra of the classical novae V603 Aql, HR Del, and RR Pic, the dwarf nova RU Peg, and the peculiar object TT Ari are the bases of this discussion of interstellar extinction, temperatures, mass loss, and mass accretion rates. The authors include plots of flux vs. wavelength (1200–3200 Å) for all stars except TT Ari, whose spectrum covers the range 1200–2000 Å. The article includes an observing log.

LaDous, C.

*Space Science Reviews*, **49**, 425, 1989

Variable Stars

“A Catalogue of Low-Resolution IUE Spectra of Dwarf Novae and Nova-Like Stars” (Announcement)

This catalogue includes all low-resolution IUE spectra of dwarf novae and nova-like stars taken through 1987 (about 2000 spectra). Long- and short- wavelength plots are merged when possible and appear in the form  $\log F_{\lambda}$  vs.  $\log \lambda$ . The epsilon-vector is displayed in the upper part of each plot. Plots are sorted by star name, followed by a table of stellar parameters and alternative names. Other features of the catalogue include a table of image names, FES magnitudes, and observation dates; AAVSO light curves; reference lists (IUE and other wavelength regions); and a list of all low-resolution IUE observations sorted by camera and time of observation. A sample spectrum of RX And appears here; the complete catalogue of 500 pages can be obtained from the publisher of *Space Science Reviews*, where it will appear as a special issue in 1990.

Marlborough, J. M., and Peters, G. J.

*Ap.J. Supp.*, **62**, 875, 1986

Hot Stars

“Ultraviolet Observations of Be Stars. II. Superionization in Be Stars of Different Spectral Types”

Thirty-three Be stars are examined for the presence and strengths of lines of N V, C IV, and Si IV in their spectra. High-resolution SWP images yielded plots of three spectral regions for each star, showing N V  $\lambda\lambda 1239, 1243$ , Si IV  $\lambda\lambda 1394, 1403$ , and C IV  $\lambda\lambda 1548, 1551$ . Plots are of the form normalized flux vs. wavelength.



Marsi, C., and Selvelli, P. L.  
*A. & A. Supp.*, 71, 153, 1987

Cool Stars; Variable Stars

“The Fe II Emission in the UV Spectrum of CH Cyg”

CH Cyg is an M6 giant that undergoes active phases showing characteristics of a symbiotic star. IUE monitored the outburst which began in 1977, including a period of time after January 1985 when the continuum weakened and many Fe II lines appeared in emission. From high-resolution SWP, LWR, and LWP spectra, the authors have compiled tables of intensities and other parameters for these lines.

Massa, D., and Savage, B. D.  
*Ap.J.*, 299, 905, 1985

Hot Stars

“The Intrinsic Ultraviolet Continua of O Stars”

The authors have obtained low-dispersion SWP and LWR spectra and OAO-2 data for twenty-two O and B stars in the open clusters NGC 2244, Trumpler 14, and NGC 6231. Main sequence B stars are used to derive UV extinction curves for the program clusters, which then determine the intrinsic UV to visual colors of O stars in the clusters. These data are analyzed in conjunction with dereddened colors of O stars with small color excesses to obtain a set of UV colors for O3–9, class V–I stars. For each star there is a plot of  $\log(F_\lambda/F_V)$  (dereddened UV flux normalized to visual flux) vs.  $\lambda$  (1200–3200 Å).

Mazzoli, P. A.  
*Ap.J. Supp.*, 65, 695, 1987

Hot Stars

“The Ultraviolet Spectrum of Beta Lyrae”

Using SWP high-resolution images taken over the years 1980–1986, the author describes prominent features of the spectrum of Beta Lyrae and identifies lines found in the 1225–3125 Å region. This star is an eclipsing interacting binary composed of a B8 or B6.5 primary of luminosity class II and a B5 secondary whose visual spectrum is dominated by a surrounding shell. Besides an observing log, there is an extensive line list which gives observed wavelength, line type, ion, multiplet, laboratory wavelength, intensity, continuum level, minimum or maximum flux, and width.

