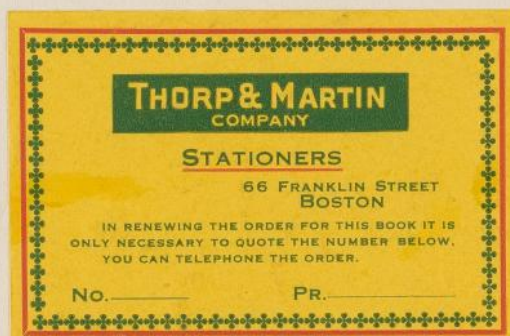


KG
11366
163

2

KG11366.163



ARS and.

H. H. Plaskett ?

KG11366.163



DAO 141 H B

Apr 27

	λ	\bar{z}	Comp	$\Delta Comp$		Mean $\Delta Comp$ P29P5	$\Delta(\Delta Comp)$
	4957.46	20171.62	66.424	+ 1.554	+45.10	1.555	45.13
	4938.83	20247.71	66.095	1.225	35.55	1.237	35.90
pr	4920.52	20323.05	65.756	0.886	25.71	0.889	25.80
	4903.33	20394.30	65.453	0.583	16.92	0.583	16.92
	4891.51	20443.58	65.235	0.365	10.59	0.367	10.65
	4878.23	20499.24	64.992	+ 0.122	3.54	0.125	3.63
$\lambda_0 \rightarrow$	4872.15	20524.82	64.870	0.000	0.00	0.000	0.00
	4859.76	20577.15	64.648	- 0.222	-6.44	-0.221	-6.41
	4736.79	21111.34	62.224	2.646	76.79	-2.645	-76.76
	4707.29	21243.65	61.609	3.261	94.63	-3.264	-94.72
	4691.42	21315.51	61.265	3.605	104.62	3.603	-104.56
	4678.86	21372.73	60.998	- 3.872	112.37	3.870	-112.31
	4667.81 D	21423.32	60.761	4.109	119.24	4.108	-119.21
	4654.57	21484.26	60.470	4.400	127.69	4.402	-127.75
	4647.44	21517.2	60.311	- 4.559	132.30		
	4607.67	21702.9	59.499	5.371	155.87		
V			57.461	7.409	215.01		
	4528.62	22081.8	57.546	- 7.324	212.54		
R			57.609	- 7.261	210.71		
						Scale	
	D		63.986	- 0.884	-25.65	-7.7	-7.89
	C		64.258	- 0.612	-17.76	0.0	0.0
	B		65.175	+ 0.305	+ 8.85	+26.1	26.61
	A		65.405	+ 0.535	+ 15.53	33.2	33.29

Additional material from P 5

DAO 141 Tracing u g 4690

April 29

Determination of magnification of tracing over plate 3

λ	Comp	a |Comp-A'|	Scale	b |Scale-A'|	$\frac{b}{a}$
A'	38.266	0.000	9.8	0.00	0.00
B'	39.739	1.473	52.7	42.9	29.12
C'	46.352	8.086	245.2	235.4	29.11
D'	46.866	8.600	260.3	250.5	<u>29.13</u>
				$(\frac{b}{a})$	29.12
A'		|Comp-D'|		|Scale-D'|	
A'		8.600		250.5	29.13
B'		7.127		207.6	29.13
C'		0.514		15.1	<u>29.38</u>
D'				$(\frac{b}{a})$	= 29.21

Magnification Value adopted: see page (7)

DAO 139 $\mu\phi$ 4684
Magnification

apr 28

λ	Comp	$|Comp - A|$	Scale	$|Scale - A|$	$(\frac{L}{a})$
A	41.504	7.169	8.7	208.1	29.03
B	41.824	6.849	18.2	198.6	29.00
C	42.029	6.644	23.6	193.2	29.08
D	43.250	5.423	59.2	157.6	29.06
E	43.475	5.198	65.9	150.9	29.03
F	43.617	5.056	70.1	146.7	29.02
G	43.835	4.838	76.0	140.8	29.10
H	44.267	4.406	88.8	128.0	29.05
I	45.617	3.056	128.1	88.7	29.02
J	45.737	2.936	131.1	85.7	29.19
K	46.325	2.348	149.2	67.6	28.79
L	48.673	0.000	216.8	35.0	
M	60.010	0.000	255.3	0.00	
Reject M			$(\frac{L}{a}) = \frac{319.39}{11}$		$= 29.034 = \alpha_1$

	$|Comp - A|$	$|Scale - A|$	
A	0.000	0.000	
B	0.320	9.5	29.69
C	0.525	14.9	28.38
D	1.746	50.5	28.92
E	1.971	57.2	29.02
F	2.113	61.4	29.06
G	2.331	67.3	28.87
H	2.763	80.1	28.99
I	4.113	119.4	29.03
J	4.233	122.4	28.92
K	4.821	140.5	29.14
L	7.169	208.1	29.03
		$(\frac{L}{a}) = \frac{319.05}{11}$	$29.005 = \alpha_2$

$$\text{Mean} = \frac{\alpha_1 + \alpha_2}{2} = 29.02$$

λ	Comp	AComp
4957	45.119	+ 1.557
4938	45.446	1.230
4920	45.785	0.891
4903	46.092	0.584
4891	46.1307	0.369
4878	46.549	0.127
$\lambda_{0 \rightarrow}$ 4872	46.676	- 0.000
4859	46.896	- 0.220
4736	49.320	2.644
4707	49.943	3.267
4691	51.277	2 4.601
4678	51.545	4.869
4667	51.782	4 5.106
4654	60.070	13 3.394

Nova Sp.			Scale	|Comp-A|	|Scale-A|	$\frac{C}{A}$
A		44.477	81.4	0.000	0.00	
B	with A	44.713	74.9	0.236	6.5	27.54
C	gd	46.142	33.4	1.429	48.0	33.60
D	pr	46.362	27.3	1.885	54.1	28.70
λ E	gd	47.288	0.0	2.811	81.4	28.96
F	gd	47.563	-7.9	3.086	89.3	28.94
			$\overline{\left(\frac{C}{A}\right)} = \frac{147.74}{5} = 29.55$			

λ	Comp	$\overset{A}{-} (Comp - 4872)$	Δ	S	$\Delta A - S$
F	47.563	\bar{x} 0.887	-25.84	-7.8	-18.04
λ E	47.288	\bar{x} 0.612	-17.83	0.0	-17.83
D	46.362	+ 0.314	+9.15	+27.4	-18.25
C	46.142	+ 0.534	15.56	+33.4	-17.84

$$M = -18 - 17.99$$

4872	46.676	0.000	0.00
4957	45.119	+ 1.557	+45.36

$$\Delta A = S - 18.0$$

$\mu\phi$ 4893 (Large Magnification)
 For the determination of magnification of tracings over plate
 Comp Measures from Page 2.

	λ	Scale	Comp	|Comp - 4957|	|Scale - 4957|	
A	4957	0.21 cm	66.424	$\overset{\circ}{0}.\overset{\circ}{3}\overset{\circ}{2}\overset{\circ}{9}$	0.00	29.48
B	4938	1.18	66.095	0.329	0.97	29.48
C	4920	2.12	65.756	0.668	1.91	28.59
D	4903	3.04	65.453	0.971	2.83	29.15
E	4891	3.67	65.235	1.189	3.46	29.10
F	4878	4.35	64.992	1.432	4.17	29.12
G	4872	4.73	64.870	1.544	4.52	29.27
H	4859	5.38	64.648	1.776	5.17	29.11
I	4736	12.45	62.224	4.200	12.24	29.14
J	4707	14.24	61.609	4.815	14.03	29.14
K	4691	15.23	61.265	5.159	15.02	29.11
L	4678	16.01	60.998	5.426	15.86	29.12
M	4667	16.71	60.761	5.663	16.50	29.14
N	4654	17.57	60.470	5.954	17.36	29.16
O	4647	18.02	60.311	6.113	17.81	29.13
P	4607	$20.\overset{40}{64}$	59.499	6.925	20.19	29.16
R			57.609	8.815		
Q	4528	26.08	57.546	8.878	25.87	29.14
R	V	26.33	57.461	8.963	26.12	29.12 ⁴

$$\text{Mean} = \frac{495.20}{19} = 29.13$$

Running Difference $|A-J|, |B-K|$ etc

A-J	4.815	14.03	29.14
B-K	4.830	14.05	29.09
C-L	4.758	13.89	29.19
D-M	4.692	13.67	29.13
E-N	4.765	13.97	29.32
F-O	4.681	13.64	29.13
G-P	5.371	15.67	29.18
H-Q	7.102	20.70	29.15
I-R	4.763	13.88	29.14
			Mean = 29.16

