A PROPOSED UK HIGH PRIORITY OBSERVING LIST FOR IUE

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A list of High Priority objects to be observed during the first 30 days (= 15 UK shifts) operation of IUE has been constructed from the UK observing proposals allocated time during the first year of operation of IUE.

The amount of time allocated in the High Priority Observing List (HPOL) for each area of study is broadly in line with the corresponding first year allocations as summarised below. Within each area of study emphasis has been placed on specific proposals and targets for which little or no previous UV data has been obtained and for which IUE is uniquely suitable.

Breakdown of UK IUE Allocations for 1st year of operation

(A)	Solar System Studies:	5 shifts	- 3.5 %
(B)	Stellar Atmospheres - Hot OBA stars:	29 shifts	- 20 %
(C)	Stellar Atmospheres - Cool stars:	14 shifts	- 10 %
(D)	Interstellar Matter:	20 shifts	- 14 %
(E)	Variable Objects:	22 shifts	- 15 %
(F)	Extragalactic Objects:	54 shifts	- 38 %

The following types of object together with a rough HPOL time allocation has been used as a guidline in constructing a detailed observing list:

Rough Guidline for the HPOL

(B)	Subluminous stars, Planetary Nebulae, Hot emission line stars	- 3 shifts
(C)	Stellar Chromospheres, T Tauri stars	- 2 shifts
(D)	Heavily reddened stars, Supernovae remnants, anomalous stars	- 2 shifts
(E)	X-ray Binaries	- 2 shifts
(F)	Normal galaxies, Quasars, Seyferts, Markarians, BL Lac objects	- 6 shifts

IUE Sensitivity

The exposure times estimated for the HPOL are based on the following flux/signal-to-noise levels deduced from the latest measured sensitivity values for IUE:

In terms of the parameter A'_λ (= the effective area of a 100 % effecient detector, derived from the measured optics effeciences), quantun effeciency Q_λ , and resolution element $\Delta\lambda$, the photon flux, F_λ , necessary to give a signal-to-noise, Γ , in an exposure time t, is given by:

$$F_\lambda = \frac{\Gamma^2}{t\,\Delta\lambda\,Q_\lambda\,A'_\lambda} \quad \text{photons cm}^{-2}\,\text{s}^{-1}\,\text{Å}^{-1}$$

The parameters A'_λ and Q_λ have recently been determined and are given below at 1500Å and 2500Å for the High Resolution (HR) and Low resolution (LR) modes together with the required photon fluxes, F_λ , necessary to give a signal-to-noise Γ = 50 in a 1 hour exposure.

		$\Delta\lambda$	Q_λ	A'_λ	F_λ ph $cm^{-2}s^{-1}Å^{-1}$	F_λ erg $cm^{-2}s^{-1}Å^{-1}$
High Resolution Mode:						
	1500Å	0.12Å	0.09	50	1.3	1.76(-11)
	2500Å	0.19Å	0.14	40	0.6	5.0(-12)
Low Resolution Mode:						
	1500Å	5.0Å	0.09	250	0.007	9.3(-14)
	2500Å	5.7Å	0.14	120	0.007	5.6(-14)

The corresponding photon fluxes estimated for the same Γ and t in the report of Boggess (1973) were: HR: F_{1500} = 8.0, F_{2500} = 2.0; LR: F_{1500} = 0.03, F_{2500} = 0.02. Thus the flux levels listed above represent a general improvement in the estimated sensitivity of the instrument of a factor of between 3 and 6. In general for stellar spectroscopy one should aim for Γ = 50, but for some of the more exotic studies requiring very long exposures (eg. extragalactic objects, X-ray sources) this could probably be relaxed to say Γ = 25.

In the following sections some notes are given regarding the selection of HPOL targets together with the UK proposal Nos. figuring in the HPOL. Notes on the derived flux estimates and exposure times are given. In general for the stellar targets absolute ultraviolet flux measurements are available from S2/68 data which allow accurate exposure times to be determined. For the non-stellar objects previous UV observations (if any) have to be corrected involves some uncertainty in the estimated exposure times. In these cases the most accurate exposure times will be determined after the first observation.

(B) Stellar Atmospheres - Hot OBA Stars

Subluminous stars, Planetary Nebulae, Hot emission line stars:
UK Proposals: 2, 3, 8, 25, 27, and 36.

A selection of UV objects under study from the S2/68 data will be drawn up after the initial S2/68 analysis is completed.
For the central stars of Planetary Nebulae fluxes have been estimated from extrapolation of the S2/68 measurements of NGC 6543 (Boksenberg et al. 1975) incorporating the interstellar reddening corrections using the colour excesses E_{B-V} determined by ANS observations (Pottasch 1977). It is anticipated that the central stars will be observed with the 3 arcsec aperture, then offsetting from the central star using the 10x20 arcsec aperture to study the nebula spectrum. Both central star and nebula observations being conducted in the LR mode in both Long (L) and Short (S) wavelength ranges.
For the hot emission line stars emphasis is placed on the WR and Of stars (Willis and Wilson 1977a,b).
One variable Ap star can be observed around its cycle of variations and the interesting peculiar eclipsing binary β Lyr can also be observed through its period. These latter two stars are bright and require only a small fraction of the available time for (B).
Total exposure time = 1400 minutes.