Molaro, P., Vladilo, G., and Beckman, J. E.  
*A. & A.*, **161**, 339, 1986

Cool Stars; Interstellar Matter

“Distribution of Mg II in the Local Interstellar Medium towards Eight Cool Giants”

LWP high-dispersion spectra of eight cool (G4–K0) giants are analyzed for Mg II interstellar lines. Some equivalent widths and column densities are derived. For each star a plot of flux vs.  $\Delta\lambda$  (relative to the rest position of the Mg II doublet in the photospheric frame) shows Mg II *h* and *k* emissive cores.

Nandy, K., and Morgan, D. H.  
*M.N.R.A.S.*, **192**, 905, 1980

Hot Stars; Extragalactic Objects

“IUE Observations of Large Magellanic Cloud Members”

The spectra and flux distributions from 1150 to 3100 Å of six supergiants in the LMC are presented, based on low-resolution SWP and LWR images. Major stellar and interstellar features are identified on the plots and discussed in the text.

Nussbaumer, H., Schmutz, W., Smith, L. J., and Willis, A. J.  
*A. & A. Supp.*, **47**, 257, 1982

Hot Stars

“IUE Ultraviolet Spectrophotometry of 15 Galactic Wolf-Rayet Stars”

Data from SWP and LWR low-dispersion spectra of WN and WC stars are presented both as plots of flux vs.  $\lambda$  from 1150 to 3200 Å and as tables of observed absolute flux distributions in  $\text{ergs/cm}^2\text{-sec-}\text{Å}$  from 1150–3090 Å. Among the topics discussed are equivalent widths of the most prominent emission lines, color excesses, color temperatures, and other properties inferred from model atmospheres.

Penston, M. V., Benvenuti, P., Cassatella, A., Heck, A., Selvelli, P., Macchetto, F., Ponz, D., Jordan, C., Cramer, N., Rufener, F., and Manfroid, J.  
*M.N.R.A.S.*, **202**, 833, 1983

Variable Stars

“IUE and Other New Observations of the Slow Nova RR Tel”

High- and low-resolution SWP and LWR images of RR Tel, taken from June 20, 1978, through February 28, 1979, yield a line list of 431 lines, over three-fourths of which are identified. The authors discuss these lines, the continuum energy distribution, reddening, and variations in ground-based photometry. An observing log is included.

Prinja, R. K., and Howarth, I. D.  
*Ap.J. Supp.*, **61**, 357, 1986

Hot Stars

“Narrow Absorption Components and Variability in Ultraviolet P Cygni Profiles of Early-Type Stars”

The authors present a survey of the properties of narrow absorption components and underlying P Cygni profiles in twenty-one main sequence, giant, and supergiant stars of types B1–O4. High-resolution SWP images were taken of each star at various times and the results plotted as residual intensity vs.  $\lambda$  for selected wavelength regions containing N V, C IV, and Si IV lines. Illustrated plots include adopted model fits, rest wavelengths, and mean narrow absorption component positions.

Prinja, R. K., Howarth, I. D., and Henrichs, H. F.  
*Ap.J.*, **317**, 389, 1987

Hot Stars

“Ultraviolet Observations of Extensive Variability in the Stellar Wind of  $\xi$  Persei”

The O7.5 giant  $\xi$  Persei (HD 24912) has been monitored with IUE over a six-year period. The resulting fifty-six high-resolution SWP spectra considered here illustrate variability in time scales as short as one hour. The authors carry out model profile fits to try to explain the appearance and variability of the lines. Their paper includes examples of line profiles and a montage of Si IV  $\lambda\lambda 1393.76, 1402.77$  spectra covering the 1370–1415 Å region.

Ramella, M., Castelli, F., Malagnini, M. L., Morossi, C., and Pasian, F.  
*A. & A. Supp.*, **69**, 1, 1987

Hot Stars

“Identification Lists of the Far-UV Spectra of 7 Solar Chemical Composition Main Sequence Stars in the Spectral Range B2–B9.5”

As part of a program to construct sequences of reference UV spectra of main sequence stars, the authors have used an automatic line identification procedure to list features found in the high-dispersion spectra of seven B dwarfs. Line lists for three of the stars appear in the paper, covering a wavelength interval from 1330 to 1960 Å. Lists for the other stars are available by request on magnetic tape.