Determinations of α

p 7	29.16	→ 29.14	2	(29) .28
p 6	29.12			
p 4	29.01	→ 29.02	1	(29) .02
"	29.03			
p 3	29.12	→ 29.17	2	(29) .34
1.3.	<u>29.21</u>			5) <u>64</u>

$$(Wtd) \text{Mean} = 29.13$$

DAO 141 HP

see page 2

$$H\beta = 4861.344 \quad \nu =$$

λ	ν	ΔComp	$\frac{K}{d(\Delta \text{Comp})}$
4957.46	ν_1 20171.62	1.555	+ 45.36 K_1
4938.83	20247.71	1.237	36.03
4920.52	20323.05	0.889	25.90
4902.33	20394.30	0.583	16.98
4891.51	20443.58	0.367	10.69
4878.23	20499.24	0.125	36.41
λ_0 4872.15	20524.82	0.000	0.00
4859.76	20577.15	-0.221	6.44
4736.79	21111.34	2.645	77.05
4707.29	21243.65	3.264	95.08
4691.42	21315.51	3.603	104.95
4678.86	21372.73	3.870	112.73
4667.81	21423.32	4.108	119.67
4654.57	21484.26	4.402	128.23
4647.44	21517.2	4.559	132.80
4607.67	21702.9	5.371	156.46
4528.62	ν_2 22081.8	7.324	213.35 K_2

$$\nu_2 - \nu_1 = \frac{22081.8}{1910.2} \quad K_2 - K_1 = \frac{213.35}{257.65} \quad \Delta \nu = \frac{7.324}{57.69}$$

Curve of (ν) vs (K) plotted.

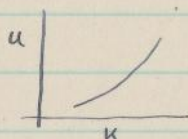
$$\Delta \nu = 1910$$

$$\Delta \lambda = 5.76 \text{ m}\mu$$

$$\frac{\Delta \nu}{\Delta \lambda} = 33.2$$

The object of the (v) vs (k) curve, is to calibrate the glass scale, with its zero point at $\lambda 4872$, in wavenumbers.

We can then read off v 's for each unit of the glass scale. Hence compute a U (Radial velocity) value for each glass scale unit and plot against against the glass scale:



This curve has its zero of k at $\lambda 4872$, as above.

Then by measuring the position of the reference lines (in absorption) for each contour, ^{again with ref. to $\lambda 4872$} we can then relate the converted comp scale (converted to k) to that scale given in the contour measures. Hence we get U for each point of the contour.

A secondary sliding scale should be made for the measures referred to the contour. Then having found the position of these contour lines to with relation to 4872 , (on the comparator) we can find where the two scales coincide

$$H\beta = 4861.344$$

$$D = 20570.41$$

Values of v read off curve (data given on page 8) for each integral scale reading:

$$\frac{\Delta\lambda}{\lambda} = \frac{\lambda - \lambda_0}{\lambda_0} = \frac{u}{c}; u = c\left(\frac{\lambda}{\lambda_0} - 1\right) = c\left(\frac{v_0}{v} - 1\right) \quad v_0 = 20570.5$$

10

H β

scale	v	$\frac{v_0}{v}$	$\frac{v_0}{v} - 1$	$u = c\left(\frac{v_0}{v} - 1\right)$ km/sec
-2				
39	20825	.98776	.01224	3670
38	20818	.98809	.01191	3571
37	20810	.98847	.01153	3457
36	20802	.98885	.01115	3343
35	20795	.98918	.01082	3244
34	20788 784	.98951	.01049	3145
33	20780 780	.98989	.01011	3031
32	20772 772	.99028	.00972	2914
31	20764 764	.99080	.00920	2858
30	20756 756	.99094	.00906	2716
29	20750 750	.99133	.00867	2599
28	20742 742	.99171	.00829	2485
27	20734	.99209	.00791	2371
-26.0	20726	.99247	.00753	-2257
25	20719	.99281	.00719	2156
24	20711	.99319	.00681	2042
23	20704	.99353	.00647	1940
22	20696	.99391	.00609	1826
21	20688	.99430	.00570	1709
20	20680	.99468	.00532	1595
19	20673	.99502	.00498	1493
18	20666	.99535	.00465	1394
-17	20658	.99574	.00425	-1274

Referred to λ 4872
as zero ($v = 20570$)

Scale	v	$\frac{v}{c}$	$\frac{v}{c} - 1$	$u = c(\frac{v}{c} - 1)$
-16	20650	.99613	.00387	-1160
15	20642	.99651	.00349	1046
14	20635	.99685	.00315	944
13	20628	.99719	.00281	842
12	20620	.99758	.00242	726
11	20611	.99801	.00199	597
10	20604	.99845	.00155	465
9	20596	.99874	.00126	378
8	20588	.99913	.00087	261
7	20580	.99951	.00049	-147
6	20573	.99985	.00015	-44.9
5	20565	1.00024	.00024	+72
4	20558	1.00058		173
3	20549	1.00102		306
-2	20542	1.00136		408
-1	20534	1.00175		525
0	20526	1.00 ²¹⁴ 214		642
+1	20519	1.00249		747
+2	20512	1.00283		848
+3	20504	1.00322		965
+4	20496	1.00361		1082
+5	20488	1.00400		1199
+6	20481	1.00435		1304
+7	20471	1.0048 ⁴ 8		1451
+8	20465	1.00513		1538
+9	20458	1.00547		1640
10	20450	1.00589		1760
11	20442	1.00626		1877
12	20435	1.00661		1982

date	λ	$\frac{v_r}{v_p}$	
13	20426	1.00705	2114
14	20419	1.00730	2219
15	20411	1.00779	2335
16	20403	1.00819	2455
17	20396	1.00853	2557
18	20388	1.00893	2677
19	20380	1.00932	2794
20	20372	1.00972	2914
21	20364	1.01012	3034
22	20356	1.01051	3151
23	20349	1.01086	3256
24	20341	1.01126	3376
25	20333		
26	20326		
27	20318		
28	20309		
29	20301		
30	20294		
31	20286		
32	20278		
33	20271		
34	20263		
35	20255		
36	20247		
37	20240		
38	20232		
39	20224		
40	20216		

Curve plotted

DAO 141

H β Region.

Tracing made, with one part of slit on H α sp, and other part on Fe arc sp, with other part blocked out. Hence we get a tracing of the H β band upon which is superposed the Fe lines ⁴⁸⁵⁹4872, 4891, 4920, 4957.

Measurements on the glass scale of the lines ⁴⁸⁵⁹4872, 4891, 4920, 4957, A, X, D, C, B A were made.

Line	Reading mm
⁴⁸⁵⁹ 4872	19.7
4891	26.3
4920	36.5
4957	

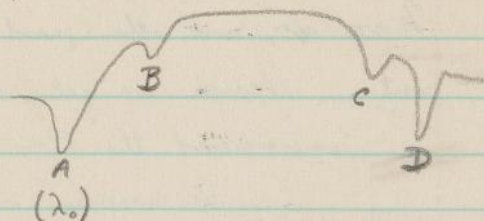
Line	Scale Reading mm	λ_1 [Scale - 4872]
4859	19.7	-6.6
4872	26.3	0.0
4891	36.5	10.2
4920	52.0	25.7
4957	71.5	45.2
D	more 0.0 \rightarrow 0.5	-26.3 \rightarrow -25.8
C	7.8	-18.5
B	34.9 \rightarrow 35.0	8.7
A	41.2	14.9

Line	(λ_1)	$\lambda(\Delta 6 \text{ mp})$ page 2	$|\Delta|$	$\lambda_2 = \text{Scale} - C$
4859	-6.6	-6.41	0.19	
4872	0.0	0.00	0.00	
4891	+10.2	+10.65	0.44	
4920	25.7	+25.80	0.10	
4957	45.2	+45.13	0.07	

					Tracing 49688
D	~ -26.0	-25.65	+35	0.25	-7.3 \rightarrow -7.8
C	-18.5	-17.76	-76	0.15	0.0
B	+8.7	+8.85	-15		27.2
A	+14.9	+15.53	-63		33.4

DAO 143 HB

Tracing



λ	Comp	Δ (λ_0) [Comp - 4872]	$\alpha \Delta$
4872	40.584	0.000	0.000
4891	40.948	+ 0.364	10.60
4920	41.471	+ 0.887	25.84
4957	¹³⁵ 42.355	+ ^{1.551} 0.777	45.18

				scale 0%	Correction ($\alpha \Delta$ - scale)
A	39.698	- 0.886	- 25.81	0.0	- 25.81
B	39.952	- 0.632	- 18.41	7.2	- 25.61
C	40.882	+ 0.298	+ 8.68	35.0	- 26.32
D	41.086	+ 0.502	+ 14.62	40.3	- 25.68

