

THE SPECTRAL TYPE STANDARD STAR PROGRAM
AT THE IUE OBSERVATORY (GSFC)

In March 1980, the IUE Observatory at the Goddard Space Flight Center started a program to obtain low dispersion trailed spectra for a group of stars which covers spectral type from O3 to M4 and luminosity class from V to Ia. The stars were selected according to the following four criteria:

1. The stars chosen had to be sufficiently faint that low dispersion trailed spectra can be obtained at trail rates less than 40 arc second per second.
2. The stars had to be relatively unreddened. Uncertainties in the shape of the extinction curve to be applied to different regions of the sky could greatly increase the errors in the derived unreddened fluxes for heavily reddened stars. The exceptions to this criteria are the stars with types from O3 to O6 where there are no lightly reddened stars. To derive appropriate extinction curves, we need to observe some late O and early B stars which are in the same fields as the heavily reddened O3-O6 stars. This is necessary because it is likely that each association has a unique extinction curve so that use of the "average extinction curve" for dereddening may introduce gross errors.
3. The stars must have well-determined spectral types in the MK system. An effort was made to include as many of the primary MK standards ("dagger" types) from Morgan and Keenan (1973) as satisfied the other criteria. Gaps in the coverage were filled in mostly with stars classified by Johnson and Morgan (1953), Walborn (1973), Lesh (1968, 1972), Hiltner, Garrison, & Schild (1969).
4. Stars known to be spectroscopic binaries were rejected.

In addition, some super-metal-rich (SMR) stars are also included in our program.

It is important to construct a good grid of standard stars not only for its obvious scientific values, but also because these unreddened (almost) stars will most likely be too bright for future ultraviolet experiments. Intrinsic colors of stars of different spectral types and luminosity classes are available for bandpasses at 1550, 1800, 2200, 2500 and 3300 Å (Wu et al. 1980). These colors were derived from the observations made by the Dutch ANS satellite with a spectral resolution of 100-200 Å. The IUE spectra, even in low dispersion, have significantly higher resolution ($\sim 5-7$ Å) and have the additional coverage of the spatial region from 1200-1550 Å. The low dispersion IUE spectra, for all practical purposes, have sufficient resolution for stellar population synthesis of galaxies, spectral synthesis of accretion disks and X-ray heated atmospheres, derivation of extinction curves and comparison with the low dispersion spectra of peculiar objects.

Several important classes of objects have been left out of our observing program. These are hot white dwarfs, subdwarfs, horizontal branch stars, selected globular clusters and extragalactic H II regions. They have been or will be observed by different investigators and will eventually be available for our file.

The data obtained for this program will be made available to NASA observers on request. The exact form of the data to be distributed remains to be determined. At a minimum, tape copies of the extracted spectra ("eslo"), calibrated spectra, and dereddened calibrated spectra in the IUE format will be made available. Other output products under consideration include averaged dereddened spectra for observed spectral types, binned averaged spectra for degradation of resolution, equivalent widths of the strongest lines, and CalComp plots for observers without the necessary tape reading facilities.

This project is being carried out under the supervision of C.-C. Wu, B. E. Turnrose, A. V. Holm, and F. H. Schiffer. Up to now, 40.5 hours of US2 (high radiation background) time has been used and the stars which have been observed are listed in Table 1. If you wish to receive the data for these stars, you can write me and send me a scratch tape. We will be able to send you the line by line (essr) and extracted (eslo) data at this time. When other forms of the data (as mentioned above) become available, we will make announcements in future Newsletters. My mailing address is CSC Code 685, NASA Goddard Space Flight Center, Greenbelt, MD 20771. I can be reached at 301-344-7537.

September 26, 1980

Chi-Chao Wu

IUE Resident Astronomer

References

- Hilnter, W. A., Garrison, R. F., and Schild, R. E. 1969, Ap.J. 157, 313.
- Johnson, H. L., and Morgan, W. W. 1953, Ap.J. 117, 313.
- Lesh, J. R. 1968, Ap. J. Suppl., 151, 371.
- _____. 1972, Astr. Ap. Suppl., 5, 129.
- Morgan, W. W., and Keenan, P. C. 1973, Ann. Rev. Astr. Ap., 11, 29.
- Walborn, N. R. 1973, Ap.J. 179, 517.
- Wu, C.-C., Faber, S. M. Gallagher, J. S., Peck, M., and Tinsley, B. M. 1980, Ap.J. 237, 290.

TABLE 1
STARS OF DIFFERENT SPECTRAL TYPES OBSERVED BY THE IUE

H D	Name	SP Type	V	E(B-V)	Note
47839	15 Mon	O7 V	4.65	0.07	a
14633		O8 V	7.46	0.09	
214680	10 Lac	O9 V	4.88	0.11	a
188209		O9.5 Ia	5.65	0.18	b
36512	υ Ori	B0 V	4.61	0.02	a
63922		B0 III	4.11	0.11	
34816	λ Lep	B0.5 IV	4.29	0.03	
150898		B0.5 Ia	5.57	0.15	
31726		B1 V	6.15	0.05	
40111	139 Tau	B1 Ib	4.83	0.12	
3360	ζ Cas	B2 IV	3.66	0.05	a
51283		B2 III	5.28	0.05	
165024	θ Ara	B2 Ib	3.66	0.08	
32630	η Aur	B3 V	3.18	0.02	ab
190993	17 Vul	B3 V	5.06	0.02	
53138	ο ² CMa	B3 Ia	3.01	0.05	a
147394	τ Her	B5 IV	3.90	0.01	a
83183		B5 II	4.08	0.14	
86440	φ Vel	B5 Ib	3.54	0.00	
164353	67 Oph	B5 Ib	3.96	0.11	
58350	η CMa	B5 Ia	2.44	0.00	ab
23630	η Tau	B7 III	2.87	0.03	a
23324	18 Tau	B8 V	5.65	0.04	a
103287	γ UMa	A0 V	2.44	0.01	a
111775		A0 II	6.32	0.03	
104035		A0 Ia	5.60	0.17	b
166205	δ UMi	A1 V	4.35	-0.01	
197345	α Cyg	A2 Ia	1.25	0.04	a
216956	α PsA	A3 V	1.16	0.00	a
122408	τ Vir	A3 III	4.27	0.00	bc

Note to Table 1

a MK standard as given by W. W. Morgan and P. C. Keenan (1973, Ann. Rev. Astr. Ap., 11, 29.)

b LWR image affected by microphonics noise

c SWP image under-exposed