Rocca-Volmerange, B., and Guiderdoni, B.  
*A. & A. Supp.*, **75**, 93, 1988

Extragalactic Objects

“An Atlas of Synthetic Spectra of Galaxies”

Evolutionary synthetic spectra of galaxies from 1220 Å–1 μm with a resolution of 10 Å are computed with the authors' model of spectrophotometric evolution. Stellar spectra are based on IUE spectral atlases and Gunn and Stryker (*Ap.J. Supp.*, **52**, 121, 1983). Synthetic spectra are plotted as relative flux  $F_\lambda$  vs.  $\lambda$  at various ages for eight galaxy types: burst, UV-cold E/S0, UV-hot E/S0, Sa, Sb, Sc, Sd, and Im. There are also tables of flux values, equivalent widths, extinction-free line ratios, and cosmological and evolutionary correction factors.

Rocca-Volmerange, B., and Guiderdoni, B.  
*A. & A.*, **175**, 15, 1987

Extragalactic Objects

“Star Formation in the Nuclei of S0/E Galaxies”

Spectra of five nearby bright galaxies are analyzed with the help of the IUE Low-Dispersion Spectra Reference Atlas of Heck *et al.* to determine mean spectral types and stellar formation rates. The authors present plots of flux versus wavelength for these galaxies covering the 1200–3200 Å region.

Rosa, M., Joubert, M., and Benvenuti, P.  
*A. & A. Supp.*, **57**, 361, 1984

Extragalactic Objects

“IUE UV Spectra of Extragalactic H II Regions. I. The Catalogue and the Atlas”

More than 150 SWP and LWR spectra of giant H II complexes in about thirty spiral, blue compact, and irregular galaxies are catalogued. Thirty-two objects are plotted in the form of flux versus wavelength in the range 1150–3200 Å. There is a detailed log of observations. Stellar, nebular, interstellar, and spurious features are marked on an identification transparency.

Rossi, L., Viotti, R., and Altamore, A.  
*A. & A. Supp.*, **55**, 361, 1984

Hot Stars

“A Comparative Study of the Ultraviolet Spectrum of Hot Subdwarfs”

High- and low-resolution spectra of four O subdwarfs are analyzed for the presence of stellar and interstellar lines. The article includes tables of line identifications, ordered by element and ionization stage, giving laboratory wavelength, species, laboratory intensity, excitation potential of lower level, and computed radial velocities.

Rucinski, S. M.

*M.N.R.A.S.*, **215**, 615, 1985

Cool Stars; Variable Stars

“The Mg II Emission in W UMa-Type Binaries”

Low-resolution LWR and LWP spectra of the Mg II emission lines in eight contact binaries are examined. Plots are of the form  $F$  vs.  $\lambda$  (2600–3000 Å) and, combined with four previously published spectra, are arranged in order of increasing orbital period. The authors discuss the ratio of Mg II flux to bolometric flux and its dependence on color and period

Sadakane, K., and Jugaku, J.

*P.A.S.P.*, **93**, 60, 1981

Hot Stars

“Boron and Beryllium in Early-Type Peculiar Stars”

High-dispersion SWP and LWR spectra of eleven peculiar stars of types He-weak, Mn-Hg, Si, Sr-Cr-Eu, and Cr are examined in this article. Several series of plots are presented, showing intensity versus wavelength for small wavelength regions in which lines of interest are found. The approximate intervals covered are: 1350–1365 Å (ten stars), 1622–1627 Å (four stars), 2064–2069 Å (three stars), and 3125–3135 Å (ten stars). The authors include two tables of line identifications.

Sahade, J., Brandi, E., and Fontenla, J. M.

*A. & A. Supp.*, **56**, 17, 1984

Hot Stars; Variable Stars

“IUE Low Dispersion Observations of Symbiotic Objects”

Spectra of twenty symbiotic stars and the binary RY Scuti are analyzed for variations in line intensity and in the continuum. For ten stars, measurements were made at two epochs, while 17 Lep and AX Mon were also observed at high dispersion. For each star spectra are plotted from 1200 to 3200 Å. Tables of line identifications are included.

Schönberner, D., and Drilling, J. S.