 λ correction

$$= \bar{C} = - 25.84$$

$$\alpha \Delta = S + \bar{C} = S - 25.84$$

λ	b_{comp}	Δ ($b_{\text{comp}} - 4872$)	$\alpha\Delta$			
4872	40.414	0.000	0.000			
4891	40.776	0.362	10.55			
4920	41.301	0.887	25.84			
4957	41.965	1.551	45.18			
				\vec{s} scale 0.6	\vec{c} ($\alpha\Delta - s$)	
A	39.531	-	0.883	-25.72	0.0	-25.72
B	39.785	-	0.629	-18.32	7.4	-25.72
C	40.713	+	0.299	+8.71	34.8	-26.19
D	40.908	+	0.494	14.39	40.2	-25.81

$$\alpha\Delta - s = c$$

$$\alpha\Delta = s + \bar{c} = \alpha\Delta - 25.86$$

DA0 148

H γ Measurement to determine radial velocity curve.
Referred to λ 4325.77

$$\alpha = 29.13$$

λ	v	\overline{Comp}	Δ (Comp - 4325)	($\alpha \Delta$)
4250.46	23526.9	50.168	-2.266	-66.01
4260.49	23471.5	50.475	-1.959	-57.07
4271.17	23412.8	50.824	-1.610	-46.90
4282.41	23351.3	51.149	-1.285	-37.43
4294.13	23287.6	51.500	-0.934	-27.21
4299.25	23259.9	51.650	-0.784	-22.84
4307.91	23213.1	51.911	-0.523	-15.23
4315.09	23174.5	52.122	-0.312	-9.09
→ 4325.77	23117.3	52.434	0.000	0.00
X 4227.05	23110.4	52.763	+0.329	+9.58
4352.74	22974.0	53.207	+0.773	+22.52
4375.93	22852.3	53.860	+1.426	+41.54
4383.55	22812.6	54.073	+1.639	+47.74
4404.75	22702.8	54.654	+2.220	+64.67
4416.13	22649.4	54.933	+2.499	+72.80

06 scale (4d) - 06 scale

λ_{-1}	51.916	-0.518	-15.09	-7.6	-7.49
λ_0	52.225	-0.209	-6.09	0.0	-6.09
λ'_0	52.265	-0.169	-4.92	+3.2	-8.12
λ_1	52.508	+0.074	+2.16	+10.0	-7.84
λ_2	52.995	+0.561	+16.34	+24.2	-7.86
λ_3	53.740	+1.306	+38.04	46.2	-8.16
λ_4	53.887	+1.453	+42.33	50.0	-7.67

$$\Sigma 53.23$$

$$M = -\frac{53.23}{7} = -7.60$$

$$(\Delta d) - S = -7.60$$

$\Delta d = S - 7.60$ (Add -7.6 to each glass scale reading to get scale converted to that with λ 4325 as zero).

H γ λ 4340.477

v 23038.9

17

Scale	v	$\frac{v_0}{v}$	$\frac{v_0}{v} - 1$	$c(\frac{v_0}{v} - 1)$	Scale	v	$\frac{v_0}{v}$	$\frac{v_0}{v} - 1$	$c(\frac{v_0}{v} - 1)$
-60	23495	0.98072	-.01928		-32	318	.98803	.01197	
-59	22486	.98097	.01903		321	312	.98829	.01171	
-58	23480	.98122	.01878		320	306	.98854	.01146	
-57	474	.98147	.01853		279	299	.98884	.01116	
-56	468	.98172	.01828		278	293	.98910	.01090	3268
-55	462	.98197	.01803		277	287	.98935	.01065	3193
-54	456	.98222	.01778		26	280	.98965	.01035	3103
-53	450	.98247	.01753		25	274	.98990	.01010	3028
-52	443	.98277	.01723		24	268	.99016	.00984	2950
51	437	.98302	.01698		23	262	.99041	.00959	2875
50	431	.98327	.01673		22	256	.99067	.00933	2797
49	425	.98352	.01648		21	249	.99097	.00903	2707
48	418	.98382	.01618		20	243	.99122	.00878	2632
47	412	.98407	.01593		19	237	.99148	.00852	2554
46	406	.98432	.01568		18	230	.99178	.00822	2464
45	400	.98457	.01543		17	224	.99203	.00796	2386
44	23393	.98487	.01513		16	218	.99229	.00771	2311
43	387	.98512	.01488		-15	212	.99255	.00745	2234
42	381	.98537	.01463		-14	205	.99285	.00715	2144
41	375	.98563	.01437		-13	200	.99306	.00694	2081
40	369	.98588	.01412		-12	23194	.99332	.00668	2003
39	362	.98617	.01383		-11	187	.99362	.00638	1913
38	256	.98643	.01357		-10	181	.99387	.00613	1838
37	350	.98668	.01332		-9	174	.99417	.00583	1748
36	344	.98693	.01307		-8	168	.99443	.00557	1670
35	337	.98723	.01277		-7	162	.99469	.00531	1592
34	331	.98748	.01252		-6	156	.99495	.00505	1514
33	325	.98774	.01226		-5	150	.99521	.00479	1436

	Scale	v	$\frac{v_0}{v}$	$\frac{v_0}{v} - 1$	$u = \frac{c(\frac{v_0}{v} - 1)}{c(\frac{v_0}{v} - 1)}$	Scale	v	$\frac{v_0}{v}$	$\frac{v_0}{v} - 1$	$u = \frac{c(\frac{v_0}{v} - 1)}{c(\frac{v_0}{v} - 1)}$
14	+4	23144	.99546	.00454	1361	24	22964	1.00327	.980	
	3	137	.99576	.00424	1271	25	57	1.00357	1070	
	2	131	.99602	.00398	1193	26	51	1.00383	1148	
	1	124	.99632	.00368	1103	27	45	1.00410	1229	
0	± 0	117	.99663	.00337	1010	28	38	1.00440	1319	
	+01	111	.99688	.00312	935	29	32	1.00467	1400	
	02	105	.99714	.00286	857	30	25	1.00497	1490	
	03	23098	.99745	.00255	764	31	18	1.00528	1583	
	04	92	.99770	.00230	690	32	12	1.00554	1661	
	05	86	.99796	.00204	612	33	6	1.00581	1742	
	06	80	.99822	.00178	534	34	22900	1.00607	1820	
	07	73	.99853	.00147	441	35	22893	1.00638	1913	
	08	66	.99883	.00117	351	36	887	1.00664	1991	
	09	60	.99909	.00091	273	37	880	1.00695	2084	
16	10	54	.99935	.00065	195	38	875	1.00717	2150	
	11	47	.99965	.00035	105	39	868	1.00748	2243	
	12	41	.99991	.00009	-27	40	862	1.00774	2320	
	13	35	1.00017		+51	41	855	1.00805	2413	
	14	28	1.00048		144	42	849	1.00832	2494	
	15	22	1.00074		222	43	842	1.00862	2584	
	16	16	1.00100		300	44	836	1.00889	2665	
	17	23009	1.00130		390	45	829	1.00920	2758	
	18	23002	1.00161		483	46	823	1.00946	2836	
	19	22994	1.00196		588	47	817	1.00973	2917	
20	20	989	1.00217		651	48	810	1.01004	3010	
	21	83	1.00244		732	49	228804	1.01031	3091	
	22	77	1.00270		809	50	22797	1.01062	.01062	3184
	23	70	1.00300		899					

λ	Comp	(Comp - 4872)	($\alpha \Delta$)	Obs Scale
4872	74.899	0.000		
4891	75.265	0.366	10.66	
4920	75.794	0.895	26.07	
4957	76.456	1.557	45.36	

($\alpha \Delta$) - Obs Scale

A	74.047	-0.852	-24.82	0.0	-24.82
B	74.279	-0.620	-18.06	+10.0	-28.06
C	75.106	+0.207	+6.03	+33.0	-27.97
D	75.380	+0.481	+14.01	+41.4	-27.31

4 | 28.16

$$M_1 = -27.04$$

$$M_2 = -\frac{24.82 + 27.31}{2} = -26.06$$

$$\frac{M_1 + 2M_2}{-3} = -\frac{27.04 + 52.12}{3} = -26.39$$

Add to each glass scale reading for DA 0148 H β
the quantity -26.4 to reduce to scale with
 λ 4872 as zero.