(C) Stellar Atmospheres - Cool stars

Stellar Chromospheres, T Tauri stars. UK proposals - 1, 20 and 46

For the chromospheric study 7 stars expected to show observable chromospheric emission lines in the S wavelength range have been selected, covering the spectral range F0 to M1 and luminosity classes I, III and V. Most of these stars have some chromospheric emission line intensities measured from Copernicus data (cf. Chromosphere references), allowing IUE exposures to be derived. It is proposed to observe in the HR mode in the S wavelength range giving two exposures (short and long) to enable the full range of emission line intensities to be studied. In addition a HR mode L wavelength scan should be made to study the MgII resonance lines, and photospheric spectrum for which S2/68 measurements are available.
Total exposure time = 600 minutes.
For the T Tau stars no data on the expected UV energy distributions are available and rough exposures have been estimated assuming an F star energy

distribution, using the V mags. of the T Tau stars and S2/68 observations of F stars. The LR mode in both wavelength ranges should be used.
Estimated total exposure time = 240 minutes.
Total exposure time for (C) = 840 minutes.

(D) Interstellar Matter. UK proposals 6, 22, 23, 38, and 24

In view of the extensive ultraviolet data on the interstellar medium already obtained with the Copernicus and TD-1 satellites, it is proposed to restrict the interstellar study in the HPOL to observation of heavily reddened stars, inaccessible to previous experiments, and the more unusual regions of interstellar space.
It is suggested that the star HD 149757 (ζ Oph) should be observed to provide a comparison of IUE performance with that of Copernicus.
A list of reddened stars with colour excesses in the range 0.0 to 0.67 in three supernovae remnants, forming a time sequence, (Wallerstein et al. 1971, 19 Silk et al. 1973) has been drawn up, which together with 4 very heavily reddened stars observed extensively in the visible for the diffuse interstellar features (Herbig 1975) makes up the proposed Galactic HPOL interstellar programme. All the programme stars have some S2/68 measurements and therefore have reliably determined exposure times. Observations should be made in the HR mode in both L and S wavelength ranges.
Total exposure time = 900 minutes.

(E) Variable Objects

X-ray Binaries. Proposals: 37

It is proposed that time in the HPOL for this study area should be given over entirely to observation of X-ray binaries. Three optically identified targets (Blumenthal 1973) have been selected for this initial list, of which two have some S2/68 measurements (HD 153919 and Vela X-1).
The UV flux estimate for Cyg X-1 is based on the spectral type and colour excess of the optical component using HD 77581 (Vela X-1) for comparison.
Repeat observations of each target should be made over the binary periods (3.4, 5.6 and 9.0 days), a minimum requirement being ten observations of each in the HR mode in both L and S wavelength ranges. A Γ = 25 is considered acceptible at this stage. Initial total exposure time = 600 minutes.
The rest of the available time for (E) should be used to make further observations of the above targets and/or observations of other X-ray binaries.

(F) <u>Extragalactic Objects:</u> UK Proposals: 5, 13, 33, 42 and 40

Observation of the following types is proposed: Normal galaxies (Spirals and ellipticals); Quasars; Seyferts; Markarians and BL Lac objects.
It is suggested that approximately one shift should be allocated to each class. Morphological descriptions of many extragalctic objects have been given by Bastos (1974). Previous UV observations of a few galaxies have been made with large apertures (Carnochan et al. 1975) and thus exposure estimates for IUE are very uncertain. They have been derived here from fluxes at 2500Å estimated from (i) the data of de Vaucouleurs (1972) (V mag., B-V, $(B-V)_0$ and aperture/V relationships for Galaxy type) together with the relation of Code (1972): $m_{2450} - m_{4250}$ vs. $(B-V)_0$ (approximating m_{2500} - B). The fluxes derived by this method are expected to be good to a factor of about two. In this area observation of the first target will provide the best exposure estimates for following objects.
The Seyfert galaxy NGC 3077 has been observed by ANS, which enables compartively accurate flux estimates for IUE to be derived. The other Seyferts are scaled from NGC 3077 from their V mags. Similarly for Mark 35 observed by ANS and the other Markarians.
For the Quasars it is suggested that an initial exposure of about 1 hour should be made on 3C 273. The results of this will determine subsequent Quasar observations and exposures in the HPOL. It is possible that, if strong emission lines are observed, a HR scan would be profitable.
Similar considerations apply to the BL Lac objects.
All exposures listed have been derived for $\Gamma = 25$.
For the fainter objects it may be profitable to use the high gain mode which will decrease the necessary exposure time but at the expense of signal-to-noise.
Total estimated exposure time = 2500 minutes.

