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SPECTRAL EVOLUTION OF GALAXIES. II AN ATLAS OF *IUE* SPECTRA OF LATE TYPE STARS AND NEARBY EARLY TYPE STELLAR SYSTEMS

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RESUMEN

Se presentan en forma gráfica y tabular espectros de baja dispersión de estrellas tardías, cúmulos globulares y galaxias elípticas obtenidos con el satélite *IUE*. Para aquellos tipos de objetos con más de un espectro observado, se calculan espectros promedios.

ABSTRACT

Low dispersion *IUE* spectra are presented in both pictorial and tabular form for late type stars, globular clusters, and elliptical galaxies. Average spectra are computed for types of objects with more than one observed spectrum.

Key words: LATE TYPE STARS–GLOBULAR CLUSTERS–ELLIPTICAL GALAXIES–ULTRAVIOLET SPECTRA

I. INTRODUCTION

The *International Ultraviolet Explorer* satellite (*IUE*) was used to obtain ultraviolet spectra of late type stars and early type galaxies. These spectra were needed in order to complete an extensive project that involves the study of the spectral evolution of galaxies in the wavelength range from the ultraviolet to the infrared (Bruzual 1981, 1983*a*, 1983*b*, 1983*c*). The stellar data were required to complete the library of stellar spectra used in the synthesis. For spectral types earlier than G2 the *OAO-2* data of Code and Meade (1979) were used. The galaxy data were needed to define the typical early type galaxy UV spectrum to be compared with the results of the evolutionary synthesis. Due to the apparent faintness of the sources, the low dispersion mode of the *IUE* was used to maximize the signal-to-noise ratio and to make the exposure times reasonable. This mode provides enough resolution (~ 5 Å) for the synthesis program.

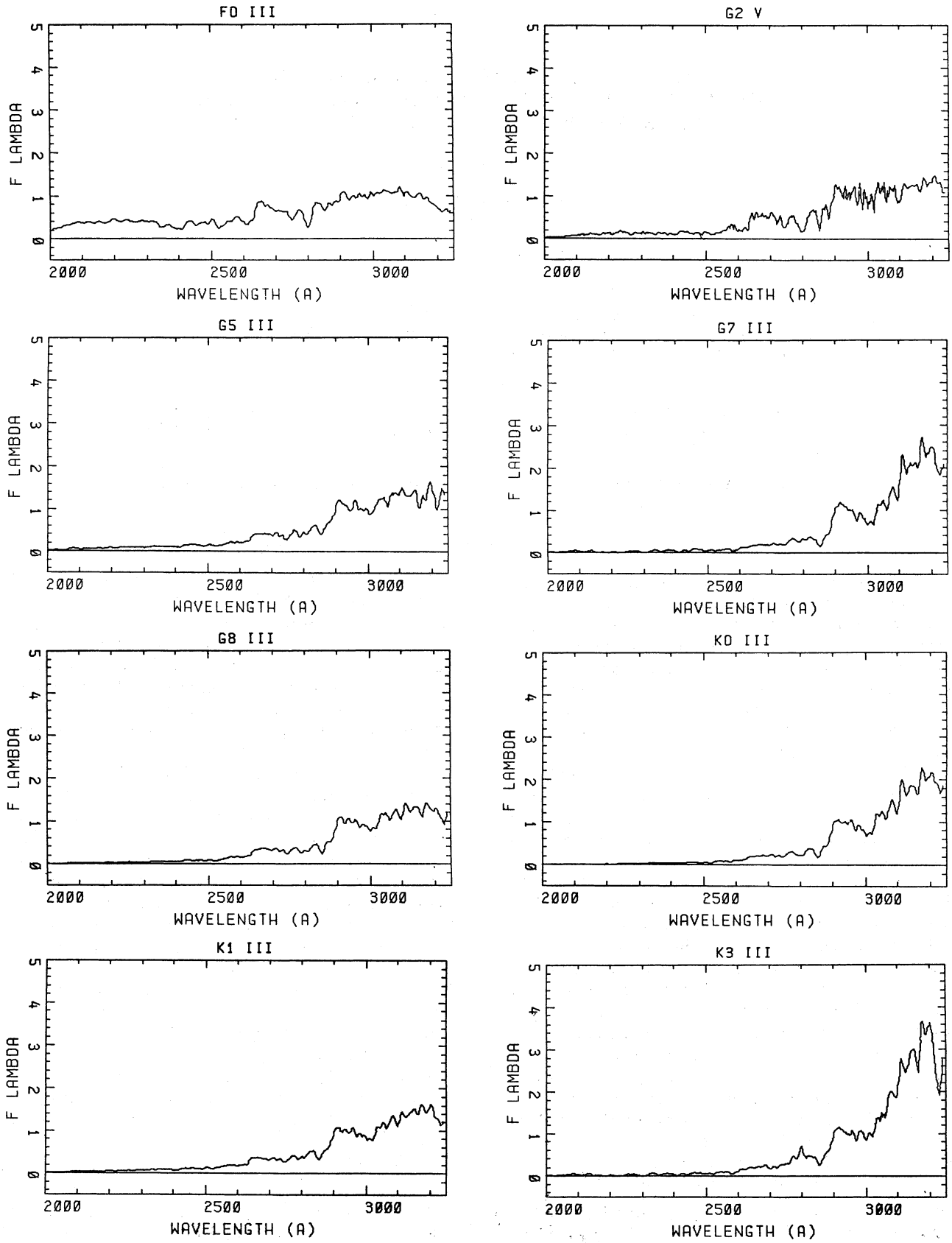
Besides the data acquired by the author, several *IUE* spectra of both stars and stellar systems were provided by the National Space Science Data Center (see Tables 1 and 2). While collecting these data it became apparent that there was a need for a uniform presentation of these spectra, similar to that given by Code and Meade (1979) for the *OAO-2* stellar data. Much of the data are dispersed throughout the literature, but the spectra have not been presented in a consistent and coherent form. In this paper I present such a compilation. All the spectra are displayed in both pictorial and tabular form in a common wavelength scale. Section II describes the details of the *IUE* data reduction performed by the author. The results are presented in section III.

II. DATA REDUCTION

The final reduction of the spectra was performed based on the files provided by the *IUE* data reduction facilities. Each spatially resolved spectral segment (line-by-line spectrum file) provided by NASA or ESA was plotted individually, as a spectrum F_λ versus λ. By visual inspection those segments with the highest signal-to-noise, i.e., with the spectral shape clearly visible, were chosen as defining the source spectrum. The spectra of extended sources typically included from eight to ten segments; in some of the exposures, the source was off-center in the large aperture. Special care was taken used to define the background level. Segments were chosen to cover most of the camera, approaching as close as possible to the source spectrum, without including segments with recognizable spectral features. The segments defining the brackground were averaged and smoothed, then normalized to the same area as the spectrum, and finally subtracted. At this stage the net counts were calibrated as usual (Bohlin and Holm 1980). This procedure improved the final spectrum considerably, especially below 2500 Å, over the standard reduction. This can be seen by comparing Figure 2*a* with Figure 1 of Bruzual and Spinrad (1981). The latter was constructed with the spectra reduced by the NASA facilities. The remaining high frequency noise in the final spectra should not be taken as spectral features. Quite often these apparent emission peaks represent particles hitting the detector at any time during the exposure.

III. RESULTS

Table 1 lists the stars, spectral type, and LWR image



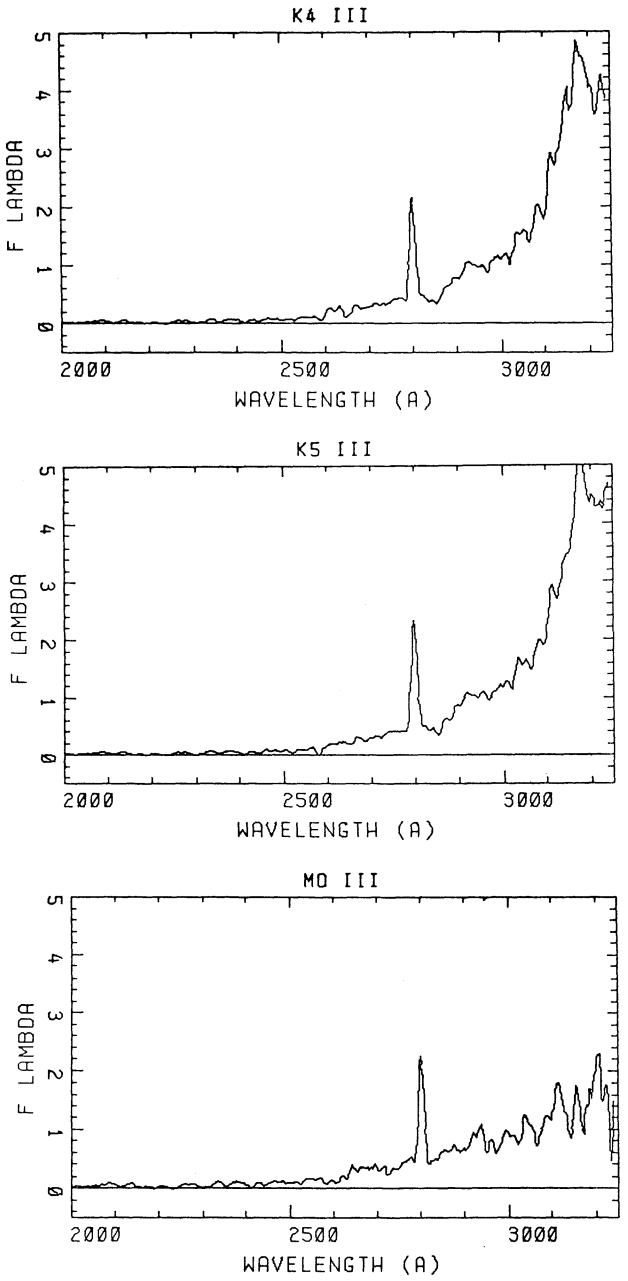


Fig. 1. (a,b,c,d,e,f,g,h,i,j,k) Ultraviolet spectra obtained with the *IUE* statellite for stars of spectral types as indicated in Table 1 and on top of each figure. For the spectral types with more than one entry in Table 1, an average spectrum was determined. All the spectra have been normalized to $F_\lambda = 1$ at $\lambda = 2940$ Å.

number for which *IUE* data were obtained. For spectral types of stars with more than one entry in this table an average spectrum was used after normalization at $\lambda = 2940$ Å. The spectra in the range from 2000 to 3240 Å are displayed in Figure 1 as plots of F_λ versus λ.