HP
DAO 148Material Fromy Blk I p64
Correction (see II 19) -26.4
 $\Delta d = S - 26.4$

I	I'	λ	$\log r$	$U_{\text{km/sec}}$	λ	$\log r$	U	I	I'	I
	5.78	^{33.5} -33.4	-0.012	3075	-19.4	+ .409	⁴⁰ -152	14.42	5.62	5.78
5.78		³³ 32.9	0.000	2020	¹⁹ 18.9	.426	-1480	15.00		5.78
		32.4	-0.029	2955	18.4	.442	-1425	15.56		
5.51		³² 31.9	-0.021	2910	¹⁸ 17.9	.496	1370	17.62		4
		31.4	- .021	2855	17.4	.563	1315	20.56		
5.06		³¹ 30.9	- .058	2800	¹⁷ 16.9	.605	-1255	22.65		4
		-30.4	- .058	2745	-16.4	.634	-1200		5.57	
4.79		³⁰ 29.9	- .082	2690	¹⁶ 15.9	.638	1145	24.21		41
4.42		29.4	- .117	2635	15.4	.656	1090			
4.13		²⁹ 28.9	- .146	2575	¹⁵ 14.9	.660	1035	25.97		33
3.71		28.4	- .193	2525	14.4	.679	980			
(3.12)		²⁸ 27.9	(-.267)	-2460	¹⁴ 13.9	.708	920	28.44		31
(3.12)		27.4	(-.267)	-2410	13.4	.734	870			
(2.49)		²⁷ 26.9	(-.366)	-2355	¹³ 12.9	.743	810	30.82		28
(2.11)	5.72	-26.4	(-.433)	2300	12.4	.763	-755		5.51	
(2.49)		²⁶ 25.9	(-.381)	2250	¹² 11.9	.758	700	31.05		25
(2.98)		-25.4	(-.283)	2195	-11.4	.763	640			
3.59		²⁵ 24.9	(-.202)	-2140	¹¹ 10.9	.795	590	34.36		24
4.49		-24.4	(-.105)	2085	10.4	.806	-530			
6.42		²⁴ 23.9	+0.512	2030	¹⁰ 9.9	.821	475	36.48		20
7.76		-23.4	+ .133	1975	9.4	.814	420			
8.64	5.66	²³ 22.9	+ .185	1920	⁹ 8.9	.836	360	37.76		20
10.6		-22.4	+ .273	1865	-8.4	.850	310			
11.56	5.62	²² 21.9	.313	1810	⁸ 7.9	.866	250	40.0	5.45	2
10.94		21.4	.289	1755	7.4	.898	190			
11.38		²¹ 20.9	.306	1700	⁷ 6.9	.939	135	47.32		21
12.53		20.4	.348	1650	6.4	.953	-80		5.36	
13.21	5.62	²⁰ 19.9	.371	1590	⁶ 5.9	.977	-825	50.82		16

			Corrected scale								
I			λ	$\log r$	u	λ	$\log r$	u			
62	53.21	5.36	-5.4	.997	+35	8.6	.464	1600			
	55.46		5 4.9	1.015	+90	9 9.1	.436	1660	13.30	4.81	
			4.8	1.031	123						
			44	1.015	145	9.6	.393	1720		4.81	
	49.43	5.31	4 3.9	.969	200	10 10.1	.340	1775	10.52		
			3.4	.947	260	10.6	.327	1830		4.75	
	44.57		3 2.9	.924	320	11 11.1	.321	1890	9.95		
57		5.25	2.4	.920	375	11.6	.324	1950			
	41.50		2 1.9	.898	430	12.1	.295	2000	9.23	4.68	
			-1.4	.844	485	12.6	.272	2055			
	35.73	5.20	+0.9	.837	545	13.1	+.235	2120	8.04		
			-0.4	.815	600	13.6	+.167	2175		4.61	
	31.62		0 +0.1	.784	655	14 14.1	+.086	2230	5.62		
		5.15	0.6	.769	705	14.6	+.035	2280		4.55	
	28.44		+1 1.1	.742	765	15 15.1	-.002	2335	4.53		
51		5.13	1.6	.715	820	15.6	+.027	2400			
	25.88		2 2.1	.703	875	16 16.1	.094	2460	5.57	4.49	
			2.6	.700	925	16.6	.120	2515			
	24.00	5.08	3 3.1	.674	990	17.1	.143	2580			
			3.6	.621	1045	17.6	.125	2635			
	20.70		4 4.1	.610	1100	18.1	.175	2695			
			4.6	.613	1155	18.6	.138	2750			
	20.56	5.00	5 5.1	.614	1210	19.1	.111	2810			
			5.6	.620	1265	19.6	.140	2870			
45	22.18		6 6.1	.647	1325	20.1	.127	2920			
		4.90	6.6	.656	1375	20.6	.095	2980			
	21.09		7 7.1	.634	1430						
			7.6	.563	1490						
36	16.48	4.88	8 8.1	.529	1545						

H γ
DAO 148Material From Blk I p 132
Correction: $(\Delta \lambda) = 5 - 7.60$

Corrected λ	$\log r$	u
-27.6	.047	-3190
27.1	.047	3150
26.6	.075	3110
26.1	.071	3110
25.6	.063	3070
25.1	.047	3035
24.6	.025	2995
24.1	.006	2955
23.6	.000	2915
23.1	.008	2875
22.6	.059	2830
22.1	.049	2795
21.6	-.036	2755
21.1	-.068	2715
20.6	-.091	2675
20.1	-.091	-2635
19.6	-.116	2595
19.1	-.141	2555
18.6	-.131	-2515
18.1	-.146	2475
17.6	-.146	2435
17.1	-.135	-2395
16.6	-.108	2355
16.1	-.091	2315
15.6	-130	-2275
15.1	-.177	2235
14.6	-.150	2200
14.1	-.080	-2155

Corrected λ	$\log r$	u
-13.6	-.000	-2115
13.1	-.008	-2080
12.6	.000	-2040
12.1	+.021	-2000
11.6	+.031	-1960
11.1	+.037	-1920
10.6	+.040	-1880
10.1	+.037	1840
9.6	+.031	-1800
9.1	+.031	1760
8.6	+.037	-1720
8.1	+.031	1680
-7.6	-.016	1640
7.1	-.039	1600
6.6	+.047	-1560
6.1	+.077	1520
5.6	0.130	1480
5.1	+.1281	1440
4.6	+.260	-1400
4.1	+.275	1360
3.6	+.266	1320
3.1	+.268	1275
2.6	.268	-1235
-2.1	.279	1195
-1.6	+.279	1155
-1.1	+.291	1110
-0.6	+.308	-1070
-0.1	307	-1030

cm λ	$\log r$	u
+0.4	+307	-990 -207
0.9	+307	950
1.4	.335	905
1.9	.330	-865
2.4	.269	825
2.9	.297	785
3.4	.343	745
3.9	.365	-700
4.4	.374	660
4.9	.400	620
5.4	.427	575
5.9	440	-530
6.4	.422	490
6.9	.448	450
7.4	.454	405
7.9	.470	-365
8.4	.476	325
8.9	487	285
9.4	504	240
9.9	545	200
10.4	536	-155
10.9	536	-115
11.4	536	-70 8
11.9	533	-30
12.4	533	+10
12.9	524	50
13.4	495	95
13.9	524	+135

cm λ	$\log r$	u
14.4	.532	+180
14.9	.536	220
15.4	.459	260
15.9	.456	300
16.4	.412	340
16.9	.415	+385
17.4	.429	430
17.9	.420	470
18.4	.415	510
18.9	.416	+550
19.4	.412	595
19.9	.376	640
20.4	.375	680
20.9	.369	+725
21.4	.363	765
21.9	.341	805
	.337	827
22.4	.337	850
22.9	.354	+890
23.4	.362	930
23.9	.349	975
24.4	.354	1015
24.9	.363	1055
25.4	.365	+1100
25.9	360	1140
26.4	387	1180
26.9	.396	1225
27.4	377	1265
27.9	.390	1305

DA0148
H8

Correction (dA) = 5-7.60

Corr
λ

log R

U km/sec

28.4	+ .360	1350
28.9	+ .343	1395
29.4	+ .308	1430
29.9	+ .273	1475
30.4	.255	1515
30.9	.240	1560
31.4	.248	1600
31.9	.257	1645
32.4	.254	1685
32.9	.222 233	1725 47
33.4	.234	1770
33.9	.266	1810
34.4	.228	1855
34.9	.223	1895
35.4	.223	1940
35.9	.214	1980
36.4	+ .209	2025
36.9	.191	2065
37.4	.147	2105
37.9	.092	2150
38.4	+ .038	2190
38.9	+ .051	2235
39.4	.092	2280
39.9	.100	2320
40.4	.055	2360
40.9	.022	2405
41.4	- .006	2445
41.9	- .030	2490
42.4	- .074	2530

42.9	- .055	2575
43.4	- .036	2615
43.9		
44	- .036	2660
44.4	- .016	2700
44.9	- .016	2745
45.4	- .017	2790

H β DAO 144

Material From Blk I p 46

Correction: $\alpha\Delta = 5 - 25.9$ (Blk II p 15)

λ cm	$\log r$	u
-30.9	-0.008	-2800
30.4 29.4	-0.024	2745
29.9	-0.014	2690
29.4	-0.014	2635
28.9	-0.022	2575
28.4	-0.043	2525
27.9	-0.059	2465
27.4	-0.081	2415
26.9	-0.024	2355
26.4	-0.192	2300
25.9	-0.274	-2250
25.4	-0.227	2195
24.9	-0.164	2140
24.4	-0.078	2085
23.9	+0.031	2030
23.4	.110	1975
22.9	.158	1920
22.4	+0.175	1865
21.9	.205	1810
21.4	.230	1755
20.9	.247	1700
20.4	.271	1650
19.9	.270	1595
19.4	.241	1540
18.9	.217	1485
18.4	.208	1425
17.9	.276	1375
-15.4	.368	1320