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Notes to the HPOL List:

Column	1	Objects Name
Column	2	Spectral type, or Galaxy type.
Column	3	V Mag.
Columns	4,5	Fluxes at 1500Å and 2500Å. Unless otherwise noted all measurements are from S2/68 data. Values in { } are estimated values. Values marked * and + are ANS and OAO-2 values respectively.
Columns	5to9	Proposed spectrograph modes, wavelength range and exposure times. Where one exposure is given it refers to the total time need to carry out all proposed observations. for that object. Other cases are referred to in the notes in Column 10.
Column	10	Notes on the targets and observing proceedures are given where necessary.

OBJECT	SP	V	F_{1500} erg $cm^{-2}s^{-1}A^{-1}$	F_{2600}	HR	EXP min	LR	EXP min	NOTES
) UV OBJ	UVO	8-10	20.0(-12)	5.0(-12)	L+S	100			5-10 UV OBJ
3226	SdO	10.2	17.4(-12)	4.0(-12)	L+S	120			+39° 3226
325	SdO	9.5	36.3(-12)	8.3(-12)	L+S	65			+75° 325
442	SdO	10.5	17.4(-12)	4.4(-12)	L+S	120			+ 37° 442
43	WD	12.4	-	1.5(-13)*			L+S	40	HZ 43
ge 24	WD	12.3	3.4(-12)	6.1(-13)+			L+S	10	Feige 24
2392	O6f	10.5	{4.0(-12)	1.1(-12)}			L+S	5 + 30 -	3" for cent.star, 10x20" for n
246	OVI	11.9	{1.6(-12)	4.7(-13)}			L+S	10 + 30 -	" " ". Planetary Neb.
7662	Con	11.8	{1.9(-12)	5.4(-13)}			L+S	10 + 30 -	" " ". Planetary Neb
40	WC8	10.6	{1.8(-12)	5.2(-13)}			L+S	10 + 30 -	" " ". Planetary Neb.
50896	WN5	6.8	3.0(-10)	5.0(-11)	L+S	10			
92740	WN7	6.5			L+S	10			
192163	WN6	7.4	2.4(-11)	5.7(-12)	L+S	90			
65763	WC6	7.8	6.0(-11)	1.8(-11)	L+S	30			
56385	WC7	7.4	6.5(-11)	1.3(-11)	L+S	40			
92103	WC8	7.9	1.1(-11)	4.0(-12)	L+S	120			
64794	O4V((f))	5.9	4.1(-10)	8.0(-11)	L+S	6			
99579	O6V((f))	6.0	1.2(-10)	5.2(-11)	L+S	15			
10839	O6If	5.1	1.2(-10)	5.6(-11)	L+S	15			
47839	O7V((f))	4.6	2.0(-09)	5.6(-10)	L+S	1			
88001	O7Iaf	6.2	1.2(-10)	5.2(-11)	L+S	15			HD 174638 (β Lyr)
CVn	Ap	2.9	6.4(-10)	4.1(-10)	L+S	2x 4			α² CVn Period= 5.5d

(C) Stellar Atmospheres: Cool Stars

OBJECT	SP	V	F_{1500} erg $cm^{-2}s^{-1}A^{-1}$	F_{2500}	HR	EXP min	LR	EXP min	NOTES
α Car	F0Ib	-0.9	7.8(-12)	1.2(-09)	L+S (.5)	5+60			Exp. in () are L wavelengt Others are Short and long
α CMi	F5IV	0.3	2.0(-12)	3.5(-10)	L+S (1)	6+90			F(Ly∝)=1.9(-11); F(SiIII)=
α Aur	G5III+G0III	0.1	2.1(-12)	7.6(-11)	L+S (4)	1+10			F(Ly∝)=1.8(-10); F(OI)= 9.
α Boo	K2III	0.0	F_{2740} = 60.0(-12)		L+S (5)	1+15			F(Ly∝)=1.1(-10); F(OI)=2.2
ε Eri	K2V	3.8	F_{2740} = 7.0(-12)		L+S (40)	1+15			F(Ly∝)=1.2(-11); F(OV)=9.7
α Sco	M1Ib	1.0	F_{2740}=1.6(-11)		L+S (20)	5+40			
α Ori	M2I	0.8	F_{2740} = 1.6(-11)		L+S (20)	5+40			F(OI)=3.5(-12) all fluxes in erg cm^{-2} s^{-}
RW Tau	T Tau	9.6_{max}					L+S	60	
RU Lup	T Tau	9.6_{max}					L+S	60	
T Tau	T Tau	9.6_{max}					L+S	60	
RY Tau	T Tau	9.3_{max}					L+S	60	

(E) Variable Objects: X-ray binaries

3U 0900-40 Vela X-1 HD 77581	B0.5Ib	6.8		5.5(-12)	L+S	25x10			X-Ray Bin. P=9d. STN=25
3U 1700-37 HD 153919	07f	6.7		1.5(-11)	L+S	10x10			X-Ray Bin. P=3.4d, STN =
3U 1956+35 Cyg X-1 HDE 226868	B0Ib	8.6		{1.0(-12)}	L+S	25x10			X-Ray Bin. P=5.6d, STN =