Table 2 indicates the identification, color excess, *IUE* image number, and exposure time for the elliptical gal-

TABLE 1

STARS OBSERVED WITH *IUE*

Sp. Type	Star	LWR Image No.
F0 III	γ Tuc	4688
G2 V	Sun	(*)
...	16 Cyg A	1888, 1889
G5 III	ι Tuc	4689
G7 III	χ^2 Tuc	4690
G8 III	ϵ And	4670
...	η And	4671
...	λ And	4666
K0 III	α Cas	4646
...	3 And	4667, 4668
K1 III	β Cet	4672, 4687
K3 III	δ And	4669
K4 III	ϕ^3 Cet	4686
K5 III	δ Psc	4684, 4685
M0 III	β And	4683

* The data for the sun was taken from Broadfoot (1972) and Arvensen *et al.* (1969).

axies and globular clusters for which *IUE* spectra were available. The reddening law (analytical approximation from Seaton (1979) was used to correct the observed *UV* spectra. As in the optical region, the degree of similarity between the *UV* spectra of these systems in the 2000 to 3200 Å region is very high, and it is possible to define an average *UV* spectrum for each type of stellar system considered. Different spectra were assigned weights in proportion to the observing time and in accord with spectral quality, as given in Table 3.

Table 4 lists *IUE* stellar spectra in numerical form. All the spectra presented in this atlas have been normalized to $F_\lambda = 1$ at $\lambda = 2940$ Å. The resulting average spectra of stellar systems in the range from 2000 to 3200 Å are shown in Figure 2 and listed in Table 5.

Finally, Figure 3 shows the average spectrum of M 31 and M 32, as well as the spectra of the globular clusters NGC 6752 and 47 Tuc in the range from 1200 to 3200 Å. These were the only systems observed down to 1200 Å. The fluxes are listed in Table 6. The fluxes from 1940 to 1995 Å are listed as zero; in this region there is no good overlap betweeen the *IUE* SWP and LWR cameras.

IV. CONCLUDING REMARKS

The *IUE* spectra of late type stars, globular clusters, and elliptical galaxies presented in section III are expected to be representative of objects of their kinds. These spectra can be used to estimate *UV* luminosities or for spectral feature identification purposes.

None of the galaxies included in this work show the rapid increase shortward of 2000 Å that has been observed in NGC 4486 (Bertola *et al.* 1980; Perola and Tarenghi 1980) and NGC 4649 (Bertola, Capaccioli, and Oke 1982). These two galaxies are thus "peculiar" with

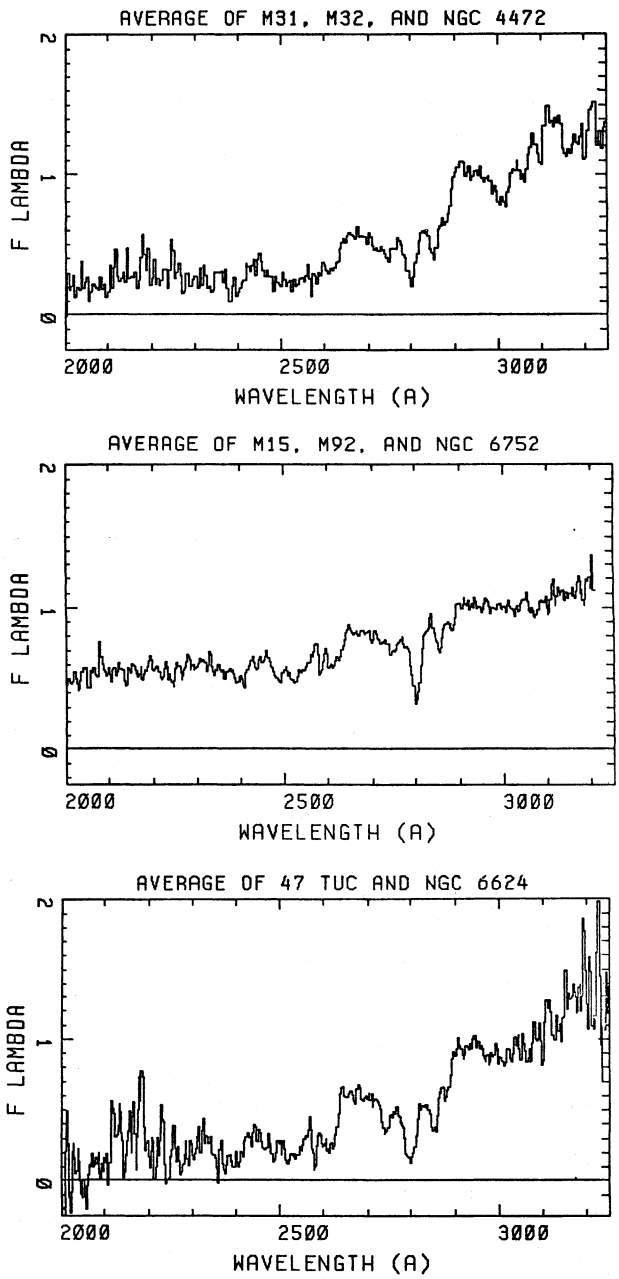


Fig. 2. Average spectral energy distributions in the range from 2000 to 3200 Å for: (a) M 31, M 32, and NGC 4472, (b) M 15, M 92, and NGC 6752, and (c) 47 Tuc and NGC 6624. Each spectrum was normalized at 2940 Å and weighted according to exposure time and spectral quality as indicated in Table 3. The high frequency structure shortward of 2600 Å is not real, being most likely due to detector noise, or particles reaching the camera during the esposures. The narrow "absorption feature" around 2580 A seen in some of the spectra is produced by a reseau mark in the camera.

respect to M31 and M32. Nor do any of these galaxies show emission lines as seen in the spectrum of M81 displayed by Peimbert and Torres-Peimbert (1981) and Bruzual, Peimbert, and Torres-Peimbert (1982).

TABLE 2

STELLAR SYSTEMS OBSERVED WITH *IUE*

Object	Type	E(B–V)	Image No.	Exposure (hrs.)
M 31 (bulge)	E – gal	0.10	SWP 3520	8.3
			LWR 3088	5.0
			LWR 4665 (*)	1.0
			LWR 4682 (*)	2.5
M 32	E – gal	0.10	SWP 3545	5.0
			LWR 3111	6.3
			LWR 4644 (*)	3.0
			LWR 4645 (*)	2.5
NGC 4472	E – gal	0.02	LWR 4520	3.0
			LWR 4521	3.5
			LWR 4664 (*)	6.0
			LWR 4681 (*)	4.5
M 15	G. C.	0.09	LWR 1457	0.2
			LWR 1820	1.0
			LWR 1821	1.2
M 92	G. C.	0.02	LWR 1448	0.5
			LWR 1881	0.7
			LWR 1882	0.7
NGC 6752	G. C.	0.04	SWP 1531	0.7
			SWP 1532	0.7
			LWR 1482	0.5
			LWR 1839	0.5
47 Tuc	G. C.	0.06	SWP 1510	3.0
			LWR 1461	0.5
NGC 6624	G. C.	0.30	LWR 1458	1.5

* Data obtained by H. Spinrad and the author.

TABLE 3

AVERAGE S. E. D. OF DIFFERENT STELLAR SYSTEMS

Object	Range (A)	Ingredients	Weight
E – gal	1250-3200	M 31 (bulge)	0.50
		M 32	0.50
	2000-3200	M 31 (bulge)	0.30
		M 32	0.40
		NGC 4472	0.30
G. C. (metal poor)	2000-3200	M 15	0.55
		M 92	0.30
		NGC 6752	0.15
G. C. (metal rich)	2000-3200	47 Tuc	0.75
		NGC 6624	0.25

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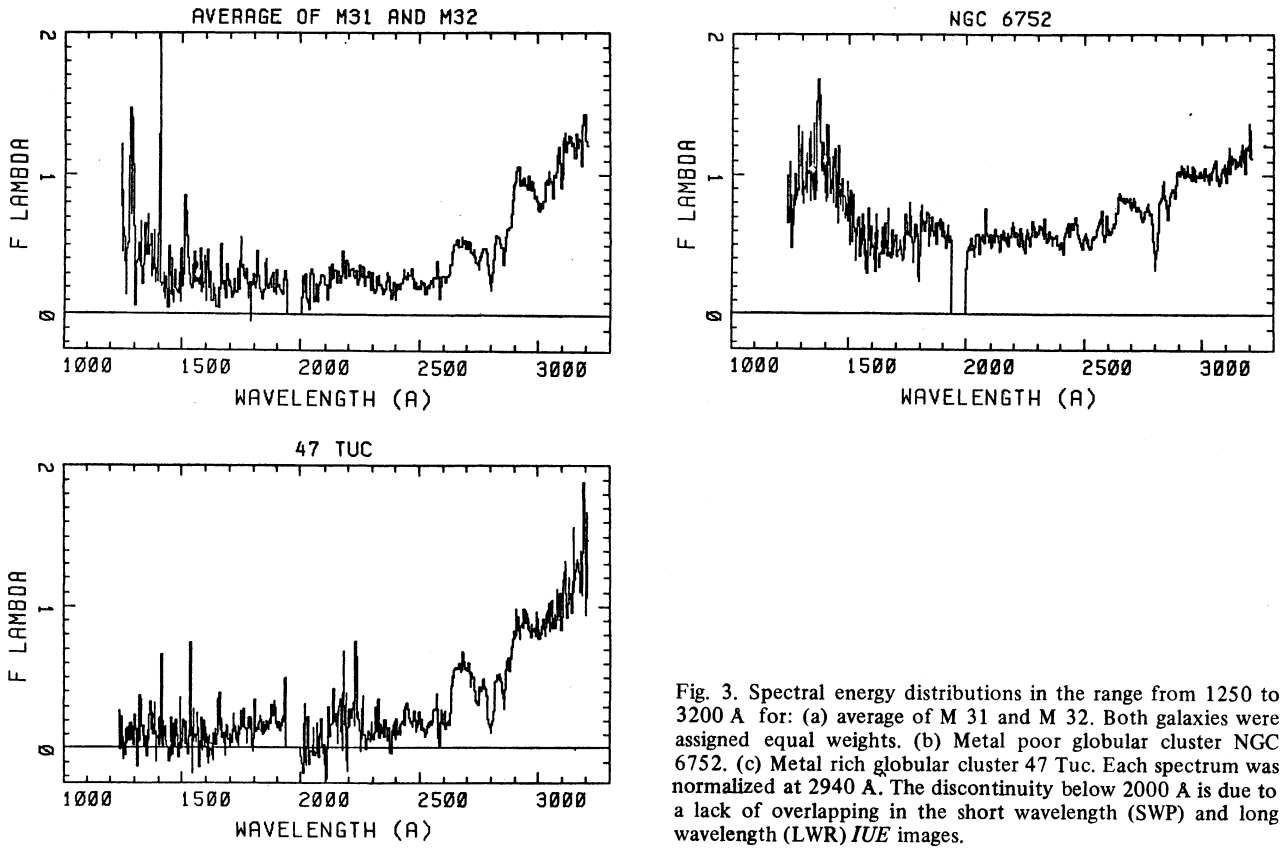

Fig. 3. Spectral energy distributions in the range from 1250 to 3200 A for: (a) average of M 31 and M 32. Both galaxies were assigned equal weights. (b) Metal poor globular cluster NGC 6752. (c) Metal rich globular cluster 47 Tuc. Each spectrum was normalized at 2940 A. The discontinuity below 2000 A is due to a lack of overlapping in the short wavelength (SWP) and long wavelength (LWR) *IUE* images.