λ cm	$\log r$	u
16.9	+0.440	-1265
16.4	.512	1210
15.9	.566	1155
15.4	.598	1100
14.9	.619	1045
14.4	.618	985
13.9	.652	930
13.4	.655	875
12.9	.693	820
12.4	.717	765
11.9	.737	710
11.4	.753	650
10.9	.789	-595
10.4	.793	540
9.9	.836	485
9.4	.862	-425
8.9	.906	370
8.4	.930	310
7.9	.934	-255
7.4	.929	200
6.9	.929	145
6.4	.936	-90
5.9	.921	-30
5.4	.930	+20
4.9	.921	80
4.4	.914	+140
3.9	.904	190
-3.4	.883	+250

$$\Delta = 5 - 25.9$$

27

λ^{cm}	$\log r$	u
-2.9	+0.847	+305
2.4	.818	365
1.9	.763	415
-1.4	.727	475
-0.9	.727	530
-0.4	.730	585
+0.1	.660	640
0.6	.641	+760
1.1	.626	765
1.6	.617	820
2.1	.582	875
2.6	.589	930
3.1	.554	+985
3.6	.533	1045
4.1	.516	1100
4.6	.501	1155
5.1	.474	12 ¹⁵ 60
5.6	.420	1270
6.1	.394	+1325
6.6	.364	1380
7.1	.304	1440
7.6	.267	1495
8.1	.109	1555
8.6	.039	1610
9.1	+ .042	+1665
9.6	+ .065	1725
10.1	+ .065	1785
10.6	+ .083	1840

λ^{cm}	$\log r$	u
11.1	+0.090	1895
11.6	.080	1950
12.1	+ .034 + .017	2000
12.6	-.005	2065
13.1	-.089	2125
13.6	-.178	2180
14.1	-.244	2235
14.6	-.258 -.251	2295
15.1	-.177	23 ⁵⁰ 80
15.6	-.108	2385
16.1	-.043	2465
16.6	-.007	2520
17.1	+ .004	2580
17.6	+ .007	2640
18.1	.000	2700
18.6	-.013	2755
19.1	+ .001	2815
19.6	+ .005	2870
20.1	+ .006	2930
20.6	+ .016	2985
21.1	+ .038	3045
21.6	+ .043	3080
22.1	.049	

28

H β 143 DAOMaterial from Blk I p 56
Correction $\alpha \Delta = 5 - 25.8$ (Blk II, p 14)

λ_{cm}	ν_{long}	$\log \frac{r}{H}$	λ_{cm}	ν_{long}	$\log \frac{r}{H}$
-28.8	-2570	0.000	-14.8	1035	.712
28.3	2510	-.020	14.3	975	(.748)
27.8	2455	-.042	13.8	920	(.748)
27.3	2400	-.068	13.3	865	(.736)
26.8	2345	-.167	12.8	810	(.757)
26.3	2290	-.253	12.3	755	(.775)
25.8	2235	-.337	11.8	700	(.807)
25.3	2180	-.287	11.3	640	(.807)
-24.8	2125	-.218	10.8	585	(.811)
24.3	2075	-.098	10.3	530	(.823)
23.8	2020	+032	-9.8	475	(.859)
23.3	1965	+119	9.3	415	(.901)
22.8	1910	.130	8.8	360	(.901)
22.3	1855	.250	8.3	300	(.974)
21.8	1800	.281	7.8	-245	(.974)
-21.3	1745	.314	7.3	-190	(.974)
20.8	1690	.350	6.8	-135	(.974)
20.3	1640	.342	-6.3	-875	(1.018)
19.8	1580	.342	5.8	-820	(.980)
19.3	1525	.318	5.3	+35	(.980)
18.8	1475	.281	4.8	+90	(.980)
18.3	1420	.287	4.3	150	(.982)
17.8	1365	.330	3.8	205	(.962)
17.3	1310	.342	-3.3	260	(.915)
16.8	1255	.425	2.8	315	(.885)
16.3	1200	.627	2.3	370	(.849)
15.8	1145	.670	1.8	430	(.853)
-15.3	1090	.686	-1.3	485	(.829)

λ	μ $\log r$	$\log r$ μ
-0.8	+540	(829)
-0.3	595	(797)
+0.2	+660	(803)
0.7	715	(776)
1.2	770	.732
1.7	825	.708
2.2	885	.702
2.7	940	.695
3.2	995	.695
3.7	1050	.673
4.2	1110	.673
+4.7	1165	.635
5.2	1220	.627
5.7	1275	.600
6.2	1330	.586
6.7	1385	.506
7.2	1440	.469
+7.7	1500	.388
8.2	1555	.250
8.7	1610	.123
9.2	1665	.095
9.7	1720	.095
10.2	1775	.123
10.7	1835	.123
11.2	1890	.171
11.7	1950	.165
12.2	2005	.147
12.7	2065	.147

λ	$\log r$	μ
13.2	+0.037	2120
13.7	-.034	2175 ⁸⁰
14.2	-.149	2240
14.7	-.177	2300
15.2	-.112	2355
15.7	-.022	2410
16.2	+0.088	2470
16.7	+0.113	2530
17.2	+0.102	2590
17.7	+0.122	2650
18.2	+0.136	2705
18.7	+0.123	2760
19.2	+0.121	2820

H β

DAO 142

Material from Rk I p 50

Correction $\alpha\Delta = 5 - 18.34$ (Rk II, p 31) $\sim 5 - 18.3$

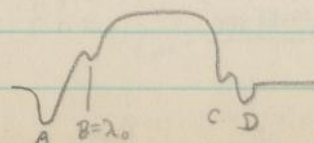
	λ	$\log r$	U	I	I'	λ	$\log r$	U
	-29.3	0.00	-2620			75.3	+ .564	-1085
	28.8	+ .048	2570		15	14.8	.598	1030
	28.3	+ .094	2510			14.3	.615	975
		+ .048						
28	27.8	.000	2455		14	13.8	.636	920
	27.3	-.085	2400			13.3	.651	865
27	26.8	-.126	2345		13	12.8	.651	810
	-26.3	.176	2290			12.3	.652	755
26	25.8	.280	2235		12	-11.8	.662	700
	25.3	.273	2180			11.3	.677	640
25	24.8	.193	2125		11	10.8	.696	585
	24.3	-.069	2075			10.3	.713	530
24	23.8	-.025	2020		10	9.8	.725	475
	23.3	+ .074	1965			9.3	.774	415
23	22.8	+ .134	1910		9	8.8	.809	360
	22.3	+ .182	-1855			8.3	.821	300
22	-21.8	.213	1800		8	7.8	.826	245
	21.3	.219	1745			7.3	.836	190
21	20.8	.253	1690		7	6.8	.836	135
	20.3	.269	1635			-6.3	.839	75
20	19.8	.258	1580		6	5.8	.846	20
	-29.3	.235	1525			5.3	.837	35
19	18.8	.217	1475		5	4.8	.817	90
	18.3	.184	1415			4.3	.796	150
18	17.8	+ .240	1365		4	3.8	.794	205
	17.3	.312	1310			-3.3	.779	260
17	16.8	.393	1250		3	2.8	.749	320
	16.3	.480	1195			2.3	.730	375
16	-15.8	.532	-1145 ⁰		2	-1.8	.708	430

$$\alpha\Delta = S - 18.3$$

	λ	$\log r$	u		λ	$\log r$	u		
	-1.3	.689	490		+12.7	+.007	2065		
1	-0.8	.656	545	13	13.2	-.035	2120		
	-0.3	.656	610		13.7	-.147	2180		
0	+0.2	.650	660		14.2	-.206	2240		
	+0.7	.630	715		14.7	-.249	2300		
1	1.2	.614	770		15.2	-.210	2355		
	1.7	.586	825		15.7	-.105	2415		
2	2.2	.569	885		16.2	-.026	2470		
	2.7	.551	940		16.7	0.000	2530		
3	3.2	.530	995		17.2	.024	2590		
	3.7	.524	1050		17.7	.018	2660		
4	4.2	.498	1105		18.2	.008	2705		
	+4.7	.481	1165		18.7	.008	2765		
5	5.2	.465	1200						
	5.7	.446	1275						
6	6.2	.413	1330	λ	Comp	(Comp - 4872)	$\alpha\Delta$	S	$\Delta\alpha - S$
	6.7	.375	1385	A	53.755	- 0.890	-25.93	-7.2	-18.73
7	7.2	.338	1440	B = λ_0	54.022	- 0.623	-18.15	0.0	-18.15
	7.7	.245	1500	C	54.944	+ 0.299	+8.71	+27.6	-18.89
8	8.2	.159	1555	D	55.148	+ 0.503	+14.65	+33.0	-18.35
	8.7	.068	1610		4872	54.645	0.000	0.000	
9	9.2	.031	1665		4957	56.200	1.555	45.30	
	9.7	.067	1720		$M_1 = -18. - \frac{2.12}{4} =$		-18.53		
10	10.2	.082	1775		$M_2 = -18. - \frac{.50}{2} =$		-18.25		
	10.7	.082	1830		Correction =	$\frac{M_1 + 2M_2}{3} =$	-18.34		
11	10.2	.079	1890						
	+11.7	.090	1950						
12	12.2	.061	2005						