(D) Interstellar Matter

OBJECT	SP	V	F_{1500} erg $cm^{-2}s^{-1}A^{-1}$	F_{2500}	HR	EXP MIN	LR	EXP min	NOTES
HD 42740	B1IB	6.1	4.3(-11)	3.0(-11)	L+S	34			Monoc. Loop. E_{B-V}= 0.3
HD 46769	B7Ib	5.8	7.9(-11)	3.4(-12)	L+S	22			Monoc.Loop. E_{B-V}= 0.1
HD 48977	B3V	5.9	2.6(-10)	8.4(-11)	L+S	8			Monoc. Loop E_{B-V} = 0.02
HD 44700	B3IV	6.4	1.3(-10)	4.3(-11)	L+S	15			Monoc. Loop E_{B-V} = 0.02
HD 46150	B5V	6.7	6.4(-11)	2.3(-11)	L+S	30			Monoc. Loop E_{B-V} = 0.33
HD 47432	09.5II	6.2	6.3(-11)	2.9(-11)	L+S	30			Monoc. Loop E_{B-V} = 0.44
HD 36665	B1e	8.0		{4.0(-12)}	L+S	120			Shajn Loop E_{B-V}=0.65
HD 37318	B0.5e	8.4		{3.0(-12)}	L+S	120			Shajn Loop E_{B-V}=0.67
HD 38116	B5	7.9	1.4(-11)	3.8(-12)	L+S	120			Shajn Loop E_{B-V}=0.35
HD 74455	B3V	5.5	8.4(-10)	2.2(-10)	L+S	3			Vela Loop. E_{B-V}= 0.0
HD 75821	B0III	5.1	1.1(-09)	3.2(-10)	L+S	1			Vela Loop. E_{B-V}= 0.1
HD 76161	B6V	5.9	1.8(-10)	6.5(-11)	L+S	10			Vela Loop. E_{B-V}= 0.0
HD 74371	B5Ia	5.2	4.6(-11)	2.8(-11)	L+S	30			Vela Loop. E_{B-V}= 0,03
HD 14134	B3Ia	6.7		1.4(-11)	L+S	40			Herbig Diff. Feat. E_{B-V} =
HD 43384	B3Ia	6.3		6.9(-12)	L+S	70			Herbig Diff. Feat. E_{B-V} =
HD 190603	B1.5Ia	7.3		1.1(-11)	L+S	60			Herbig Diff.Feat. E_{V-V} =
HD 183143	B	6.9		3.5(-11)	L+S	200			Herbig Diff. Feat. E_{B-V} =
HD 149757	09.5Ia	2.5	3.8(-09)	1.4(-09)	L+S	1			ζ Oph for Copernicus com

(F) Extragalactic Objects

OBJECT	SP	V	F_{1500}	F_{2500} erg cm^{-2} s^{-1} A^{-1}	HR	EXP min	LR	EXP min	NOTES
NGC 221	E2	10.0(16")		{ 3.4(-14)}			L+S	50	size: 3'x2'
NGC 205	E2	11.1(64")		{ 1.5(-14)}			L+S	100	size: 12'
NGC 224	S3	10.0(16")		{ 2.3(-14)}			L+S	70	size: 160'x40'
NGC 7793	Sd	11.6(64")		{ 6.5(-15)}			L+S	240	
NGC 2681	S0	11.4(30")		{ 6.3(-15)}			L+S	260	
NGC 3115	L-	10.3(30")		{ 6.7(-15)}			L+S	240	size: 4'x1'
NGC 3379	E+	10.8(30")		{6.6(-15)}			L+S	240	size: 2'x2'
NGC 4826	Sb			{8.5(-15)}			L+S	100	S2/68 Observed. size: 8'x
NGC 5055	Sb			{ 2.3(-14)}			L+S	70	S2/68 Observed. size: 8'x
NGC 1068	Seyf.	10.8(16")		{ 2.9(-14)}			L+S	60	size: 3'
NGC 4151	Seyf.	11.7(30")		{1.8(-14)}			L+S	90	
NGC 3077	Seyf.	12.0(30")		{1.3(-14)}			L+S	120	ANS Observed.
NGC 3690	MK	12.9(30")		{ 8.0(-15)}			L+S	100	
Mark 3	MK	13.3(30")		{ 5.5(-15)}			L+S	150	
Mark 35	MK	13.5(30")		{ 4.6(-15)}			L+S	150	ANS observed.
3C 273	Quasar	12.8					L+S		z = 0.16
3C 351	Quasar	15.3					L+S		z = 0.37
3C 249	Quasar	15.7					L+S		z = 0.31
3C 345	Quasar	16.0					L+S		z = 0.59
OJ 287	BL Lac	12.5-15.5					L+S		
BL Lac	BL Lac	12.0-14.5					L+S		
MK 421	BL Lac	13.5					L+S		

close binaries

Additional High Priority targets

C.-C. Wu
A. V. Holm

I Calibration Stars

A. High Dispersion Mode

HD	name	Sp. T.	V	B-V	
34816	λ Lep	B0.5 IV	4.29	-0.27	
120315	η UMa	B3 V	1.84	-0.19	
149757	ζ Oph	O9.5 Vnn	2.56	+0.02	
209952	α Gru	B7 V	1.74	-0.14	
87901	α Leo	B7 V	1.35	-0.12	alternate