REFERENCES

Arvesen, J. C., Griffin, R. N., and Pearson, B. D. 1969, *Applied Optics*, 8, 2215.

Bertola, F., Capaccioli, M., Holm, A., and Oke, J. B. 1980, *Ap. J. (Letters)*, 237, L65.

Bertola, F., Capaccioli, M., and Oke, J. B. 1982, *Ap. J.*, 254, 494.

Broadfoot, A. L. 1972, *Ap. J.*, 173, 681.

Bohlin, R., and Holm, A. 1980, *IUE NASA Newsletter*, No. 10, 37.

Bruzual A., G. 1981, *Ph. D. thesis*, University of California, Berkeley. (Extra copies available from University Microfilms International, Ann Arbor, Michigan 48106, US).

Bruzual A., G. 1983*a*, *Ap. J.* (submitted).

Bruzual A., G. 1983*b*, *Ap. J.* (submitted).

Bruzual A., G. 1983*c*, *Rev. Mexicana Astron. Astrof.*, 8, 63.

Bruzual A., G., Peimbert, M., and Torres-Peimbert, S. 1982, *Ap. J.*, 260, 495.

Bruzual A., G., and Spinrad, H. 1981, in *The Universe at Ultraviolet Wavelengths: The First Two Years of IUE*, ed. R. D. Chapman, (NASA: Goddard Space Flight Center), p. 731.

Code, A. D., and Meade, M. R. 1979, *Ap. J. Suppl.*, 39, 195.

Peimbert, M., and Torres-Peimbert, S. 1981, *Ap. J.*, 245, 845.

Perola, G. C., and Tarenghi, M. 1980, *Ap. J.*, 240, 447.

Seaton, M. J. 1979, *M. N. R. A. S.*, 187, 73 p.

TABLE 5

IUE SPECTRA OF STELLAR SYSTEMS (2000-3200 A)

λ(A)	E-GAL F_λ	MP-GC F_λ	MR-GC F_λ	λ(A)	E-GAL F_λ	MP-GC F_λ	MR-GC F_λ	λ(A)	E-GAL F_λ	MP-GC F_λ	MR-GC F_λ	λ(A)	E-GAL F_λ	MP-GC F_λ	MR-GC F_λ	λ(A)	E-GAL F_λ	MP-GC F_λ	MR-GC F_λ
2000	-. 109	0. 203	-. 098	2240	0. 264	0. 622	0. 023	2480	0. 227	0. 671	0. 270	2720	0. 492	0. 847	0. 597	2960	1. 076	1. 043	0. 985
2005	0. 140	0. 410	-. 207	2245	0. 460	0. 569	0. 014	2485	0. 252	0. 660	0. 150	2725	0. 472	0. 837	0. 571	2965	1. 001	1. 034	0. 911
2010	0. 234	0. 484	-. 290	2250	0. 491	0. 541	0. 023	2490	0. 247	0. 646	0. 151	2730	0. 504	0. 839	0. 525	2970	0. 983	0. 992	0. 868
2015	0. 202	0. 436	0. 508	2255	0. 319	0. 597	0. 229	2495	0. 224	0. 634	0. 222	2735	0. 472	0. 833	0. 428	2975	1. 006	0. 998	0. 921
2020	0. 278	0. 556	-. 128	2260	0. 310	0. 635	0. 403	2500	0. 227	0. 682	0. 267	2740	0. 442	0. 802	0. 341	2980	1. 000	1. 009	0. 861
2025	0. 145	0. 505	-. 079	2265	0. 365	0. 653	0. 137	2505	0. 306	0. 717	0. 187	2745	0. 410	0. 790	0. 363	2985	0. 927	1. 018	0. 910
2030	0. 204	0. 529	0. 269	2270	0. 283	0. 633	0. 250	2510	0. 241	0. 674	0. 291	2750	0. 439	0. 808	0. 386	2990	0. 923	1. 017	0. 920
2035	0. 183	0. 535	0. 047	2275	0. 161	0. 692	0. 041	2515	0. 224	0. 664	0. 155	2755	0. 483	0. 822	0. 476	2995	0. 909	1. 006	0. 963
2040	0. 342	0. 577	0. 232	2280	0. 228	0. 709	0. 117	2520	0. 246	0. 615	0. 123	2760	0. 490	0. 834	0. 487	3000	0. 834	1. 018	0. 853
2045	0. 216	0. 541	-. 002	2285	0. 285	0. 591	0. 189	2525	0. 185	0. 602	0. 151	2765	0. 492	0. 868	0. 487	3005	0. 808	1. 015	0. 895
2050	0. 256	0. 523	-. 126	2290	0. 227	0. 614	0. 161	2530	0. 241	0. 655	0. 186	2770	0. 560	0. 862	0. 527	3010	0. 853	1. 018	0. 866
2055	0. 146	0. 528	-. 120	2295	0. 251	0. 669	0. 204	2535	0. 214	0. 662	0. 191	2775	0. 533	0. 847	0. 462	3015	0. 814	0. 994	0. 857
2060	0. 147	0. 557	-. 208	2300	0. 279	0. 637	0. 268	2540	0. 231	0. 675	0. 183	2780	0. 497	0. 883	0. 403	3020	0. 851	1. 001	0. 956
2065	0. 222	0. 534	0. 044	2305	0. 264	0. 659	0. 153	2545	0. 264	0. 699	0. 189	2785	0. 432	0. 830	0. 316	3025	0. 919	0. 998	0. 933
2070	0. 210	0. 546	0. 102	2310	0. 215	0. 635	0. 236	2550	0. 260	0. 722	0. 236	2790	0. 369	0. 731	0. 190	3030	1. 003	1. 017	0. 864
2075	0. 191	0. 560	0. 096	2315	0. 295	0. 663	0. 284	2555	0. 271	0. 737	0. 258	2795	0. 293	0. 616	0. 171	3035	1. 063	1. 028	1. 041
2080	0. 207	0. 605	0. 116	2320	0. 288	0. 661	0. 208	2560	0. 336	0. 752	0. 320	2800	0. 216	0. 535	0. 131	3040	1. 062	1. 041	0. 986
2085	0. 233	0. 628	0. 128	2325	0. 321	0. 668	0. 365	2565	0. 280	0. 786	0. 323	2805	0. 274	0. 598	0. 206	3045	1. 119	1. 026	1. 062
2090	0. 205	0. 601	0. 048	2330	0. 209	0. 666	0. 268	2570	0. 156	0. 798	0. 467	2810	0. 393	0. 720	0. 244	3050	1. 039	1. 014	0. 883
2095	0. 151	0. 546	0. 124	2335	0. 208	0. 627	0. 322	2575	0. 304	0. 823	0. 231	2815	0. 475	0. 848	0. 450	3055	1. 004	1. 038	1. 073
2100	0. 156	0. 515	0. 162	2340	0. 163	0. 634	0 272	2580	0. 276	0. 680	0. 079	2820	0. 558	0. 918	0. 558	3060	0. 994	0. 995	0. 942
2105	0. 356	0. 472	0. 191	2345	0. 202	0. 621	0. 321	2585	0. 254	0. 508	0. 115	2825	0. 610	0. 904	0. 546	3065	1. 035	0. 975	0. 874
2110	0. 216	0. 490	-. 032	2350	0. 314	0. 638	0. 183	2590	0. 304	0. 644	0. 331	2830	0. 609	0. 912	0. 538	3070	1. 149	0. 985	0. 961
2115	0. 362	0. 589	0. 498	2355	0. 312	0. 592	0. 167	2595	0. 345	0. 736	0. 332	2835	0. 615	0. 907	0. 533	3075	1. 223	1. 003	0. 879
2120	0. 401	0. 574	0. 523	2360	0. 315	0. 634	-. 021	2600	0. 368	0. 723	0. 247	2840	0. 585	0. 897	0. 520	3080	1. 319	1. 063	1. 164
2125	0. 264	0. 538	0. 336	2365	0. 269	0. 615	0. 230	2605	0. 328	0. 693	0. 274	2845	0. 493	0. 843	0. 459	3085	1. 252	1. 067	1. 031
2130	0. 255	0. 578	0. 338	2370	0. 321	0. 644	0. 127	2610	0. 309	0. 728	0. 222	2850	0. 451	0. 817	0. 365	3090	1. 229	1. 048	1. 034
2135	0. 304	0. 580	0. 560	2375	0. 218	0. 609	0. 080	2615	0. 336	0. 752	0. 208	2855	0. 435	0. 821	0. 394	3095	1. 156	1. 058	1. 020
2140	0. 254	0. 517	0. 349	2380	0. 104	0. 581	0. 117	2620	0. 330	0. 775	0. 274	2860	0. 539	0. 849	0. 474	3100	1. 106	1. 028	0. 878
2145	0. 478	0. 529	0. 025	2385	0. 128	0. 596	0. 176	2625	0. 355	0. 772	0. 251	2865	0. 642	0. 903	0. 647	3105	1. 297	1. 041	1. 166
2150	0. 267	0. 518	0. 182	2390	0. 225	0. 611	0. 140	2630	0. 385	0. 786	0. 332	2870	0. 687	0. 917	0. 674	3110	1. 424	1. 077	1. 315
2155	0. 275	0. 543	0. 362	2395	0. 213	0. 599	0. 103	2635	0. 448	0. 830	0. 481	2875	0. 669	0. 914	0. 678	3115	1. 528	1. 143	1. 315
2160	0. 289	0. 560	0. 357	2400	0. 154	0. 580	0. 147	2640	0. 515	0. 889	0. 633	2880	0. 681	0. 893	0. 616	3120	1. 410	1. 112	1. 213
2165	0. 256	0. 558	0. 465	2405	0. 189	0. 600	0. 134	2645	0. 553	0. 896	0. 685	2885	0. 736	0. 893	0. 687	3125	1. 414	1. 107	1. 025
2170	0. 233	0. 519	0. 344	2410	0. 236	0. 586	0. 139	2650	0. 531	0. 911	0. 611	2890	0. 820	0. 950	0. 766	3130	1. 392	1. 091	1. 121
2175	0. 398	0. 602	0. 318	2415	0. 252	0. 631	0. 210	2655	0. 582	0. 897	0. 614	2895	0. 947	0. 991	0. 888	3135	1. 429	1. 108	1. 093
2180	0. 566	0. 582	0. 757	2420	0. 370	0. 674	0. 203	2660	0. 597	0. 887	0. 634	2900	1. 018	0. 999	0. 910	3140	1. 433	1. 113	1. 143
2185	0. 434	0. 624	0. 802	2425	0. 343	0. 701	0. 321	2665	0. 583	0. 900	0. 641	2905	1. 061	0. 990	0. 965	3145	1. 419	1. 160	1. 188
2190	0. 362	0. 688	0. 734	2430	0. 328	0. 743	0. 346	2670	0. 564	0. 853	0. 585	2910	1. 087	0. 993	0. 985	3150	1. 238	1. 080	1. 302
2195	0. 428	0. 730	0. 216	2435	0. 382	0. 723	0. 319	2675	0. 611	0. 865	0. 617	2915	1. 115	0. 990	0. 964	3155	1. 190	1. 112	1. 251
2200	0. 241	0. 629	0. 287	2440	0. 341	0. 673	0. 349	2680	0. 589	0. 872	0. 702	2920	1. 114	1. 018	0. 894	3160	1. 163	1. 120	1. 373
2205	0. 343	0. 602	0. 088	2445	0. 373	0. 713	0. 396	2685	0. 580	0. 878	0. 632	2925	1. 018	0. 997	0. 983	3165	1. 203	1. 184	1. 329
2210	0. 285	0. 613	0. 315	2450	0. 449	0. 729	0. 291	2690	0. 571	0. 892	0. 596	2930	1. 052	1. 003	0. 975	3170	1. 195	1. 164	1. 436
2215	0. 265	0. 601	0. 015	2455	0. 399	0. 726	0. 366	2695	0. 563	0. 885	0. 608	2935	1. 068	1. 011	0. 999	3175	1. 281	1. 109	1. 339
2220	0. 221	0. 540	0. 306	2460	0. 319	0. 785	0. 278	2700	0. 536	0. 862	0. 601	2940	1. 000	1. 000	1. 000	3180	1. 287	1. 081	1. 239
2225	0. 263	0. 587	0. 176	2465	0. 295	0. 756	0. 236	2705	0. 589	0. 868	0. 638	2945	1. 031	0. 992	1. 052	3185	1. 256	1. 129	1. 435
2230	0. 333	0. 636	0. 549	2470	0. 314	0. 707	0. 240	2710	0. 541	0. 849	0. 633	2950	1. 057	0. 974	1. 017	3190	1. 300	1. 223	1. 346
2235	0. 298	0. 602	0. 432	2475	0. 280	0. 661	0. 305	2715	0. 491	0. 854	0. 578	2955	1. 025	1. 008	1. 017	3195	1. 389	1. 117	1. 824
																3200	1. 136	1. 171	1. 291