*Ap.J.*, **290**, L49, 1985

Hot Stars; Interstellar Matter, Nebulae, and Related Objects

“On the Ultraviolet Iron Spectrum of Pre-White Dwarfs”

This study includes plots of flux versus wavelength over three wavelength intervals: 1225–1245 Å, 1320–1340 Å, and 1360–1380 Å, with lines of Fe V, VI, and VII indicated. The plots are derived from high-resolution SWP spectra of two central stars of planetary nebulae and four hot sub-dwarfs. Variations in line strengths are discussed.

Shore, S. N., and Sanduleak, N.  
*Ap.J. Supp.*, **55**, 1, 1984

#### Hot Stars; Extragalactic Objects

“The Early-Type Strong Emission-Line Supergiants of the Magellanic Clouds: A Spectroscopic Zoology”

The authors analyze UV, optical, and infrared spectra of some bright OB supergiants and consider classification procedures,  $T_{eff}$ ,  $M_{bol}$ , reddenings, masses, radii, luminosities, and mass-loss rates. SWP and LWR low-dispersion spectra of twenty-one stars, all but two in the LMC, were used. The article includes an atlas of SWP images between 1200 and 2000 Å and an observing log.

Shull, J. M., and Van Steenberg, M. E.  
*Ap.J.*, **294**, 599, 1985

#### Interstellar Matter, Nebulae, and Related Objects

“Galactic Interstellar Abundance Surveys with IUE. I. Neutral Hydrogen”

This article is a survey of interstellar densities, abundances, and cloud structure in the Galaxy. From high-dispersion SWP spectra, the authors derive interstellar H I column densities toward 244 early-type stars. Many plots are presented, including gas-to-dust ratios, distances to stars, and color excesses. A table gives H I column densities and many parameters for the stars.

Simon, T.  
*Ap.J.*, **279**, 738, 1984

#### Cool Stars

“On the Dispersion in Brightness of Far-Ultraviolet Emission Lines of Cool Giant Stars”

This study includes plots of twelve late-type F5–G8 III stars derived from SWP low-dispersion images. Plots are of the form  $F$  vs.  $\lambda$  and cover the region 1100–2100 Å. Normalized C IV flux as a function of spectral type and causes of variations in transition-region emission are among the topics examined.

Sitko, M. L., Savage, B. D., and Meade, M. R.  
*Ap.J.*, **246**, 161, 1981

#### Hot Stars

“Ultraviolet Observations of Hot Stars with Circumstellar Dust Shells”

Absolute fluxes from 1200 to 3200 Å are presented for thirteen normal early-type stars and twelve early-type stars with infrared excesses, including Herbig Ae/Be stars, peculiar shell stars, and the central object in the Red Rectangle Nebula. Data were based on low-resolution LWR and SWP spectra and high-resolution spectra of several brighter stars. This information is plotted as log flux vs.  $\lambda$ , with some spectral features identified on the plots.

Slettebak, A., and Carpenter, K. G.  
*Ap.J. Supp.*, **53**, 869, 1983

Hot Stars

“Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A–F Type Shell Stars”

High-dispersion SWP and LWR images of eighteen later-type Be and A–F type shell stars plus eight standard non-emission-line stars are analyzed for anomalous ionization and mass-loss effects. Plots of relative flux vs. wavelength in several spectral regions show lines of Si IV, C IV, C I, Al II, Mg II, and Fe II.

Smith, L. J., and Willis, A. J.  
*A. & A. Supp.*, **54**, 229, 1983

Hot Stars; Extragalactic Objects

“UV and Visual Spectrophotometry of Nine LMC Wolf-Rayet Stars”

Spectral characteristics of six WN and three WC LMC stars are discussed and compared with galactic Wolf-Rayet stars. All stars were observed with the SWP and LWR cameras at low resolution and one star, FD 70, was also observed at high resolution. The article includes tables of spectrophotometric data for all stars, giving  $\log F_\lambda$  at 5 Å intervals from 1150 to 1990 Å and at 10 Å intervals from 1900 to 3080 Å. Flux vs. wavelength (1150–3000 Å) is plotted. The data are combined with visual spectrophotometry to yield plots of  $\log F_\lambda$  vs.  $\log \lambda$ .