B. Low Dispersion Mode

29138	B1 Ik	7.18	-0.07
48857	B5 V	7.00	-0.15
145454	A0	5.44	-0.02
197637	B3	6.8	

These stars ~~were~~ are chosen from Monfils' list, they have $\frac{\sigma_{1500}}{\sqrt{N}} \lesssim 2\%$, $\frac{\sigma_{2500}}{\sqrt{N}} \lesssim 4\%$ at 1500 and 2500 Å respectively from TD-1 observations, N being the number of spectra available.

II Cataclysmic Variables

SS Cyg Dwarf nova $V \sim 12^m.1$

Any other dwarf novae that decide to outburst during the commissioning period

V603 Aql old nova $V \sim 10.8$

η Car old nova ? $V \sim 7.9$

V1500 Cyg (Nova Cyg 1975), Young nova remnant presently at $V = 12.8$, $E(B-V) = 0.69$

NQ Vul (Nova Vul 1976), Young nova remnant
$V \sim 11.4$ in June 1977 $\alpha = 19^h 27^m 04.06$, $\delta = 20° 21' 43.3$ } 1950

Any nova that may outburst during the commissioning period.

AG Peg Symbiotic Star $V \sim 7.7$

V1016 Cyg Symbiotic Star $V \sim 11.3$

RR Tel Symbiotic Star $V \sim 12$

To the list of Gondalekhar, Willis & Wilson

B: Stellar Atmospheres: Hot OBA Stars

+28° 4211	SdO	extremely hot	$V=10^m.5$
HD 49798	SdO	Unseen companion	$V=8^m.29$
+37° 1977	?	peculiar UV spectrum	$V=10^m.0$
Feige 11	Sd B	Helium Weak	$V=12^m.1$
+13° 3224	Sd B	Helium Strong	
HD 86986	Horizontal Branch star		V = 7.99
HD 109995	"	" "	V = 7.61

E X-Ray Binaries

Sco X-1	X-ray heating effect, V ~ 12.5
AM Her (3U 1809 +50)	at bright portion of the light Curve V ~ 12.3
LMC X-4	Luminous O star $p \sim 1^d.7$ as optical counterpart ?

SNR Crab Nebula

F Extragalactic Objects

NGC 598 (M33)	Sc
NGC 4449	Irr I
NGC 5253	Irr I
NGC 3077	Irr II

Markarian 231 Seyfert type 1, at detection limit of the ANS

ESA's

~~ERA's~~ Inputs to High Priority Targets

BD $-3^{o}5357$ v = 9.34 Spectral Type : G8 + UV object

This object (detected by TD1) is an eclipsing binary with hot subdwarf companion.

BD $-6^{o}1253$ v = 9.3 Spectral Type : BO

(many emission lines in the visible and IR).

BD $+61^{o}623$ v = 9.5 Spectral Type : B2

(idem).

xx Oph v = 10 Spectral Type : BO

(idem).

HD 175754 (L = 16^{o} 23o, B = 9^{o} 55i) and HD 1994478 (L - 87^{o} 31o, B = $+1^{o}$ 25').

21 cm emission absent

3 C 390.3: seyfert 1 V = 14 (z = 0.051, size 12 arcsec)

ngc 5506 : seyfert - like spiral V ≈ 13.2 size 130 arcsec east-west;

30 arcsec north-south

z = 0.006

(ref: Wilson et al., 1976, MNRAS 177, p. 673)