TABLE 6

IUE SPECTRA OF STELLAR SYSTEMS (1250-3200 A)

λ(A)	E-GAL F_λ	N6752 F_λ	47TUC F_λ	λ(A)	E-GAL F_λ	N6752 F_λ	47TUC F_λ	λ(A)	E-GAL F_λ	N6752 F_λ	47TUC F_λ	λ(A)	E-GAL F_λ	N6752 F_λ	47TUC F_λ	λ(A)	E-GAL F_λ	N6752 F_λ	47TUC F_λ
1250	0.479	1.045	0.187	1645	0.058	0.529	0.040	2035	0.050	0.488	-.123	2425	0.255	0.624	0.211	2815	0.452	0.705	0.437
1255	0.589	0.572	-.055	1650	0.158	0.542	0.315	2040	0.324	0.573	-.024	2430	0.297	0.646	0.217	2820	0.555	0.803	0.503
1260	0.424	0.654	0.035	1655	0.111	0.511	0.305	2045	0.331	0.573	-.049	2435	0.321	0.578	0.290	2825	0.594	0.826	0.562
1265	0.294	0.841	-.038	1660	0.372	0.521	0.301	2050	0.289	0.524	0.159	2440	0.300	0.570	0.235	2830	0.582	0.849	0.549
1270	0.519	0.881	0.101	1665	0.348	0.673	0.210	2055	0.150	0.437	-.053	2445	0.281	0.650	0.346	2835	0.577	0.958	0.527
1275	0.768	0.848	0.059	1670	0.236	0.487	0.108	2060	0.134	0.550	-.056	2450	0.324	0.612	0.307	2840	0.542	0.856	0.542
1280	1.315	0.910	0.067	1675	0.239	0.422	0.051	2065	0.230	0.577	0.079	2455	0.309	0.623	0.305	2845	0.514	0.783	0.486
1285	0.857	1.256	0.156	1680	0.242	0.522	0.014	2070	0.118	0.526	0.090	2460	0.313	0.693	0.210	2850	0.413	0.752	0.394
1290	1.458	1.061	0.089	1685	0.172	0.459	0.173	2075	0.229	0.514	-.067	2465	0.344	0.645	0.190	2855	0.413	0.679	0.385
1295	0.658	1.133	0.149	1690	0.309	0.526	0.149	2080	0.249	0.762	0.117	2470	0.306	0.584	0.187	2860	0.521	0.785	0.450
1300	0.411	1.096	0.135	1695	0.232	0.547	0.065	2085	0.272	0.605	0.085	2475	0.248	0.572	0.253	2865	0.625	0.874	0.667
1305	0.344	0.828	0.153	1700	0.230	0.534	0.079	2090	0.305	0.562	0.015	2480	0.231	0.519	0.218	2870	0.648	0.883	0.673
1310	0.403	0.895	0.004	1705	0.196	0.414	0.096	2095	0.299	0.520	0.031	2485	0.247	0.505	0.133	2875	0.641	0.900	0.682
1315	0.535	0.989	0.131	1710	0.149	0.457	0.080	2100	0.245	0.579	-.010	2490	0.212	0.482	0.189	2880	0.664	0.858	0.654
1320	0.432	1.072	0.131	1715	0.165	0.497	0.178	2105	0.226	0.481	-.075	2495	0.219	0.505	0.187	2885	0.671	0.847	0.689
1325	0.618	1.000	0.067	1720	0.261	0.463	0.136	2110	0.133	0.559	-.007	2500	0.207	0.558	0.223	2890	0.777	0.927	0.773
1330	0.229	1.188	0.279	1725	0.176	0.413	0.122	2115	0.247	0.531	0.319	2505	0.260	0.581	0.143	2895	0.902	1.017	0.839
1335	0.273	0.946	0.124	1730	0.262	0.460	0.121	2120	0.304	0.548	0.104	2510	0.245	0.515	0.198	2900	0.987	1.022	0.843
1340	0.391	0.967	0.013	1735	0.287	0.560	0.028	2125	0.237	0.571	0.134	2515	0.240	0.500	0.135	2905	1.010	0.989	0.945
1345	0.509	0.943	0.038	1740	0.193	0.644	0.152	2130	0.334	0.559	0.188	2520	0.236	0.488	0.136	2910	1.057	1.018	0.989
1350	0.516	1.347	0.078	1745	0.476	0.643	0.247	2135	0.296	0.517	0.454	2525	0.177	0.469	0.090	2915	1.101	1.026	1.001
1355	0.627	0.842	-.046	1750	0.368	0.588	0.191	2140	0.327	0.448	0.207	2530	0.209	0.513	0.129	2920	1.049	1.021	0.838
1360	0.483	1.044	0.105	1755	0.358	0.575	0.187	2145	0.336	0.577	0.265	2535	0.231	0.555	0.194	2925	0.978	0.984	0.933
1365	0.563	1.629	0.326	1760	0.304	0.706	0.303	2150	0.252	0.537	0.171	2540	0.215	0.540	0.211	2930	0.983	1.020	0.939
1370	0.500	1.425	0.256	1765	0.282	0.548	0.161	2155	0.308	0.598	0.068	2545	0.240	0.554	0.193	2935	1.005	1.068	0.960
1375	0.334	1.459	0.246	1770	0.336	0.478	0.130	2160	0.320	0.558	0.260	2550	0.256	0.587	0.181	2940	1.000	1.000	1.000
1380	0.637	1.164	0.154	1775	0.236	0.474	0.117	2165	0.272	0.553	0.381	2555	0.233	0.610	0.244	2945	0.999	1.003	1.052
1385	0.246	1.100	0.247	1780	0.176	0.642	0.237	2170	0.276	0.533	0.128	2560	0.257	0.638	0.296	2950	0.958	0.979	1.026
1390	0.345	1.127	0.025	1785	0.161	0.609	0.208	2175	0.453	0.500	0.099	2565	0.276	0.659	0.304	2955	0.974	0.980	0.945
1395	0.265	0.955	0.145	1790	0.067	0.584	0.228	2180	0.354	0.530	0.736	2570	0.357	0.732	0.419	2960	1.032	1.059	0.963
1400	0.913	0.803	0.026	1795	0.240	0.272	0.011	2185	0.287	0.549	0.180	2575	0.404	0.744	0.296	2965	0.977	1.043	0.895
1405	1.770	0.854	0.068	1800	0.302	0.498	0.131	2190	0.408	0.619	0.429	2580	0.257	0.578	0.081	2970	0.951	0.965	0.853
1410	0.236	1.259	0.524	1805	0.226	0.763	0.338	2195	0.410	0.664	-.173	2585	0.148	0.537	0.082	2975	1.001	0.993	0.949
1415	0.243	0.936	0.062	1810	0.217	0.599	0.135	2200	0.339	0.564	0.292	2590	0.238	0.615	0.275	2980	0.971	0.991	0.891
1420	0.246	0.878	0.187	1815	0.459	0.635	0.165	2205	0.316	0.573	0.196	2595	0.277	0.710	0.262	2985	0.904	0.979	0.903
1425	0.172	0.945	0.063	1820	0.300	0.612	0.179	2210	0.345	0.587	0.291	2600	0.296	0.617	0.190	2990	0.886	1.014	0.863
1430	0.243	1.126	0.156	1825	0.211	0.639	0.144	2215	0.353	0.546	0.245	2605	0.290	0.589	0.260	2995	0.860	0.987	1.041
1435	0.140	1.097	0.038	1830	0.169	0.705	0.239	2220	0.304	0.493	0.356	2610	0.255	0.595	0.151	3000	0.798	1.001	0.843