$$\alpha\Delta = S - 18.34 \sim S - 18.3$$

$$\alpha\Delta = S - 18.34 \sim S - 18.3$$



DAO 150 H β

λ	λ_{comp}	Δ (Comp - 4872)	$\Delta\Delta$	S	$\Delta\Delta - S$
$\lambda_0 = A$	50.737	-0.931	-27.12	0.0	-27.12
B	50.806	-0.862	-25.11	+3.1	-28.21
C	51.036	-0.632	-18.41	+10.5	-28.91
D ^S	52.150	+0.482	+14.04	+42.2	-28.16
X ^S	50.264	-1.404	-40.90	-12.6	-28.30
E ^S	53.809	+2.141	+62.37	90.5	-28.13

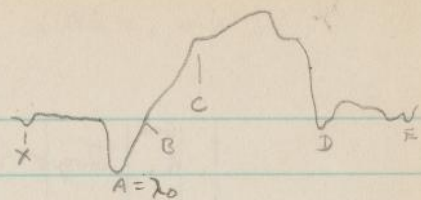
δ rest frame

4872 51.668 0.000 0.00

4957 53.221 +1.553 45.24

$$\text{Correction} = M_1 = \frac{\Sigma(\Delta\Delta - S)}{6} = -28 - \frac{0.83}{6} = -28.14$$

$$\Delta\Delta = S - 28.14$$

DAO ²⁵³~~250~~ H β

λ	λ_{comp}	Δ (Comp - 4872)	$\Delta\Delta$	S	$\Delta\Delta - S$
A	32.233	-0.339	-9.88	-3.2	-6.68
$\lambda_0 = B$	32.109	-0.215	-6.26	0.0	-6.26
C	31.824	+0.060	+1.75	+8.0	-6.25

4872 31.894 0.000 -

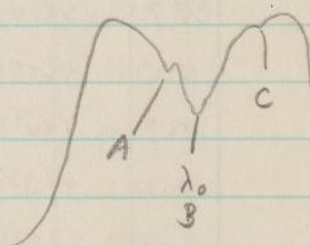
4859 30.343 1.551 45.18

$$M_1 = -1.19/6 = -6.40$$

$$M_2 = -6.68$$

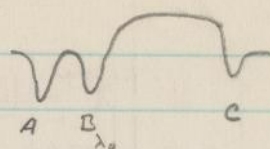
$$\text{Correction} = \frac{M_1 + M_2}{2} = -6.54$$

$$\Delta\Delta = S - 6.54 \sim S - 6.5$$



DAO 139 HB

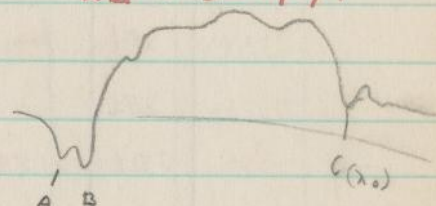
	λ	Comp	Δ (Comp - 4872)	$\alpha\Delta$	S	$\alpha\Delta - S$
A	36.368		-0.896	-26.10	-8.0	-18.10
λ_0 B	36.087		-0.615	-17.91	0.0	-17.91
C	35.190		+0.302	+8.86	26.0	17.20



$$M = -17.74$$

4872	35.472	0.000	
4957	33.922	1.550	45.16

$$\alpha\Delta = S - 17.74$$



DAO 156 HB

	λ	Comp	Δ (4872 - Comp)	$\alpha\Delta$	S	$\alpha\Delta - S$
λ_0 C	36.177		+0.535	13.55	± 0.00	13.55
B	37.562		-0.920	-26.80	-41.0	14.20
A	37.660		-1.018	-29.65	-43.0	13.35

$$\text{Mean } 4957 - 4872 = 1.553 \text{ mm}$$

4957	35.089
	(36.642)
4872	33.536

$$\text{Mean} = \frac{13.35 + 13.55}{2} = 13.45$$

$$\alpha\Delta = S + 13.45$$

$$\sim S + 13.5$$

DAO 157 HB

	λ	Comp	Δ (4872 - Comp)	$\alpha\Delta$	S	$\alpha\Delta - S$
λ_0 C	35.968		+0.476	13.87	0.0	13.87
B	37.351		-0.907	-26.42	-41.1	14.68
A	37.476		-1.032	-30.06	-43.6	13.54
4957	34.891		1.553	45.24		
4872	36.444					

$$M = 13 + \frac{.87 + .64}{2} = 13.71$$

$$\alpha\Delta = S + 13.7$$

DAO 141

	λ	Comp	Δ (Comp - 4872)	$\alpha\Delta$	S	$\alpha\Delta - S$
D	38.557		-0.888	-25.87	-7.6	-18.27
λ_0 C	38.835		-0.610	-17.77	0.0	-17.77
B	39.743		+0.298	8.68	+27.1	+17.42
A	39.966		+0.521	15.18	+33.3	-18.12
4872	39.445					
4957	40.999		1.554	45.27		

$$M_1 = -\frac{18.27 + 18.12}{2} = -18.20$$

$$M_2 = -\frac{17.77 + 17.42}{2} = -17.59$$

$$\text{Comp} = \frac{M_2 + 2M_1}{3} = -18.00$$

$$\alpha\Delta = S - 18.00$$

H β

DAO 150

Material from Blk I p 60

Correction $\Delta\lambda = 5 - 28.14$

(Blk II p 32)

 $\approx 5 - 28.1$

λ^{cm}	$\log r$	u	λ^{cm}	$\log r$	u
-38.1		-.002	-24.1	+1.52	-2050
37.6		-.002	23.6	.174	1995
37.1		-.080	23.1	.239	1945
36.6		-.007	22.6	.270	1890
36.1		-.011	22.1	.285	1805
35.6		-.024	21.6	.297	-1780
35.1		-.021	21.1	.314	-1725
34.6		-.033	20.6	.328	1670
34.1	-3150	-.038	-20.1	.368	-1615
33.6	3095	-.037	19.6	.409	1560
33.1	3040	-.024	19.1	.419	1505
32.6	2985	-.031	18.6	.478	1450
32.1	-2930	-.063	18.1	.543	1395
31.6	2880	-.095	17.6	⁵⁶¹ 553	-1345
31.1	2820	-.109	17.1	.515	1285
30.6	-2765	-.182	16.6	.537	1230
30.1	2710	-.242	-16.1	⁵⁸³ 575	1175
29.6	2665	-.286	15.6	⁵³⁷ 583	1120
-29.1	2600	-.347	15.1	.613	1065
28.6	2545	-.409	14.6	.619	1010
28.1	-2490	-.452	14.1	.644	-955
27.6	2435	-.419	13.6	.664	900
27.1	2380	-.404	-13.1	.677	845
26.6	2325	-.339	12.6	.692	785
26.1	2270	-.286	12.1	.704	730
25.6	2215	-.208	11.6	.713	675
-25.1	2160	-.016	-11.1	.732	620
24.6	-2105	+0.095	10.6	.747	-565

$$\Delta = 5 - 28.1$$

λ_{cm}	$\log r$	u	λ_{cm}	$\log r$	u
-10.1	+7.65	-505	+3.9	.580	1075
9.6	.774	450	4.4	.588	1130
9.1	.812	395	4.9	.589	1185
8.6	.812	335	5.4	.583	1240
8.1	.827	280	5.9	.554	1300
7.6	.849	220	6.4	.545	1350
7.1	.858	165	6.9	.512	1410
6.6	.879	110	7.4	.456	1465
-6.1	.882	55	7.9	.428	1520
5.6	.875	0	8.4	.390	1580
5.1	.871	55	8.9	.376	1630
4.6	.871	115	9.4	.344	1685
4.1	.858	170	9.9	.316	1740
3.6	.844	225	10.4	.299	1800
3.1	.839	280	10.9	.277	1855
2.6	.838	340	11.4	.250	1915
2.1	.810	395	11.9	.207	1970
1.6	.767	450	12.4	.145	2030
1.1	.752	505	12.9	+0.115	2090
0.6	.701	585	13.4	+0.028	2145
-0.1	.688	620	13.9	-0.039	2200
+0.4	.671	675	14.4	-0.042	2265
0.9	.644	725	14.9	-0.016	2320
1.4	.628	790	15.4	+0.065	2380
1.9	.610	850	15.9	+0.112	2440
2.4	.592	905	16.4	.145	2495
2.9	.567	960	16.9	.150	2555
+3.4	.571	1015	17.4	.155	2615
	.568		17.9	.162	2670