Smith, L. J., Willis, A. J., and Wilson, R.  
*M.N.R.A.S.*, **191**, 339, 1980

Hot Stars; Interstellar Matter and Related Objects

“IUE Observations of Interstellar Si IV and C IV Lines Observed in the Spectra of Wolf-Rayet Stars”

Strengths of Si IV and C IV narrow absorption lines observed in ten Wolf-Rayet stars and two other early-type stars are compared, using high-dispersion SWP and LWR images. Included are plots of intensity vs. wavelength from 1385–1410 Å showing the Si IV  $\lambda 1400$  resonance doublet in nine stars and from 1543–1565 Å showing the C IV  $\lambda 1550$  resonance doublet in nine stars.

Soderblom, D. R., and Clements, S. D.  
*A.J.*, **93**, 920, 1987

#### Cool Stars

“Chromospheric and Transition-Region Emission from Young Solar-Type Stars in Clusters, Kinematic Groups, and the Field”

This article examines the strength of chromospheric and transition-region emission in solar-type stars belonging to the Ursa Major Group and the Hyades Cluster and Group, and in other young stars in the solar neighborhood. Chromospheric emission as an age indicator is among the topics discussed. There are observing logs for both the short-wavelength (low-resolution) and long-wavelength (mostly high-resolution) images, which include stellar surface fluxes of the principal emission features. Plots of flux versus wavelength are shown for sixteen stars between 1200 and 1900 Å and for forty-two stars between 2790 and 2810 Å (the latter to illustrate Mg II *h* and *k* emission).

Stencel, R. E., Mullan, D. J., Linsky, J. L., Basri, G. S., and Worden, S. P.  
*Ap.J. Supp.*, **44**, 383, 1980

#### Cool Stars

“The Outer Atmospheres of Cool Stars. VII. High-Resolution, Absolute Flux Profiles of the Mg II *h* and *k* Lines in Stars of Spectral Types F8 to M5”

This paper deals with high-resolution LWR spectra of the emission cores of the Mg II resonance doublet at 2795 and 2803 Å. The fifty-four stars studied range from types F8 to M5 and include classes IV–Ia. The authors discuss line profiles and flux characteristics in detail. Of special interest is an atlas of flux plots for each star in the wavelength range 2791–2807 Å. A table of integrated line fluxes is included as well.

Szkody, P.  
*Ap.J.*, **247**, 577, 1981

#### Variable Stars

“IUE Observations of Eight Dwarf Novae: A Study of the Outburst Cycle from 0.12 to 3.5 Microns”

IUE observations of eight dwarf novae at various stages of their outburst cycles are combined with optical and infrared data to provide a continuum flux distribution from 0.12 to 3.5 microns. IUE measurements were made with the SWP and LWR cameras in low-dispersion mode. Plots are of the form magnitude vs. wavelength (1200–3200 Å).



Szkody, P.  
*A.J.*, **90**, 1837, 1985

Variable Stars

“Multiwavelength Observations of Eleven Cataclysmic Variables.”

Observations of ten dwarf novae and one novalike system at various outburst states are presented. IUE SWP and LWR low-dispersion images are combined with optical spectroscopy and broadband optical and infrared photometry to derive flux distributions. Plots of flux vs. wavelength range from 1150–3000 Å for nine stars and from 1150–1950 Å for one star.

Szkody, P., and Mateo, M.  
*Ap.J.*, **301**, 286, 1986

Variable Stars

“Z Camelopardalis: Outburst P Cygni Profiles and Quiescent Continuum”

This article is an orbital study of C IV P Cygni profiles in the dwarf nova Z Cam. The authors compare parameters of the line components as a function of phase and discuss the continuum flux distribution during standstill, decline, and quiescence. They give a summary of SWP, LWP, and LWR low-resolution observations at each phase and plot flux vs.  $\lambda$  (1450–1650 Å) at six phases. Short- and long-wavelength images are joined for five different dates of observation to show representative 1150–3200 Å spectra at standstill, decline, and quiescence.

Talavera, A., and Gomez de Castro, A. I.  
*A. & A.*, **181**, 300, 1987

Hot Stars

“The UV High Resolution Spectrum of A-Type Supergiants”

This is a study of thirteen A supergiants observed at high dispersion with the SWP, LWR, and LWP cameras. Included are plots of  $F/FC$  vs.  $\lambda$  over various wavelength intervals, illustrating lines of Mg II, Fe II, C II, and Si II. There is a discussion of the structure, velocities, and variability of the stellar winds seen in some spectra.