ngc 1275

Proposed List of Standard Stars. (1

Spectrum	Name	v sin i	HR(=BSC)	V	B-V
O9 V	10 Lac	29	8622	4.87	-0.20
B0 V	τ Sco	13	6165	2.82	-0.26
B0 Ia	ε Ori	85	1903	1.70	-0.19
B0.5 III	ε Per	150	1220	2.88	-0.17
B0.5 III	1 Cas	74	8797	4.87	-0.04
B1 V	—	5	1886	5.68	-0.22
B1 Ib	ρ Leo	70	4133	3.85	-0.14
B2 IV	γ Peg	0	39	2.8 var	-0.23
B2 III	γ Ori	60	1790	1.64	-0.23
B3 V	η Aur	125	1641	3.17	-0.18
B3 III	ι Her	0	6588	3.80	-0.18
B5 V	υ And	80	226	4.53	-0.15
B5 IV	τ Her	20	6092	3.89	-0.15
B5 III	τ Ori	25	1735	3.59	-0.12
B5 Ib	67 Oph	17	6714	3.97	+0.02
B5 Ia	η CMa	60	2827	2.40	-0.07
B7 V	π Cet	15	811	4.23	-0.13
B7 III (p)	β Tau	80	1791	1.65	-0.13
B8 V	ι And	88	8965	4.28	-0.10
B8 III	27 Tau	160	1178	3.62	-0.08
B8 Ia	β Ori	40	1713	0.08	-0.03
B9 III	γ Lyr	90	7178	3.25	-0.05
A0 V	α Lyr	0	7001	0.04	0.00
A0 V	γ UMa	165	4554	2.44	0.00
A0 III	α Dra	0	5291	3.64	-0.05
A2 Ia	α Cyg	10	7924	1.26	+0.09
A3 V	α PsA	85	8728	1.16	+0.09

Spectrum	Name	V sin i	HR	V	B-V	Vis. binary separation
A5 V	β Ari	70	553	2.65	+0.13	
A5 Ib	—	23	2874	4.85	+0.23	
A7 III	θ^2 Tau	70	1412	3.41	+0.18	
F0 V	γ Vir N	23	4825	3.65	—	} 3".75
F0 V	γ Vir S	40	4826	3.68	—	
F0 II	—	24	1242	5.03	+0.50	
F0 Ib	α Car	0	2326	−0.73	+0.16	
F2 IV	β Cas	70	21	2.25	+0.35	Sp. bin.
F2 II-III	π Sgr	25	7264	2.90	+0.36	
F5 IV	α CMi	0	2943	0.34	+0.40	
F5 Ib	α Per	12	1017	1.79	+0.48	
F8 Ib	γ Cyg	4	7796	2.24	—	
F9 V	β Vir	0	4540	3.61	+0.55	
G2 V	α Cen A	< 30	5459	0.33		B: 17".66 V=1.70
G2 Ib-II	β Dra	"	6536	2.80		
G5 V	η Cas	"	219	3.45	+0.58	12".50
G5 III	μ Vel	"	4216	2.68	+0.90	
G8 IV	β Aql	"	7602	3.71	+0.86	comp. dM3
G8 III	η Dra	"	6132	2.77		Bin. comp K1
G8 Ib	ε Gem	"	2473	2.99		Bin. comp K[illegible]
K0 III	β Gem	"	2990	1.14	+1.00	
K1 V	α Cen B	"	5460	1.70		A: 17".66 V=0.33
K2 III	α Ari	"	617	2.00	+1.15	
K2 Ib	ε Peg	"	8308	2.40		opt. bin.
K5 V	61 Cyg A	"	8085	5.23	+1.19	24".4
K5 III	α Tau	"	1457	0.86	+1.53	
K7 V	61 Cyg B	"	8086	6.02	+1.38	24".4
K7 Ib	σ CMa	"	2646	3.46	+1.74	

Proposed List of Standard Stars (continues)

Spectrum	Name	HR	V	B-V	Binary ref.
M0 V	HD 88230	—	6.6		
M0 III	β And	337	2.05	+1.63	
M1.5 III	α Cet	911	2.53	+1.64	
M1.5 Iab	α Sco	6134	1.08	+1.80	comp. d B4
M2 Iab	α Ori	2061	0.1-1.2	+1.86	var.
M3 III	μ Gem	2286	2.97		
M3 III	δ Vir	4910	3.38	+1.57	
M6 III	30 Her	6146	4.4		