DAO
H β

253

Material from Rk I p 80

Correction $\Delta A = 5 - 6.54$ (Rk II p 32)
 $\sim 5. - 6.5$

$-\lambda_{\text{cm}}$	$\log r$	U	$\lambda_{\text{cm}}^{\text{cor}}$	$\log r$	U
-26.5	-0.043	-2310	-12.5	1.193	-775
26.0	+0.051	2255	12	1.191	-720
25.5	+0.066	2205	11.5	1.153	665
25.0	+0.051	2150	11	1.086	610
24.5	-0.006	2095	10.5	1.086	550
24	-0.023	2040	10	1.096	495
23.5	+0.035	1985	9.5	1.024	440
23	.061	1930	9	0.953	-380
-22.5	.192	1885	8.5	0.942	-325
22	.328	1825	-8.0	0.881	-265
21.5	.451	1770	7.5	0.874	-215
21	.680	1715	7	0.884	-155
20.5	.863	1660	6.5	0.905	-100
20.0	1.052	1605	6	0.936	-.45
19.5	1.274	1550	-5.5	1.004	+15
-19.0	1.396	1495	5	1.044	70
18.5	1.428	1440	4.5	1.054	125
18	1.392	1385	4	1.094	180
17.5	1.423	1330	3.5	1.091	240
17	1.406	1275	-3.0	1.104	295
-16.5	1.392	1220	-2.5	1.134	350
16.0	1.374	1165	-2	1.177	405
15.5	1.316	1110	-1.5	1.231	460
15.0	1.316	1055	-1	1.298	520
14.5	1.316	1000	-0.5	1.327	575
14.0	1.264	-945	0.0	1.378	635
13.5	1.234	-890	+0.5	1.357	690
-13.0	1.221	-830	+1.0	1.406	750
			+1.5	1.486	805

λ	$\log r$	U
+2	1.557	860
2.5	1.634	915
3	1.641	970
3.5	1.641	1030
4.	1.669	1085
4.5	1.641	1140
5	1.620	1200
5.5	1.620	1255
6	1.532	1310
6.5	1.298	1360
7.	1.058	1420
7.5	0.770	1475
8	0.470	1535
8.5	0.326	1590
9	0.215	1640
9.5	0.155	1700
10	0.057	1755
10.5	0.041	1810
11	0.062	1865
11.5	0.030	1925
12	0.057	1985
12.5	0.136	2040
13	0.163	2095
13.5	0.155	2155
14	0.215	2215
14.5	0.240	2275
15.0	0.171	2335
15.5	0.205	2390

38

H β

DAO 138

Material from 13h I p 90
 Correction 13h II p 32
 $\Delta = 5 - 18.0$

λ ^{cm}	$\log r$	U	λ ^{cm}	U $\log r$	$\log r$ U
-28.0	0.000	2480	-14.0	-945	.273
27.5	-0.032	2425	13.5	890	.290
27	-0.092	2370	13.0	835	.306
26.5	-0.146	2310	12.5	775	.319
26	-0.205	2255	12.0	720	.330
25.5	-0.191	2200	11.5	-665	.325
-25.0	-.155	2150	-11.0	610	.343
24.5	-.129	2095	10.5	550	.334
24	-.090	2040	10.0	495	.335
23.5	-.066	1985	9.5	440	.346
23	-.044	1935	9.0	380	.379
22.5	-.018	1880	8.5	325	.383
22	-.006	1825	-8.0	265	.389
21.5	+0.003	1770	7.5	210	.386
21	-.003	1715	7.0	-155	.381
20.5	-.004	1660	6.5	-100	.387
20	-.023	1605	6.0	45	.393
19.5	-.075	1550	5.5	15	.378
19	-.121	1495	-5.0	70	.368
18.5	-.170	1440	4.5	125	.370
-18.0	-.207	1385	4.0	180	.371
17.5	-.177	1330	3.5	240	.359
17	-.071	1275	-3.0	295	.354
16.5	+0.015	1220	-2.5	350	.346
16	+0.092	1165	-2.0	405	.341
15.5	+0.168	1100	-1.5	460	.331
-15.0	+0.220	1055	-1.0	520	.317
14.5	+0.258	1000	-0.5	570	.311

λ ^{cm}	u log r	$\log r$ u	λ ^{cm}	$\log r$	u
± 0.0	635	.303			
0.5	690	.300			
1.0	7 ⁴⁵	.292			
1.5	800	.291			
2.0	860	.263			
2.5	915	.255			
+3.0	975	.248			
3.5	1030	.239			
4.0	1085	.235			
4.5	1140	.228			
5.0	1195	.235			
5.5	1250	.222			
6.0	1310	.204			
6.5	1360	.180			
+7.0	1420	.150			
7.5	1480	.107			
8.0	1535	.047			
8.5	1590	.000			
9.0	1645	-.044			
9.5	1700	-.046			
10.0	1755	-.029			
10.5	1810	-.012			
11.0	1870	-.001			
11.5	1925	-.001			
+12.0	1985	-.005			

H β DAO 139

Material from Blk I r 94.

Correction, Blk II p 33

$$\Delta\Delta = 5-17.7$$

λ ^{cm}	$\log r$	U
-27.7	2445	+0.008
-27.2	2390	-.030
26.7	2335	-.095
26.2	2280	-.161
25.7	22 ²⁵ 22	-.192
25.2	2170	-.173
24.7	2115	-.132
24.2	2060	-.106
23.7	2010	-.080
23.2	1955	-.037
-22.7	1900	-.014
22.2	1840	-.002
21.7	1790	-.002
21.2	1735	+0.02
20.7	1680	+0.02
20.2	1625	-.004
19.7	15 ⁷ 15	-.020
19.2	1515	-.056
18.7	1460	-.102
18.2	1405	-.145
17.7	1355	-.174
17.2	1300	-.135
-16.7	1245	-.072
16.2	1185	+0.073
15.7	1130	+0.146
15.2	1075	+0.206
14.7	1020	248
14.2	965	+268

λ ^{cm}	$\log r$	U
-13.7	+301	-910
13.2	.315	855
12.7	.305	800
12.2	.305	-740
11.7	.317	685
11.2	.325	630
10.7	.325	585
10.2	.336	520
9.7	.358	460
9.2	.378	405
8.7	.382	350
8.2	.386	-290
7.7	.394	-235
7.2	.394	-180
6.7	.392	-120
6.2	.388	-265
5.7	.388	-10
5.2	.380	+45
4.7	.380	+100
4.2	.372	+160
-3.7	.362	+215
3.2	.362	+270
-2.7	.364	+330
-2.2	.348	385
-1.7	.338	440
-1.2	.325	495
-0.7	.327	550
-0.2	.334	+605

$$\Delta = 8 - 17.7$$

λ ^{nm}	$\log r$	u
+0.3	.326	670
+0.8	.299	725
+1.3	.297	780
+1.8	.289	840
2.3	.278	895
2.8	.261	950
3.3	.251	1005
3.8	.251	1060
4.3	.251	1120
4.8	.245	1175
5.3	.242	1230
5.8	.233	1290
6.3	.222	1340
6.8	.199	1395
7.3	.158	1455
7.8	.090	1510
8.3	.024	1565
8.8	-.043	1620
9.3	-.055	1675
9.8	-.050	1730
10.3	-.028	1790
10.8	-.006	1840 ⁵
11.3	-.003	1900
11.8	-.002	1960
12.3	-.004	2020
12.8		
13.3		
13.8		