Tarafdar, S. P., and Krishna Swamy, K. S.  
*M.N.R.A.S.*, **200**, 431, 1982

Hot Stars; Interstellar Matter and Related Objects

“Molecules in Celestial Objects. III. Study of CO in Interstellar Diffuse Clouds”

Absorption lines corresponding to the A–X transition of CO were found in high-resolution SWP spectra of nine of fourteen observed stars. The authors determine column densities of CO toward these nine and its upper limit toward the rest. They include plots of flux vs. wavelength in the region 1418–1325 Å for three stars and in the region 1507–1422 Å for five stars.

Van Steenberg, M. E., and Shull, J. M.  
*Ap.J. Supp.*, **67**, 225, 1988

#### Interstellar Matter, Nebulae, and Related Objects

“Galactic Interstellar Abundance Surveys with IUE. II. The Equivalent Widths and Column Densities”

The authors continue their survey of interstellar densities, abundances, and cloud structure in the Galaxy by presenting equivalent widths of eighteen ultraviolet resonant transitions and deriving column densities for Si II, Mn II, Fe II, S II, and Zn II toward 261 early-type stars. Their article includes tables of H I column densities toward seventeen stars and equivalent width data and metal column densities, based on high-resolution SWP and LWR or LWP images of 261 stars.

Verbunt, F.  
*A. & A. Supp.*, **71**, 339, 1987

#### Variable Stars

“Ultraviolet Observations of Cataclysmic Variables: The IUE Archive”

The author presents a comparative study of the ultraviolet properties of cataclysmic variables of several types, using SWP and LWR or LWP image pairs of each object. Reddening and the nature of the spectral flux distribution are among the topics examined. The systems selected have orbital periods between eighty minutes and 0.5 days and contain accretion disks. Plots include  $\log(\text{flux})$  versus  $\log(\lambda)$ , where the flux is averaged in bins 80 Å wide, centered on 1460, 1800, 2140, and 2880 Å.

Walborn, N. R., Nichols-Bohlin, J., and Panek, R. J.  
*NASA Reference Publication* #1155, 1985

#### Hot Stars

International Ultraviolet Explorer Atlas of O-Type Spectra from 1200 to 1900 Å

This atlas employs SWP high-dispersion spectra of ninety-eight O stars and is arranged in twenty-two montages of four or five spectra each. It is divided into three sections: an overview of main sequence O3–B1 stars plus luminosity sequences at O6.5 and O9.5; a sample of normal spectra, organized into restricted spectral type ranges at fixed luminosity classes, and peculiar spectra, including weak winds, N-enhanced stars, peculiar giants/supergiants, and WN-A stars. Plots are in the form of flux versus wavelength in the range 1200–1900 Å. There is also a table of principal interstellar lines.

Walborn, N. R., and Panek, R. J.  
*Ap. J.*, **286**, 718, 1984

Hot Stars

“Ultraviolet Spectral Morphology of the O Stars. II. The Main Sequence”

This survey of the 1200–1900 Å region in forty-nine stellar spectra of types O3–B1 V uses SWP high-dispersion images. Key ultraviolet spectral regions are plotted for various type ranges, in order to illustrate critical features. A table illustrates the behavior of stellar wind features.

Walborn, N. R., and Panek, R. J.  
*Ap.J.*, **291**, 806, 1985

Hot Stars

“Ultraviolet Spectral Morphology of the O Stars. III. The ON and OC Stars”

Key regions of the 1200–1900 Å high-resolution spectra of two ON dwarfs and four ON/OC supergiants are illustrated and discussed. The authors present seven sequences of flux plots, over small wavelength intervals, comparing the appearance of various spectral features to their counterparts in standard dwarf and supergiant spectra.

Walborn, N. R., and Nichols-Bohlin, J.  
*P.A.S.P.*, **99**, 40, 1987

Hot Stars

“Ultraviolet Spectral Morphology of the O Stars. IV. The OB Supergiant Sequence”

The author’s study of stellar-wind profiles versus spectral type relationships continues with the presentation of spectra of twenty-five O3–B8 supergiants. The images were taken in the high-dispersion mode with the SWP camera. There are five spectral montages for each wavelength range (1320–1580 Å and 1620–1880 Å), each montage containing the observations of five stars in order of advancing spectral type.