ASTRONOMY WORKING GROUP'S
High Priority Targets

	No.	Name	R.A.	Dec.	Sp.	V	B-V	Observing Mode R λ	N
AO Cas	001	H00001337	00 15 03	+51 09	085	6.25	+0.03	11	3
	002	H00001337	00 15 03	+51 09	085	6.25	+0.03	12	3
ε Eri	003	H00022049	03 30 34	-09 38	K25	3.73	+0.89	11	3
	004	H00022049	03 30 34	-09 38	K25	3.73	+0.89	12	3
α Aur	005	H00034029	05 13 00	+45 57	G83	0.09	+0.80	11	3
	006	H00034029	05 13 00	+45 57	G83	0.09	+0.80	12	3
β Ori	007	H00034085	05 12 08	-08 16	B88	0.08	-0.03	11	3
	008	H00034085	05 12 08	-08 16	B88	0.08	-0.03	12	3
ε Ori	009	H00037128	05 33 41	-01 14	B08	1.70	-0.19	11	3
	010	H00037128	05 33 41	-01 14	B08	1.70	-0.19	12	3
α Ori	011	H00039801	05 52 28	+07 24	M29	0.80	+1.86	11	3
	012	H00039801	05 52 28	+07 24	M29	0.80	+1.86	12	3
	013	H00039801	05 52 28	+07 24	M29	0.80	+1.86	21	3
	014	H00039801	05 52 28	+07 24	M29	0.80	+1.86	22	3
α Car	015	H00045348	06 22 50	-52 40	F01	-0.73	+0.16	11	3
	016	H00045348	06 22 50	-52 40	F01	-0.73	+0.16	12	3
WN5	017	H00050896	06 52 08	-23 52	055	6.55	-0.32	11	2
	018	H00050896	06 52 08	-23 52	055	6.55	-0.32	12	2
	019	H00050896	06 52 08	-23 52	055	6.55	-0.32	21	2
	020	H00050896	06 52 08	-23 52	055	6.55	-0.32	22	2
ζ Gem	021	H00052973	07 01 09	+20 39	F71	3.7		11	3
	022	H00052973	07 01 09	+20 39	F71	3.7		12	3
UW CMa	023	H00057060	07 16 35	-24 28	071	4.5		11	3
	024	H00057060	07 16 35	-24 28	071	4.5		12	3
	025	H00057146	07 16 49	-26 30	G02	5.27	+0.96	11	1
	026	H00057146	07 16 49	-26 30	G02	5.27	+0.96	12	1
	027	H00057146	07 16 49	-26 30	G02	5.27	+0.96	21	1
	028	H00057146	07 16 49	-26 30	G02	5.27	+0.96	22	1
α CMi	029	H00061421	07 36 41	+05 22	F54	0.34	+0.40	11	3
	030	H00061421	07 36 41	+05 22	F54	0.34	+0.40	12	3
α Pup	031	H00064440	07 50 30	-40 27	G53	3.70	+1.02	11	1
	032	H00064440	07 50 30	-40 27	G53	3.70	+1.02	12	1
	033	H00064440	07 50 30	-40 27	G53	3.70	+1.02	21	1
	034	H00064440	07 50 30	-40 27	G53	3.70	+1.02	22	1
γ Vel	035	H00068273	08 08 00	-47 12	085	1.82	-0.26	11	3
	036	H00068273	08 08 00	-47 12	085	1.82	-0.26	12	3
0900-40	037	H00077581	09 00 13	-40 21	B01	6.9	+0.45	11	3
	038	H00077581	09 00 13	-40 21	B01	6.9	+0.45	12	3
η Car	039	H00093308	10 43 07	-59 25	B81	-1.0		11	3
	040	H00093308	10 43 07	-59 25	B81	-1.0		12	3
	041	H00093403	10 43 47	-59 09	051	7.25	+0.22	21	3
	042	H00093403	10 43 47	-59 09	051	7.25	+0.22	22	3
Hi Z 09 Ip	043	H00093521	10 45 34	+37 50	B35 E	6.90	+0.10	11	3
	044	H00093521	10 45 34	+37 50	B35 E	6.90	+0.10	12	3
	045	H00093840	10 46 57	-46 31	B25 E	7.75	+0.16	11	3
	046	H00093840	10 46 57	-46 31	B25 E	7.75	+0.16	12	3
	047	H00101947	11 41 07	-62 13	G08	5.05	+0.80	11	3
	048	H00101947	11 41 07	-62 13	G08	5.05	+0.80	12	3
3 Cen	049	H00120709	13 48 56	-32 45	B53	4.72	-0.13	11	3
	050	H00120709	13 48 56	-32 45	B53	4.72	-0.13	12	3
α Boo	051	H00124897	14 13 23	+19 26	K03	0.24	+1.23	11	3

R = { 1 hi, 2 Lo, 3 both } W = { 1 long, 2 short, 3 both } N = repeat obs.