1440	0.256	1.081	-.005	1835	0.125	0.715	0.160	2225	0.279	0.511	0.172	2615	0.300	0.589	0.190	3005	0.781	0.997	0.883
1445	0.424	0.764	-.098	1840	0.166	0.495	0.102	2230	0.298	0.614	0.814	2620	0.303	0.651	0.213	3010	0.841	1.018	0.866
1450	0.238	0.899	0.015	1845	0.173	0.627	0.195	2235	0.309	0.490	0.432	2625	0.318	0.622	0.192	3015	0.826	0.999	0.893
1455	0.338	1.047	0.073	1850	0.400	0.673	0.140	2240	0.247	0.525	0.278	2630	0.358	0.656	0.271	3020	0.931	0.989	0.985
1460	0.235	0.847	-.048	1855	0.225	0.602	0.184	2245	0.328	0.467	0.228	2635	0.433	0.725	0.476	3025	0.882	0.961	0.916
1465	0.187	0.911	0.115	1860	0.196	0.564	0.200	2250	0.330	0.487	-.023	2640	0.513	0.777	0.543	3030	0.970	0.987	0.861
1470	0.250	0.819	0.088	1865	0.240	0.643	0.179	2255	0.293	0.609	0.185	2645	0.528	0.845	0.596	3035	1.009	0.968	1.030
1475	0.194	0.908	0.159	1870	0.258	0.509	0.188	2260	0.363	0.592	0.406	2650	0.530	0.860	0.618	3040	0.987	1.021	0.966
1480	0.229	0.804	0.054	1875	0.227	0.572	0.247	2265	0.340	0.540	0.107	2655	0.562	0.821	0.612	3045	1.068	1.045	1.108
1485	0.241	0.773	-.065	1880	0.294	0.648	0.301	2270	0.226	0.517	0.090	2660	0.562	0.803	0.602	3050	1.018	1.053	0.891
1490	0.187	0.745	0.110	1885	0.174	0.680	0.282	2275	0.286	0.579	-.001	2665	0.542	0.842	0.646	3055	1.002	1.103	1.128
1495	0.391	0.871	0.280	1890	0.204	0.597	0.297	2280	0.302	0.667	0.075	2670	0.515	0.799	0.637	3060	0.929	0.976	1.035
1500	0.228	0.769	0.055	1895	0.224	0.618	0.230	2285	0.307	0.627	0.132	2675	0.557	0.818	0.597	3065	0.985	0.997	0.935
1505	0.314	0.851	0.196	1900	0.276	0.621	0.205	2290	0.208	0.592	0.051	2680	0.556	0.831	0.739	3070	1.037	0.937	1.032
1510	0.823	0.716	0.216	1905	0.227	0.564	0.184	2295	0.269	0.565	0.211	2685	0.542	0.805	0.664	3075	1.063	0.947	0.979
1515	0.690	0.720	0.130	1910	0.213	0.527	0.148	2300	0.322	0.578	0.112	2690	0.555	0.820	0.608	3080	1.113	0.985	1.218
1520	0.645	0.635	0.050	1915	0.176	0.529	0.181	2305	0.189	0.606	0.126	2695	0.516	0.835	0.620	3085	1.205	1.040	1.063
1525	0.354	0.554	-.037	1920	0.162	0.614	0.227	2310	0.172	0.619	0.145	2700	0.509	0.753	0.592	3090	1.211	1.032	1.039
1530	0.347	0.488	0.070	1925	0.230	0.546	0.231	2315	0.227	0.630	0.279	2705	0.551	0.803	0.652	3095	1.062	1.049	1.015
1535	0.270	0.677	0.768	1930	0.280	0.521	0.310	2320	0.280	0.612	0.141	2710	0.529	0.813	0.575	3100	0.999	0.998	0.899
1540	0.246	0.685	0.135	1935	0.327	0.388	0.441	2325	0.287	0.546	0.268	2715	0.489	0.782	0.579	3105	1.212	0.960	1.158
1545	0.358	0.465	-.177	1940	0.000	0.000	0.000	2330	0.242	0.687	0.078	2720	0.470	0.746	0.537	3110	1.317	1.101	1.346
1550	0.416	0.592	0.277	1945	0.000	0.000	0.000	2335	0.237	0.586	0.175	2725	0.459	0.757	0.545	3115	1.354	1.190	1.429
1555	0.276	0.695	0.088	1950	0.000	0.000	0.000	2340	0.207	0.516	0.125	2730	0.493	0.773	0.472	3120	1.216	1.006	1.182
1560	0.393	0.572	0.159	1955	0.000	0.000	0.000	2345	0.163	0.557	0.222	2735	0.435	0.743	0.395	3125	1.292	1.142	1.023
1565	0.303	0.541	0.209	1960	0.000	0.000	0.000	2350	0.183	0.598	0.089	2740	0.399	0.696	0.352	3130	1.295	1.078	1.204
1570	0.281	0.499	0.106	1965	0.000	0.000	0.000	2355	0.226	0.555	0.225	2745	0.364	0.667	0.337	3135	1.332	1.117	1.145
1575	0.481	0.365	0.031	1970	0.000	0.000	0.000	2360	0.292	0.567	0.124	2750	0.379	0.696	0.391	3140	1.293	1.051	1.173
1580	0.247	0.579	0.080	1975	0.000	0.000	0.000	2365	0.295	0.500	0.060	2755	0.429	0.700	0.448	3145	1.275	1.103	1.273
1585	0.268	0.575	0.006	1980	0.000	0.000	0.000	2370	0.295	0.543	0.156	2760	0.467	0.747	0.452	3150	1.245	1.061	1.325
1590	0.254	0.495	0.146	1985	0.000	0.000	0.000	2375	0.202	0.554	-.029	2765	0.483	0.762	0.461	3155	1.182	1.094	1.283
1595	0.436	0.517	0.006	1990	0.000	0.000	0.000	2380	0.125	0.547	0.024	2770	0.502	0.796	0.532	3160	1.179	1.141	1.419
1600	0.159	0.493	0.140	1995	0.000	0.000	0.000	2385	0.173	0.530	0.113	2775	0.495	0.716	0.458	3165	1.327	1.063	1.432
1605	0.464	0.450	0.017	2000	0.053	0.331	-.063	2390	0.243	0.508	0.180	2780	0.460	0.722	0.398	3170	1.263	1.170	1.422
1610	0.281	0.536	0.040	2005	0.213	0.453	-.115	2395	0.179	0.482	0.107	2785	0.403	0.689	0.307	3175	1.307	1.177	1.343
1615	0.268	0.385	0.010	2010	0.267	0.496	-.056	2400	0.156	0.479	0.138	2790	0.344	0.590	0.193	3180	1.202	1.128	1.300
1620	0.229	0.603	0.002	2015	0.190	0.458	0.345	2405	0.220	0.501	0.137	2795	0.267	0.446	0.162	3185	1.121	1.012	1.467
1625	0.098	0.357	-.037	2020	0.302	0.544	-.105	2410	0.234	0.432	0.123	2800	0.193	0.320	0.126	3190	1.395	1.193	1.490
1630	0.157	0.350	0.078	2025	0.145	0.499	0.010	2415	0.201	0.565	0.154	2805	0.247	0.410	0.181	3195	1.480	1.206	1.882
1635	0.194	0.472	0.115	2030	0.087	0.415	0.143	2420	0.234	0.585	0.138	2810	0.333	0.475	0.230	3200	1.365	1.131	1.246
1640	0.058	0.461	0.130																