Wampler, E. J., Gaskell, C. M., Burke, W. L., and Baldwin, J. A.  
*Ap.J.*, **276**, 403, 1984

Extragalactic Objects

“Spectrophotometry of Two Complete Samples of Flat Radio Spectrum Quasars”

Most of this article concerns spectrophotometry of flat radio spectrum quasars brighter than magnitude 2.0. The authors looked for correlations between the equivalent width of the C IV  $\lambda$ 1550 emission line and the luminosity of the underlying continuum. Five low- $z$  quasars were observed with the IUE SWP or LWR cameras at low dispersion. The spectra are shown as flux vs.  $\lambda$  from 1200 to 2000 Å for two quasars and from 2000 to 3000 Å for three quasars.

Weaver, H. A., Feldman, P. D., Festou, M. C., A'Hearn, M. F., and Keller, H. U.  
*Icarus*, **47**, 449, 1981

Solar System Objects

“IUE Observations of Faint Comets”

Spectra of seven comets visible in 1980 and 1981 are compared at approximately equal heliocentric distances. Effects due to heliocentric velocity, geocentric distance, and optical depth are discussed. Low-dispersion SWP and LWR spectra are plotted as brightness vs. wavelength over the range 1150–3200 Å for three comets and over the range 2000–3200 Å for four comets.

Wegner, G., and Nelan, E. P.  
*Ap.J.*, **319**, 916, 1987

Hot Stars

“Ultraviolet and Visual Spectroscopy of DB White Dwarfs”

A search for lines of elements other than helium in the visual and ultraviolet spectra of DB white dwarfs is reported. Model atmospheres are used to study temperatures and carbon and hydrogen abundances in these stars. Plots of  $\log F_\lambda + \text{constant}$  versus wavelength over the range 1250–1950 Å are presented, based on low-dispersion SWP spectra, for eight program stars plus the white dwarf LDS 678B. An observing log is included.

Willis, A. J., van der Hucht, K. A., Conti, P. S., and Garmany, D.  
*A. & A. Supp.*, **63**, 417, 1986

Hot Stars

“An Atlas of High Resolution IUE Ultraviolet Spectra of 14 Wolf-Rayet Stars”

SWP and LWR high-resolution spectra are used to create an atlas of line lists and spectral tracings of Wolf-Rayet stars. The former indicate observed wavelength, ion, laboratory wavelength, multiplet number, and ratio of central emission to continuum. There is also a combined table of the lines observed in each star's spectrum. Short- and long-wavelength plots are paired for each star, the vertical axes labeled in IUE Flux Numbers.

Wing, R. F., Carpenter, K. G., and Wahlgren, G. M.  
*Perkins Observatory Special Publication #1*, 1983

Cool Stars

Atlas of High Resolution IUE Spectra of Late-Type Stars, 2500–3230 Å

Thirteen late-type stars, a solar-type dwarf and twelve giants and supergiants of types G, K, and M are illustrated. The LWR spectra are paired, with stars of similar spectral type shown together and arranged in order of decreasing temperature. Emission lines in the spectrum of Gamma Crucis (M3 III) are identified.

Witt, A. N., Bohlin, R. C., and Stecher, T. P.  
*Ap.J.*, **279**, 698, 1984

#### Interstellar Extinction

##### “The Variation of Galactic Interstellar Extinction in the Ultraviolet”

Interstellar extinction in the ultraviolet is determined from low-resolution IUE spectra of twenty-nine reddened early-type stars. There is a plot of  $E(\lambda - V)/E(B - V)$  vs.  $1/\lambda$  ( $\mu m^{-1}$ ) for each star.

Wu, C.-C., Ake, T. B., Boggess, A., Bohlin, R. C., Imhoff, C. L., Holm, A. V., Levay, Z. G., Panek, R. J., Schiffer III, F. H., and Turnrose, B. E.  
*International Ultraviolet Explorer NASA Newsletter*, #22, 1983

#### Standard Stars

##### The IUE Ultraviolet Spectral Atlas

Low-dispersion spectra of seventy-two objects are presented, ordered by decreasing temperature. Where possible, both SWP (1150–2000 Å) and LWR (1900–3200 Å) images are plotted for each star. A table gives detailed observing information.