

A Bibliography of IUE Atlases and Catalogues

Patricia S. Pitts and Catherine L. Imhoff

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For eleven years the IUE satellite has gathered information on the properties of stars, galaxies, and other objects in the ultraviolet. The large number of images now available from the IUE archive, along with data from on-going programs, provide opportunities for large-scale surveys of these properties. Several observers have published papers in the form of atlases and catalogues which illustrate the spectral characteristics of specific object categories or identify lines of interest in the spectra of individual objects.

This list is a preliminary bibliography of atlases and catalogues based on IUE data. It may be used to determine whether a category of interest is available in atlas form. Ideas for future surveys may be stimulated by noting the lack of a useful atlas for a particular group. Similarly, the list includes references to catalogues of line identifications, which may be helpful to observers in their own ultraviolet studies.

The bibliography covers the years 1978–1988; however, it may not include every publication that meets our criteria as an atlas or catalogue. Examination of the literature will continue, and more items will be added as they are found. Any important omissions which readers bring to our attention will be greatly appreciated.

We have been fairly lenient in classifying a work as an “atlas.” Specifically, we include papers which contain plots derived from IUE data (usually flux versus wavelength), prominently displayed and on a consistent scale, of five or more objects, or in a few cases, of one object at five or more epochs. A paper having a table of line identifications is included if the table is fairly large, usually two or more pages.

The bibliography is in two parts. The first part is an index with items grouped by major category. Sub-categories are given where applicable to assist in identifying the specific atlases which a researcher may wish to examine. Part II lists the publications alphabetically according to the last name of the principal author, indicates the major category to which each item belongs, and gives a short resumé emphasizing plots and/or tables which qualify it as a catalogue or atlas.

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| | On the UV Iron Spectrum of Pre-White Dwarfs | Schönberner | sub-dwarfs nebula-associated stars | 26 |

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Part II. List of Atlases and Catalogues

| | |
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| Abbreviations: <i>A. & A.</i> | Astronomy and Astrophysics |
| <i>A. & 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 ρ 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.

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, λ 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. λ) 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 α^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

“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 (θ^1 Ori A, B, C, and D) and of θ^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; 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 μ 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.

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.

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 ($\lambda = 1200\text{--}2000 \text{ \AA}$) 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 \AA "

The high-dispersion spectrum of Procyon (F5 IV–V) over the interval 2030–2371 \AA 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 \AA region taken from SWP high-dispersion (0.1 \AA) 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 \AA), 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 δ 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 δ 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 β 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.

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.

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.

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.

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

Cool 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.

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.

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 ξ Persei”

The O7.5 giant ξ 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., **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.

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.

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.

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.

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.

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.

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.

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.