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TABLE 4

IUE STELLAR SPECTRA

λ(A)	FOIII	G2 V	G5III	G7III	G8III	KOIII	K1III	K3III	K4III	K5III	MOIII
2000.	0. 202	0. 021	0. 019	0. 011	0. 002	0. 005	0. 012	0. 013	0. 014	0. 015	0. 020
2005.	0. 220	0. 027	0. 023	0. 014	0. 015	0. 005	0. 015	0. 013	0. 014	0. 020	0. 024
2010.	0. 226	0. 030	0. 021	0. 020	0. 010	0. 005	0. 015	0. 026	0. 017	0. 026	0. 036
2015.	0. 246	0. 030	0. 026	0. 022	0. 008	0. 005	0. 016	0. 023	0. 024	0. 026	0. 038
2020.	0. 252	0. 030	0. 029	0. 020	0. 006	0. 006	0. 018	0. 012	0. 026	0. 016	0. 035
2025.	0. 258	0. 030	0. 038	0. 004	0. 006	0. 007	0. 019	0. 009	0. 024	0. 009	0. 007
2030.	0. 266	0. 031	0. 030	0. 011	0. 005	0. 006	0. 020	0. 013	0. 005	0. 016	0. 020
2035.	0. 271	0. 036	0. 024	0. 015	0. 010	0. 006	0. 021	0. 025	0. 014	0. 021	0. 027
2040.	0. 291	0. 040	0. 026	0. 019	0. 009	0. 005	0. 020	0. 018	0. 018	0. 022	0. 034
2045.	0. 308	0. 041	0. 021	0. 016	0. 008	0. 004	0. 019	0. 020	0. 023	0. 023	0. 028
2050.	0. 320	0. 042	0. 019	0. 022	0. 008	0. 004	0. 019	0. 028	0. 019	0. 029	0. 039
2055.	0. 331	0. 043	0. 026	0. 026	0. 006	0. 004	0. 019	0. 026	0. 027	0. 027	0. 046
2060.	0. 332	0. 043	0. 033	0. 018	0. 007	0. 005	0. 019	0. 023	0. 032	0. 025	0. 031
2065.	0. 341	0. 047	0. 042	0. 025	0. 014	0. 007	0. 022	0. 039	0. 021	0. 038	0. 044
2070.	0. 356	0. 050	0. 053	0. 039	0. 013	0. 008	0. 025	0. 036	0. 030	0. 042	0. 069
2075.	0. 365	0. 054	0. 060	0. 029	0. 016	0. 008	0. 026	0. 033	0. 048	0. 039	0. 052
2080.	0. 380	0. 060	0. 069	0. 037	0. 020	0. 009	0. 030	0. 050	0. 035	0. 050	0. 065
2085.	0. 389	0. 068	0. 066	0. 047	0. 019	0. 008	0. 032	0. 053	0. 045	0. 054	0. 083
2090.	0. 385	0. 068	0. 055	0. 042	0. 019	0. 008	0. 034	0. 044	0. 057	0. 048	0. 074
2095.	0. 379	0. 071	0. 047	0. 037	0. 018	0. 009	0. 036	0. 040	0. 051	0. 043	0. 065
2100.	0. 375	0. 071	0. 040	0. 034	0. 016	0. 010	0. 036	0. 032	0. 045	0. 036	0. 059
2105.	0. 365	0. 077	0. 032	0. 024	0. 013	0. 009	0. 035	0. 023	0. 041	0. 024	0. 042
2110.	0. 375	0. 073	0. 040	0. 014	0. 012	0. 009	0. 035	0. 006	0. 029	0. 015	0. 025
2115.	0. 389	0. 087	0. 057	0. 009	0. 017	0. 009	0. 037	0. 019	0. 017	0. 017	0. 016
2120.	0. 391	0. 097	0. 055	0. 019	0. 021	0. 010	0. 038	0. 025	0. 011	0. 029	0. 034
2125.	0. 383	0. 070	0. 058	0. 029	0. 023	0. 010	0. 039	0. 040	0. 023	0. 042	0. 052
2130.	0. 373	0. 083	0. 057	0. 041	0. 024	0. 011	0. 040	0. 049	0. 036	0. 053	0. 072
2135.	0. 364	0. 083	0. 053	0. 046	0. 025	0. 012	0. 039	0. 054	0. 049	0. 057	0. 082
2140.	0. 369	0. 097	0. 050	0. 048	0. 023	0. 010	0. 039	0. 045	0. 056	0. 049	0. 084
2145.	0. 386	0. 113	0. 054	0. 029	0. 021	0. 010	0. 039	0. 017	0. 058	0. 026	0. 051
2150.	0. 399	0. 102	0. 059	0. 009	0. 023	0. 010	0. 040	0. 011	0. 035	0. 013	0. 016
2155.	0. 398	0. 100	0. 061	0. 012	0. 023	0. 010	0. 041	0. 014	0. 011	0. 012	0. 021
2160.	0. 388	0. 089	0. 061	0. 006	0. 023	0. 011	0. 039	0. 003	0. 014	0. 012	0. 011
2165.	0. 371	0. 089	0. 069	0. 013	0. 025	0. 010	0. 039	0. 019	0. 008	0. 018	0. 022
2170.	0. 368	0. 086	0. 059	0. 017	0. 026	0. 011	0. 038	0. 017	0. 015	0. 019	0. 030
2175.	0. 381	0. 087	0. 061	0. 014	0. 027	0. 011	0. 040	0. 013	0. 020	0. 015	0. 024
2180.	0. 394	0. 123	0. 069	0. 010	0. 030	0. 011	0. 043	0. 011	0. 017	0. 011	0. 017
2185.	0. 423	0. 115	0. 067	0. 008	0. 031	0. 011	0. 045	-0. 001	0. 011	0. 005	0. 014
2190.	0. 455	0. 110	0. 076	-0. 002	0. 035	0. 012	0. 050	0. 002	0. 010	0. 002	-0. 003
2195.	0. 472	0. 126	0. 079	0. 006	0. 035	0. 013	0. 052	0. 011	-0. 002	0. 012	0. 011
2200.	0. 470	0. 128	0. 080	0. 015	0. 033	0. 014	0. 052	0. 022	0. 007	0. 021	0. 027
2205.	0. 454	0. 133	0. 069	0. 019	0. 030	0. 013	0. 049	0. 022	0. 018	0. 023	0. 034
2210.	0. 429	0. 090	0. 070	0. 020	0. 027	0. 012	0. 046	0. 019	0. 023	0. 019	0. 035
2215.	0. 408	0. 100	0. 068	0. 010	0. 028	0. 011	0. 042	0. 012	0. 024	0. 012	0. 018
2220.	0. 395	0. 121	0. 071	0. 010	0. 030	0. 010	0. 043	0. 005	0. 012	0. 007	0. 017
2225.	0. 419	0. 127	0. 077	0. 001	0. 032	0. 011	0. 046	-0. 001	0. 012	-0. 001	0. 001
2230.	0. 443	0. 138	0. 083	-0. 002	0. 035	0. 013	0. 052	-0. 003	0. 001	-0. 001	-0. 004
2235.	0. 458	0. 181	0. 088	-0. 000	0. 036	0. 016	0. 056	0. 002	-0. 003	0. 001	-0. 001
2240.	0. 456	0. 151	0. 083	0. 002	0. 036	0. 018	0. 058	0. 007	-0. 000	0. 010	0. 003
2245.	0. 439	0. 143	0. 088	0. 016	0. 040	0. 021	0. 060	0. 024	0. 002	0. 024	0. 029
2250.	0. 413	0. 146	0. 090	0. 024	0. 044	0. 022	0. 060	0. 031	0. 020	0. 033	0. 042
2255.	0. 401	0. 130	0. 089	0. 032	0. 046	0. 023	0. 061	0. 046	0. 029	0. 044	0. 057
2260.	0. 384	0. 123	0. 090	0. 043	0. 043	0. 023	0. 062	0. 044	0. 039	0. 048	0. 076
2265.	0. 388	0. 098	0. 086	0. 036	0. 041	0. 022	0. 061	0. 038	0. 052	0. 043	0. 063
2270.	0. 391	0. 084	0. 085	0. 035	0. 040	0. 021	0. 059	0. 042	0. 043	0. 044	0. 062
2275.	0. 404	0. 098	0. 085	0. 040	0. 039	0. 021	0. 060	0. 048	0. 042	0. 048	0. 070
2280.	0. 424	0. 127	0. 089	0. 040	0. 040	0. 020	0. 061	0. 040	0. 048	0. 043	0. 070
2285.	0. 433	0. 135	0. 086	0. 030	0. 042	0. 020	0. 061	0. 027	0. 048	0. 029	0. 053
2290.	0. 427	0. 118	0. 083	0. 017	0. 043	0. 019	0. 063	0. 016	0. 037	0. 018	0. 030
2295.	0. 420	0. 124	0. 080	0. 013	0. 042	0. 018	0. 064	0. 010	0. 020	0. 013	0. 022
2300.	0. 407	0. 104	0. 077	0. 007	0. 040	0. 017	0. 066	0. 008	0. 015	0. 010	0. 013
2305.	0. 395	0. 144	0. 081	0. 009	0. 043	0. 018	0. 066	0. 012	0. 009	0. 012	0. 015
2310.	0. 400	0. 119	0. 080	0. 011	0. 041	0. 018	0. 066	0. 013	0. 010	0. 015	0. 019
2315.	0. 414	0. 125	0. 086	0. 013	0. 043	0. 020	0. 069	0. 018	0. 013	0. 020	0. 023
2320.	0. 404	0. 124	0. 091	0. 021	0. 047	0. 023	0. 071	0. 034	0. 016	0. 036	0. 037
2325.	0. 391	0. 135	0. 099	0. 042	0. 052	0. 027	0. 075	0. 055	0. 025	0. 058	0. 075
2330.	0. 372	0. 117	0. 108	0. 056	0. 056	0. 032	0. 079	0. 069	0. 051	0. 071	0. 098
2335.	0. 336	0. 113	0. 108	0. 063	0. 057	0. 033	0. 081	0. 066	0. 067	0. 072	0. 111
2340.	0. 279	0. 100	0. 107	0. 055	0. 055	0. 033	0. 076	0. 058	0. 076	0. 060	0. 096
2345.	0. 275	0. 083	0. 105	0. 043	0. 053	0. 033	0. 076	0. 034	0. 066	0. 042	0. 075
2350.	0. 276	0. 119	0. 098	0. 023	0. 052	0. 032	0. 079	0. 021	0. 052	0. 026	0. 040
2355.	0. 286	0. 138	0. 103	0. 020	0. 053	0. 033	0. 080	0. 026	0. 028	0. 031	0. 035
2360.	0. 318	0. 115	0. 103	0. 034	0. 052	0. 033	0. 086	0. 043	0. 024	0. 044	0. 060
2365.	0. 331	0. 112	0. 104	0. 039	0. 055	0. 034	0. 091	0. 052	0. 041	0. 054	0. 068
2370.	0. 335	0. 131	0. 104	0. 054	0. 056	0. 035	0. 088	0. 059	0. 047	0. 065	0. 095
2375.	0. 285	0. 122	0. 101	0. 054	0. 057	0. 035	0. 086	0. 072	0. 065	0. 069	0. 095
2380.	0. 274	0. 098	0. 101	0. 062	0. 058	0. 035	0. 084	0. 064	0. 065	0. 070	0. 109
2385.	0. 258	0. 099	0. 096	0. 053	0. 056	0. 035	0. 082	0. 057	0. 075	0. 063	0. 094
2390.	0. 240	0. 120	0. 095	0. 051	0. 056	0. 035	0. 079	0. 057	0. 064	0. 061	0. 089
2395.	0. 239	0. 102	0. 100	0. 051	0. 055	0. 035	0. 077	0. 053	0. 061	0. 051	0. 090
2400.	0. 251	0. 106	0. 097	0. 030	0. 055	0. 033	0. 075	0. 030	0. 062	0. 035	0. 054
2405.	0. 228	0. 090	0. 094	0. 028	0. 052	0. 032	0. 072	0. 021	0. 037	0. 021	0. 050
2410.	0. 233	0. 095	0. 088	0. 003	0. 051	0. 031	0. 072	0. 009	0. 034	0. 009	0. 005