α Boo	052H00124897	14	13	23	+19	26	K03		0.24	+1.23	12	3
α Cen	053H00128620	14	37	12	-60	38	G25		0.30	+0.68	11	3
	054H00128620	14	37	12	-60	38	G25		0.30	+0.68	12	3
	055H00149881	16	34	41	+14	34	B25	E	6.60	+0.12	11	3
	056H00149881	16	34	41	+14	34	B25	E	6.60	+0.12	12	3
	057H00152236	16	50	28	-42	17	B18		4.80	+0.44	11	3
	058H00152236	16	50	28	-42	17	B18		4.80	+0.44	12	3
	059H00152408	16	51	29	-41	04	081		5.79	+0.19	11	3
	060H00152408	16	51	29	-41	04	081		5.79	+0.19	12	3
1700-37	061H00153919	17	00	33	-37	46	061		6.6	+0.27	11	3
	062H00153919	17	00	33	-37	46	061		6.6	+0.27	12	3
V453 Sco	063H00163181	17	53	00	-32	28	075		6.6		11	3
	064H00163181	17	53	00	-32	28	075		6.6		12	3
WC 6	065H00165763	18	05	29	-21	16	065		7.82	-0.28	11	1
	066H00165763	18	05	29	-21	16	065		7.82	-0.28	21	1
	067H00165763	18	05	29	-21	16	065		7.82	-0.28	12	1
	068H00165763	18	05	29	-21	16	065		7.82	-0.28	22	1
β Lyr	069H00174638	18	48	14	+33	18	B82		3.4		11	3
	070H00174638	18	48	14	+33	18	B82		3.4		12	3
υ Sgr	071H00181615	19	18	52	-16	03	B85		4.58		11	3
	072H00181615	19	18	52	-16	03	B85		4.58		12	3
	073H00187399	19	46	42	+29	16	A05		7.7		11	3
	074H00187399	19	46	42	+29	16	A05		7.7		21	3
	075H00187399	19	46	42	+29	16	A05		7.7		12	3
	076H00187399	19	46	42	+29	16	A05		7.7		22	3
η Aql	077H00187929	19	49	56	+00	53	F51		3.9	+0.80	11	3
	078H00187929	19	49	56	+00	53	F51		3.9	+0.80	12	3
Cyg X-1	079H00226868	19	56	36	+35	05	099		8.9	+0.85	21	3
	080H00226868	19	56	36	+35	05	099		8.9	+0.85	22	3
	081H00190603	20	02	38	+59	10	B18		5.6	+0.55	11	3
	082H00190603	20	02	38	+59	10	B18		5.6	+0.55	12	3
P Cyg	083H00193237	20	15	57	+37	53	B18		4.83	+0.42	11	3
	084H00193237	20	15	57	+37	53	B18		4.83	+0.42	12	3
V444 Cyg	085H00193576	20	17	43	+38	34	055		8.04	+0.51	21	3
	086H00193576	20	17	43	+38	34	055		8.04	+0.51	22	3
	087H00210839	22	09	49	+59	10	065		5.08	+0.25	11	3
	088H00210839	22	09	49	+59	10	065		5.08	+0.25	12	3
	089H00214080	22	33	25	-16	39	B25	E	6.80	+0.05	11	3
	090H00214080	22	33	25	-16	39	B25	E	6.80	+0.05	12	3
	091H00221568	23	30	27	+57	38	A25		8.90		21	3
	092H00221568	23	30	27	+57	38	A25		8.90		22	3
NGC 246	093N00000246	00	44	36	+12	09	055		11.9	-0.37	21	3
	094N00000246	00	44	36	+12	09	055		11.9	-0.37	22	3
NGC 2392	095N00002392	07	26	13	+21	01	065		10.4	-0.24	21	3
	096N00002392	07	26	13	+21	01	065		10.4	-0.24	22	3

	0970+75DE325	08	04	43	+75	07	06		9.2	-0.3	21	3
	0980+75DE325	08	04	43	+75	07	06		9.2	-0.3	22	3
	099000ABEL36	09	36	36	-02	34	06		11.6	-0.18	21	3
	100000ABEL36	09	36	36	-02	34	06		11.6	-0.18	22	3
	1010+28D4211	21	49	00	+28	38	06		10.2	-0.34	21	3
	1020+28D4211	21	49	00	+28	38	06		10.2	-0.34	22	3
	103N00007662	23	23	30	+42	16	06		11.8	-0.25	21	3
	104N00007662	23	23	30	+42	16	06		11.8	-0.25	22	3
	10500V380ORI	03	01	37	-06	29	A15	E	10.4	+0.80	21	3
	10600V380ORI	03	01	37	-06	29	A15	E	10.4	+0.80	22	3
	107000AB0AUR	04	52	34	+30	52	B95	E	7.0	+0.18	21	3
	108000AB0AUR	04	52	34	+30	52	B95	E	7.0	+0.18	22	3
	109000GW0ORI	05	26	20	+11	50	G55	E	9.7	+0.30	21	3
	110000GW0ORI	05	26	20	+11	50	G55	E	9.7	+0.30	22	3
M32	111N00000221	00	40	02	+40	36			10.0		21	3
	112N00000221	00	40	02	+40	36			10.0		22	3
M31	113N00000224	00	40	02	+41	00			4.5		21	3
	114N00000224	00	40	02	+41	00			4.5		22	3
Seyfert	115N00001068	02	40	06	-00	14			10.5		21	3
	116N00001068	02	40	06	-00	14			10.5		22	3
X-ray globular	117N00001851	05	12	23	-40	05			7.5		21	3
	118N00001851	05	12	23	-40	05			7.5		22	3
Seyfert	119N00004151	12	08	02	+39	41			11.5		21	3
	120N00004151	12	08	02	+39	41			11.5		22	3
QSO	12103C000273	12	26	33	+02	19			12.8		21	3
	12203C000273	12	26	33	+02	19			12.8		22	3
	123N00007078	21	27	35	+11	57			7.5		21	3
	124N00007078	21	27	35	+11	57			7.5		22	3
VV Cep	125H00208816	21	55	14	+63	24	M28		5.15		11	3
	126H00208816	21	55	14	+63	24	M28		5.15		21	3
	127H00208816	21	55	14	+63	24	M28		5.15		12	3
	128H00208816	21	55	14	+63	24	M28		5.15		22	3