λ(A)	FOIII	G2 V	G5III	G7III	G8III	KOIII	K1III	K3III	K4III	K5III	MOIII
2620.	0. 414	0. 256	0. 247	0. 121	0. 172	0. 108	0. 211	0. 151	0. 218	0. 192	0. 218
2625.	0. 436	0. 256	0. 247	0. 124	0. 176	0. 114	0. 209	0. 149	0. 226	0. 227	0. 197
2630.	0. 468	0. 198	0. 259	0. 137	0. 192	0. 128	0. 216	0. 182	0. 291	0. 221	0. 157
2635.	0. 616	0. 344	0. 315	0. 144	0. 249	0. 146	0. 270	0. 205	0. 277	0. 243	0. 225
2640.	0. 774	0. 558	0. 369	0. 165	0. 302	0. 182	0. 342	0. 213	0. 199	0. 209	0. 280
2645.	0. 838	0. 606	0. 394	0. 169	0. 320	0. 191	0. 355	0. 206	0. 094	0. 203	0. 346
2650.	0. 857	0. 452	0. 409	0. 168	0. 325	0. 193	0. 355	0. 201	0. 114	0. 179	0. 318
2655.	0. 885	0. 614	0. 416	0. 167	0. 335	0. 198	0. 359	0. 214	0. 146	0. 186	0. 272
2660.	0. 839	0. 565	0. 424	0. 178	0. 349	0. 210	0. 368	0. 224	0. 201	0. 248	0. 350
2665.	0. 786	0. 522	0. 420	0. 187	0. 358	0. 222	0. 359	0. 232	0. 286	0. 302	0. 347
2670.	0. 778	0. 530	0. 423	0. 179	0. 364	0. 215	0. 356	0. 221	0. 316	0. 316	0. 343
2675.	0. 789	0. 591	0. 429	0. 171	0. 358	0. 212	0. 348	0. 230	0. 291	0. 287	0. 349
2680.	0. 743	0. 523	0. 417	0. 174	0. 346	0. 213	0. 342	0. 247	0. 247	0. 258	0. 313
2685.	0. 728	0. 543	0. 420	0. 174	0. 338	0. 223	0. 339	0. 264	0. 266	0. 248	0. 350
2690.	0. 708	0. 491	0. 389	0. 171	0. 324	0. 217	0. 330	0. 251	0. 268	0. 261	0. 320
2695.	0. 679	0. 486	0. 416	0. 173	0. 312	0. 211	0. 313	0. 203	0. 272	0. 293	0. 412
2700.	0. 663	0. 588	0. 374	0. 193	0. 323	0. 217	0. 322	0. 170	0. 283	0. 287	0. 328
2705.	0. 669	0. 617	0. 384	0. 232	0. 349	0. 233	0. 348	0. 192	0. 287	0. 314	0. 294
2710.	0. 675	0. 548	0. 435	0. 235	0. 358	0. 245	0. 363	0. 229	0. 332	0. 323	0. 326
2715.	0. 663	0. 492	0. 450	0. 205	0. 334	0. 233	0. 337	0. 232	0. 340	0. 329	0. 371
2720.	0. 626	0. 335	0. 369	0. 193	0. 299	0. 204	0. 315	0. 192	0. 326	0. 294	0. 259
2725.	0. 636	0. 417	0. 360	0. 206	0. 302	0. 208	0. 321	0. 219	0. 308	0. 322	0. 239
2730.	0. 637	0. 557	0. 380	0. 213	0. 319	0. 229	0. 339	0. 255	0. 335	0. 362	0. 258
2735.	0. 625	0. 400	0. 373	0. 190	0. 307	0. 224	0. 332	0. 274	0. 326	0. 383	0. 346
2740.	0. 543	0. 296	0. 296	0. 191	0. 268	0. 197	0. 294	0. 274	0. 323	0. 401	0. 324
2745.	0. 478	0. 282	0. 285	0. 221	0. 244	0. 192	0. 272	0. 281	0. 349	0. 402	0. 325
2750.	0. 455	0. 311	0. 304	0. 250	0. 265	0. 213	0. 270	0. 292	0. 381	0. 415	0. 336
2755.	0. 492	0. 351	0. 354	0. 272	0. 308	0. 242	0. 310	0. 304	0. 403	0. 405	0. 405
2760.	0. 549	0. 524	0. 412	0. 305	0. 341	0. 272	0. 341	0. 293	0. 409	0. 410	0. 453
2765.	0. 623	0. 549	0. 449	0. 331	0. 358	0. 293	0. 367	0. 371	0. 432	0. 400	0. 456
2770.	0. 676	0. 518	0. 514	0. 328	0. 369	0. 308	0. 399	0. 433	0. 436	0. 409	0. 479
2775.	0. 680	0. 518	0. 493	0. 310	0. 356	0. 303	0. 410	0. 470	0. 438	0. 419	0. 512
2780.	0. 633	0. 367	0. 449	0. 273	0. 314	0. 286	0. 393	0. 426	0. 393	0. 426	0. 522
2785.	0. 549	0. 359	0. 345	0. 256	0. 265	0. 251	0. 348	0. 400	0. 402	0. 635	0. 459
2790.	0. 425	0. 246	0. 362	0. 267	0. 256	0. 234	0. 337	0. 540	1. 096	1. 350	0. 784
2795.	0. 318	0. 172	0. 412	0. 306	0. 288	0. 226	0. 354	0. 635	1. 762	2. 114	1. 465
2800.	0. 258	0. 166	0. 463	0. 322	0. 317	0. 230	0. 389	0. 713	2. 154	2. 210	2. 270
2805.	0. 349	0. 204	0. 403	0. 306	0. 294	0. 225	0. 357	0. 512	1. 534	1. 602	1. 893
2810.	0. 489	0. 345	0. 424	0. 308	0. 292	0. 253	0. 385	0. 464	0. 929	0. 833	1. 098
2815.	0. 692	0. 479	0. 449	0. 345	0. 329	0. 301	0. 417	0. 442	0. 542	0. 544	0. 490
2820.	0. 798	0. 572	0. 525	0. 368	0. 387	0. 357	0. 488	0. 483	0. 492	0. 522	0. 407
2825.	0. 837	0. 625	0. 561	0. 392	0. 437	0. 374	0. 513	0. 472	0. 472	0. 496	0. 468
2830.	0. 830	0. 683	0. 601	0. 422	0. 457	0. 372	0. 525	0. 464	0. 415	0. 439	0. 491
2835.	0. 825	0. 644	0. 622	0. 312	0. 462	0. 368	0. 533	0. 443	0. 360	0. 443	0. 481
2840.	0. 797	0. 671	0. 588	0. 289	0. 415	0. 339	0. 496	0. 455	0. 377	0. 480	0. 510
2845.	0. 736	0. 524	0. 520	0. 226	0. 345	0. 276	0. 429	0. 410	0. 386	0. 436	0. 592
2850.	0. 667	0. 230	0. 420	0. 142	0. 240	0. 185	0. 319	0. 299	0. 347	0. 354	0. 630
2855.	0. 688	0. 302	0. 420	0. 152	0. 264	0. 174	0. 325	0. 263	0. 346	0. 360	0. 659
2860.	0. 776	0. 629	0. 468	0. 228	0. 359	0. 238	0. 401	0. 312	0. 400	0. 482	0. 618
2865.	0. 823	0. 728	0. 555	0. 348	0. 480	0. 353	0. 493	0. 413	0. 504	0. 616	0. 623
2870.	0. 800	0. 731	0. 607	0. 412	0. 524	0. 430	0. 532	0. 465	0. 564	0. 649	0. 640
2875.	0. 783	0. 746	0. 672	0. 437	0. 520	0. 436	0. 549	0. 534	0. 616	0. 618	0. 748
2880.	0. 847	0. 466	0. 700	0. 461	0. 524	0. 453	0. 574	0. 575	0. 644	0. 618	0. 671
2885.	0. 884	0. 749	0. 747	0. 544	0. 590	0. 518	0. 646	0. 612	0. 674	0. 699	0. 660
2890.	0. 880	0. 824	0. 801	0. 736	0. 701	0. 640	0. 747	0. 716	0. 735	0. 828	0. 604
2895.	0. 889	0. 962	0. 892	0. 896	0. 837	0. 756	0. 821	0. 859	0. 777	0. 883	0. 659
2900.	0. 965	1. 206	1. 049	1. 049	0. 970	0. 929	0. 963	0. 998	0. 776	0. 864	0. 685
2905.	1. 061	1. 259	1. 163	1. 085	1. 066	1. 009	1. 028	1. 097	0. 764	0. 881	0. 671
2910.	1. 090	1. 181	1. 211	1. 112	1. 082	1. 029	1. 069	1. 130	0. 829	0. 976	0. 750
2915.	1. 067	1. 140	1. 182	1. 187	1. 056	1. 052	1. 064	1. 161	0. 919	1. 065	0. 892
2920.	1. 000	1. 132	1. 152	1. 165	0. 988	1. 040	1. 030	1. 133	0. 993	1. 067	0. 948
2925.	0. 917	0. 949	1. 110	1. 128	0. 952	0. 990	0. 964	1. 089	1. 039	1. 036	0. 867
2930.	0. 924	1. 153	1. 101	1. 083	1. 018	0. 991	1. 022	1. 057	1. 027	1. 028	0. 963
2935.	0. 976	1. 108	1. 059	1. 072	1. 044	1. 001	1. 027	1. 031	1. 006	1. 030	1. 035
2940.	1. 000	1. 000	1. 000	1. 000	1. 000	1. 000	1. 000	1. 000	1. 000	1. 000	1. 000
2945.	0. 961	1. 085	0. 968	1. 012	0. 963	0. 953	0. 993	1. 005	0. 974	1. 009	0. 766
2950.	0. 975	1. 011	0. 977	1. 005	0. 973	1. 005	0. 971	0. 970	0. 959	1. 068	0. 605
2955.	1. 009	1. 108	1. 144	0. 998	1. 034	1. 040	1. 030	1. 063	0. 978	1. 107	0. 787
2960.	1. 042	1. 218	1. 209	0. 909	0. 998	1. 028	1. 057	1. 038	0. 986	1. 044	0. 826
2965.	0. 990	0. 955	1. 141	0. 760	0. 907	0. 873	0. 953	0. 938	0. 904	0. 962	0. 755
2970.	0. 993	0. 844	0. 989	0. 820	0. 855	0. 789	0. 856	0. 843	0. 869	0. 990	0. 586
2975.	1. 010	1. 132	1. 007	0. 932	0. 904	0. 892	0. 921	0. 943	0. 998	1. 059	0. 642
2980.	0. 967	1. 096	1. 001	0. 942	0. 912	0. 934	0. 934	1. 044	1. 061	1. 108	0. 711
2985.	0. 952	0. 697	0. 970	0. 844	0. 882	0. 870	0. 900	1. 043	1. 132	1. 151	0. 833
2990.	1. 000	1. 154	0. 988	0. 796	0. 883	0. 812	0. 895	1. 026	1. 123	1. 183	0. 948
2995.	1. 076	0. 945	1. 019	0. 761	0. 850	0. 808	0. 898	0. 947	1. 146	1. 211	0. 981
3000.	1. 023	0. 707	0. 961	0. 668	0. 775	0. 719	0. 828	0. 849	1. 086	1. 188	0. 910
3005.	1. 006	0. 885	0. 884	0. 690	0. 773	0. 676	0. 780	0. 886	1. 141	1. 242	0. 882
3010.	1. 051	0. 940	0. 903	0. 738	0. 832	0. 743	0. 819	1. 010	1. 198	1. 270	0. 905
3015.	1. 068	1. 005	0. 936	0. 695	0. 830	0. 756	0. 796	0. 978	1. 128	1. 194	0. 861
3020.	1. 050	0. 618	1. 001	0. 667	0. 819	0. 727	0. 780	0. 928	1. 002	1. 145	0. 756
3025.	1. 064	1. 015	1. 078	0. 820	0. 924	0. 816	0. 847	1. 008	1. 179	1. 327	0. 778
3030.	1. 119	1. 240	1. 187	1. 073	1. 107	1. 088	1. 041	1. 349	1. 327	1. 619	1. 005

2420.	0.338	0.165	0.110	0.030	0.065	0.033	0.085	0.050	0.017	0.046	0.053
2425.	0.398	0.164	0.135	0.049	0.073	0.036	0.098	0.057	0.036	0.060	0.086
2430.	0.405	0.166	0.138	0.051	0.079	0.040	0.106	0.058	0.059	0.055	0.089
2435.	0.416	0.146	0.134	0.040	0.078	0.043	0.109	0.035	0.061	0.040	0.070
2440.	0.408	0.156	0.138	0.025	0.080	0.044	0.107	0.032	0.048	0.031	0.045
2445.	0.367	0.149	0.145	0.035	0.078	0.045	0.105	0.044	0.031	0.037	0.058
2450.	0.311	0.120	0.145	0.068	0.074	0.048	0.105	0.054	0.039	0.051	0.080
2455.	0.305	0.117	0.143	0.085	0.074	0.050	0.110	0.063	0.055	0.075	0.090
2460.	0.340	0.116	0.146	0.090	0.077	0.050	0.112	0.073	0.061	0.095	0.106
2465.	0.362	0.117	0.137	0.087	0.078	0.047	0.108	0.078	0.073	0.077	0.121
2470.	0.374	0.132	0.129	0.073	0.076	0.046	0.102	0.061	0.083	0.075	0.107
2475.	0.381	0.138	0.126	0.069	0.079	0.047	0.102	0.067	0.073	0.065	0.102
2480.	0.385	0.121	0.119	0.076	0.092	0.046	0.101	0.072	0.070	0.087	0.104
2485.	0.355	0.105	0.113	0.063	0.074	0.043	0.098	0.063	0.071	0.069	0.122
2490.	0.341	0.089	0.109	0.037	0.071	0.039	0.093	0.057	0.084	0.055	0.076
2495.	0.382	0.149	0.123	0.032	0.077	0.044	0.106	0.051	0.052	0.066	0.088
2500.	0.456	0.146	0.136	0.044	0.089	0.046	0.123	0.059	0.060	0.076	0.080
2505.	0.459	0.131	0.144	0.052	0.093	0.048	0.126	0.060	0.055	0.083	0.092
2510.	0.406	0.133	0.140	0.064	0.086	0.048	0.116	0.067	0.063	0.070	0.099
2515.	0.319	0.096	0.135	0.069	0.077	0.044	0.107	0.061	0.068	0.048	0.105
2520.	0.261	0.104	0.122	0.051	0.067	0.039	0.099	0.046	0.072	0.043	0.078
2525.	0.265	0.100	0.112	0.040	0.067	0.041	0.105	0.051	0.053	0.059	0.066
2530.	0.288	0.108	0.119	0.050	0.076	0.054	0.116	0.077	0.045	0.084	0.098
2535.	0.300	0.127	0.130	0.056	0.089	0.072	0.127	0.091	0.067	0.087	0.132
2540.	0.330	0.132	0.132	0.051	0.097	0.076	0.129	0.091	0.091	0.081	0.144
2545.	0.360	0.142	0.136	0.069	0.103	0.080	0.134	0.097	0.098	0.083	0.148
2550.	0.401	0.149	0.151	0.075	0.112	0.084	0.147	0.093	0.101	0.089	0.149
2555.	0.419	0.196	0.166	0.079	0.120	0.084	0.155	0.088	0.102	0.097	0.140
2560.	0.409	0.209	0.177	0.077	0.130	0.078	0.161	0.094	0.096	0.112	0.138
2565.	0.425	0.215	0.200	0.084	0.143	0.079	0.170	0.105	0.094	0.127	0.154
2570.	0.478	0.298	0.232	0.084	0.162	0.086	0.188	0.102	0.106	0.099	0.166
2575.	0.521	0.245	0.229	0.058	0.155	0.082	0.191	0.071	0.114	0.044	0.137
2580.	0.523	0.342	0.207	0.045	0.152	0.072	0.186	0.048	0.094	0.012	0.090
2585.	0.507	0.234	0.207	0.041	0.160	0.070	0.188	0.053	0.062	0.064	0.073
2590.	0.465	0.327	0.223	0.071	0.166	0.089	0.182	0.082	0.050	0.115	0.107
2595.	0.411	0.237	0.226	0.075	0.158	0.098	0.169	0.096	0.074	0.123	0.127
2600.	0.405	0.173	0.215	0.107	0.149	0.101	0.169	0.109	0.142	0.158	0.121
2605.	0.363	0.213	0.209	0.121	0.153	0.101	0.174	0.131	0.232	0.177	0.079
2610.	0.336	0.197	0.216	0.120	0.156	0.101	0.178	0.153	0.258	0.193	0.099
2615.	0.334	0.204	0.228	0.116	0.165	0.104	0.193	0.155	0.246	0.192	0.146

3045.	1.105	1.235	1.246	1.195	1.153	1.168	1.077	1.353	1.531	1.577	1.080
3050.	1.102	1.279	1.269	1.238	1.177	1.254	1.191	1.466	1.599	1.649	1.063
3055.	1.064	1.107	1.189	1.149	1.129	1.210	1.187	1.455	1.587	1.626	1.027
3060.	1.050	0.996	1.097	0.998	1.019	1.100	1.110	1.387	1.454	1.501	0.812
3065.	1.060	1.004	1.139	1.062	1.039	1.071	1.069	1.574	1.377	1.476	0.724
3070.	1.084	1.225	1.289	1.304	1.109	1.227	1.147	1.834	1.527	1.674	0.849
3075.	1.088	1.151	1.391	1.484	1.218	1.381	1.256	2.016	1.776	1.885	1.026
3080.	1.127	1.135	1.335	1.542	1.263	1.483	1.327	2.011	1.975	1.971	1.065
3085.	1.203	1.249	1.390	1.472	1.250	1.506	1.363	1.961	2.038	1.972	1.224
3090.	1.120	0.964	1.373	1.344	1.137	1.393	1.279	1.887	1.940	1.901	1.218
3095.	1.030	0.900	1.340	1.217	1.049	1.206	1.152	1.860	1.832	1.933	1.182
3100.	1.063	0.860	1.379	1.548	1.088	1.272	1.142	2.100	1.775	2.191	1.268
3105.	1.101	1.037	1.475	1.996	1.253	1.591	1.291	2.425	2.239	2.625	1.490
3110.	1.091	1.215	1.466	2.318	1.423	1.951	1.414	2.776	2.726	2.914	1.792
3115.	1.014	1.286	1.363	2.151	1.383	1.969	1.423	2.629	2.904	2.860	1.801
3120.	0.982	1.211	1.305	1.915	1.279	1.766	1.344	2.518	2.760	2.714	1.571
3125.	0.960	1.193	1.310	1.929	1.211	1.626	1.327	2.470	2.802	2.755	1.365
3130.	0.970	1.228	1.300	2.018	1.239	1.661	1.371	2.576	2.947	2.931	1.288
3135.	0.992	1.245	1.323	2.121	1.297	1.794	1.419	2.739	3.075	3.259	1.101
3140.	1.029	1.254	1.372	2.063	1.323	1.866	1.444	2.948	3.267	3.393	0.883
3145.	1.050	1.233	1.435	2.078	1.323	1.854	1.484	2.995	3.748	3.471	1.040
3150.	1.029	1.268	1.432	2.123	1.300	1.839	1.518	2.999	3.954	3.506	1.541
3155.	0.954	1.266	1.219	2.061	1.218	1.766	1.478	2.858	3.865	3.677	1.742
3160.	0.938	1.125	1.029	2.014	1.146	1.658	1.402	2.642	3.693	3.942	1.568
3165.	0.967	1.124	1.083	2.423	1.157	1.758	1.427	2.613	3.914	4.381	1.184
3170.	0.957	1.308	1.264	2.715	1.316	2.087	1.603	3.079	4.556	4.958	1.015
3175.	0.888	1.430	1.270	2.653	1.422	2.283	1.624	3.634	4.846	5.206	1.213
3180.	0.824	1.314	1.211	2.312	1.365	2.118	1.531	3.527	4.571	5.118	1.395
3185.	0.806	1.226	1.316	2.259	1.335	2.005	1.452	3.378	4.580	4.940	1.696
3190.	0.792	1.289	1.526	2.344	1.273	2.014	1.436	3.335	4.537	4.637	1.530
3195.	0.765	1.337	1.642	2.403	1.242	2.055	1.509	3.534	4.344	4.416	1.908
3200.	0.722	1.329	1.534	2.495	1.229	2.112	1.579	3.567	4.137	4.440	2.036
3205.	0.698	1.455	1.398	2.487	1.285	2.161	1.617	3.506	4.088	4.483	2.283
3210.	0.654	1.441	1.207	2.286	1.219	2.078	1.440	3.130	3.860	4.266	2.031
3215.	0.617	1.332	1.015	2.104	1.176	1.928	1.330	2.782	3.569	4.304	1.484
3220.	0.659	1.305	1.051	1.946	1.064	1.916	1.287	2.298	3.658	4.322	1.661
3225.	0.690	1.314	1.276	1.870	1.031	1.848	1.269	2.202	4.045	4.348	1.731
3230.	0.692	1.191	1.456	1.874	0.927	1.718	1.174	1.908	4.262	4.373	1.145
3235.	0.633	1.082	1.445	1.969	1.023	1.701	1.146	2.148	4.038	4.568	0.469
3240.	0.661	1.102	1.354	2.082	1.207	1.859	1.217	2.770	3.854	4.681	1.487