H8 Material from Plate PA0 226
 Referred to λ 4118.56 as zero

Fe λ	Comp	ν	Δ (Comp - 4118)	2Δ	
3977.75	49.620	25140.0	-5.318	-156.66	
4005.25	50.729	24967.2	-4.269	-124.36	
4009.72	50.910	24939.4	-4.088	-119.08	
4021.87	51.386	24864.1	-3.612	-105.22	Range in ν :
4045.82	52.315	24716.9	-2.683	-78.16	1392.0
4071.75	53.289	24557.5	-1.709	-49.78	or
4076.64	53.476	24530.0	-1.522	-44.34	1169.2
4107.50	54.599	24345.7	-0.399	-11.62	
4109.81	54.685	24332.0	-0.313	-9.12	
$\lambda_0 \rightarrow$ 4118.56	54.998	24280.3 (28)	0.0	0.0	Range in 2Δ
4134.68	55.562	24185.7	+1.564	+16.42	-156 \rightarrow +82
λ_0 4143.65	55.878	24133.3	+0.880	+25.63	
4192.45	57.496	^{23858.1} 23846.7	+2.498	+72.77	
4202.03	57.838	23798.0	+2.840	+82.73	
A	53.520		-1.478	-43.05	
or B	53.172		-1.826	-53.19 X	
	53.672?		1.326?	-38.63?	
Comp	Δ	2Δ			
A	53.520	-1.478	-43.05		

$$v_0 = 24379.8 \quad H\delta \quad 4101.750$$

H δ

43

Scale	λ	$\frac{v_0}{v}$	$r = \frac{v_0}{v} - 1$	$u = vr$					
					-38	24494	99535	465	-1394
					37	24488	99559	441	1322
					36	24483	99579	421	1262
					35	24478	99600	400	1199
-64	24639	.989488	.01051	-3151	34	24472	99624	376	1127
-63	24633	.989729	.01026	-3076	33	24466	99648	352	1055
-62	24628	.989930	.01006	-3016	32	60	99673	327	980
-61	24622	.990171	.00982	-2944	31	55	99693	307	920
-60	24616	.990413	.00959	-2875	30	49	99718	282	845
59	24612	.990574	.00943	-2827	29	44	99738	262	785
58	24608	.990735	.00926	-2776	28	37	99767	233	698
57	24600	.99106	.00894	2680	27	32	99787	213	639
56	24595	.99126	.00874	2620	26	28	99804	196	588
55	24589	.99150	.00850	2548	25	22	99828	172	516
54	24584	.99170	.00830	2488	24	16	99853	147	441
53	24578	.99194	.00806	2416	23	10	99877	123	369
52	24572	.99219	.00781	2341	22	4	99902	098	294
51	24567	.99239	.00761	2281	21	24400	99918	82	245
50	24561	.99263	.00736	2209	20	24393	99947	53	-159
49	24556	.99283	.00717	2150	-19	24388	99967	33	-99
48	24550	.99308	.00692	2075	18	24382	99992	8	-24
47	24544	.99332	.00668	2003	17	24376	1.00016		+48
46	24539	.99352	.00648	1943	16	24371	1.00037		111
45	24533	.99376	.00624	1871	15	24365	1.00062		186
44	24528	.99397	.00603	1808	14	60	1.00082		246
43	24522	.99421	.00579	1736	13	54	1.00107		321
42	24516	.99445	.00555	1664	12	48	1.00131		393
41	24510	.99470	.00530	1589	11	43	1.00152		456
40	24506	.99486	.00514	1541	10	37	1.00177		531
39	24500	.99510	.00490	1469	-9	32	1.00197		591

44

H 8

He Material from Plate DAO 226
Referred to λ 3977.75 as zero

Scale	v	$r(\frac{v_0}{v} - 1)$	cr				
-8	24326	.00222	666	20	24166	.00886	2656
7	320	.00247	741	21	160	911	2731
6	314	.00271	812	22	154	936	2806
5	309	.00292	875	23	148	961	2881
4	304	.00313	938	24	143	.00982	2944
-3	298	.00337	1010	25	137	.01007	3019
-2	292	.00362	1085	26	131	.01032	3094
-1	287	.00383	1148	27	126	.01053	3157
0	280	.00412	1235				
+1	275	.00433	1298				
2	269	.00457	1370				
3	264	.00478	1433				
4	258	.00503	1508				
5	252	.00528	1583				
6	246	.553	1658				
7	240	.578	1733				
8	235	.598	1793				
9	229	.623	1868				
10	224	.644	1931				
11	218	.669	2006				
12	212	.694	2081				
13	206	.719	2156				
14	200	.744	2231				
15	24195	.765	2293				
16	189	.790	2368				
17	184	.810	2428				
18	178	.835	2503				
19	172	.860	2578				

$$He \quad \lambda = 3970.08$$

$$\nu_0 = 25188.4$$

45

He Material

Fe λ	\overline{Comp}	ν	$\overline{\Delta}$ ($\overline{Comp} - 3977$)	$\Delta\Delta$
3920.26	51.918	25508.5	-2.436 ✓	-70.96
3922.92	52.032	25491.2	-2.322 ✓	-67.64
3927.93	52.249	25458.7	-2.105 ✓	-61.32
3930.30	52.353	25443.4	-2.001 ✓	-58.29
3956.57	53.476	25274.4	-0.878	-25.58
3969.26	54.004	25193.6	-0.350	-10.20
(3977.75)	54.354	25139.8	0.000	0.00
3983.96	54.609	25100.7	+0.255	+7.43
3997.40	55.153	25016.3	+0.799	23.27
4005.25	55.462	24967.2	+1.108	32.28
4009.72	55.643	24939.4	+1.289	37.55
4021.87	56.123	24864.1	+1.769	51.53

$$\Delta\Delta = 644.4$$

$(\Delta\Delta - 3)$							
Valr 3933.66	C	3933.45	52.484	25423	-1.870	-54.47	-16.7 -37.77
3968.47	B		52.993		-1.361	-39.65	-1.5 -6.3 -37.35
	A		53.063		-1.291	-37.61	0.0 -37.61
3968.47	D	3968.25	53.957	25200	-0.397	-11.56	+26.1 37.66

$$\Delta\lambda = -215 \text{ \AA}$$

Lines C and D appear to be the interstellar calcium lines
(as marked on $\mu\phi$ 4709).

$$\text{Mean } (\Delta\Delta - 3) = -37.72 \quad \sim -37.7$$

$$\frac{-215}{3951} = \frac{\nu}{c}$$

$$\nu = -c \left(\frac{215}{3951} \right)$$

He material

$$v_0 = 25188.4$$

Δ scale	v	$\frac{v_0}{v}$	$(\frac{v_0}{v} - 1) = r$	cr	Δ scale	v	$\frac{v_0}{v}$	$(\frac{v_0}{v} - 1) = r$	cr
-80	25553	.98572	.01428	- 4281	17	25228	.99841	.00159	- 471
-70					14	213	.99901	.00099	- 297
-68					11	197	.99964	.00036	- 107
-66					-8	181		.00028	+ 84
-64					-5	166		.00087	+ 261
-70	25503	98765	.01235	3703	-2	150		.00151	+ 453
-67	25487	98827	.01173	3517	0	139		.00195	+ 585
-64	25472	98885	.01115	3343	+2	129		.00235	705
-60	457	98943	.01057	3169	+3	124		.00255	764
-58	441	99006	.00994	2980	+5	113		.00299	896
-55	426	99064	.00936	2806	8	097		.00363	1088
-53	418	99126	.00874	2620	11	082		.00423	1268
-49	395	99185	.00815	2443	14	066		.00487	1460
-46	379	99247	.00753	2257	+17	055	1.00551	.00531	1652 1592
-43	364	99306	.00694	2081	20	034		.00615	1844
-40	349	99365	.00635	1904	23	018		.00680	2039
-37	332	99432	.00568	1703	26	002		.00744	2231
-34	317	99490	.00510	1529	29	24985		.00812	2434
-31	301	99553	.00447	1340	32	970		.00878	+ 2617
-28	285	99616	.00384	1151	35	954		.00938	2812
-26	275	99656	.00344	1031	38	937		.01008	3019
-23	259	99719	.00281	842	41	921		.01071	3211
-20	244	99778	.00222	666	44	905		.01136	3406
					47	888		.01205	3613
					50	871		.01275	+ 3822
					53	855		.01340	4017
					56	838		.01409	4224
					59	822		.01474	+ 4419

u vs Δ for He

Scale Δ	u	Scale Δ	u	Scale Δ	u
		-49	-2445	-21	-725
		48	2385	20	665
-75	-3995	47	2320	19	605
74	3940	46	2260	18	540
73	3875	45	2200	17	480
72	-3815	44	2140	16	415
71	3760	43	2075	15	355
70	3700	42	-2015	14	290
69	3640	41	1955	13	230
68	3580	40	1890	12	-165
67	3515	39	1830	11	-105
66	-3465	38	1770	10	-45
65	3405	37	1710	9	+20
64	3345	36	1650	8	+80
63	3285	35	-1590	7	+145
62	3225	34	1525	6	205
61	3165	33	1465	5	265
60	-3105	32	1400	4	325
59	3045	31	1340	-3	390
58	2985	30	1280	-2	450
57	2925	29	1220	-1	520
56	2865	28	1155	0	585
55	2805	27	1095		
54	-2745	26	1035		
53	2685	25	970		
52	2625	24	910		
51	2565	23	850		
50	2505	22	790		

U vs αA for He

49

Scale αA	U	αA	U
±0	585	±28	2360
1	645	29	2420
2	710	30	2490
3	770	31	2555
4	835	32	2620
5	895	33	2685
6	960	34	2750
7	1020	35	2815
8	1085	36	2885
9	1145	37	2950
10	¹⁰ 1205	38	3015
11	1275	39	3080
12	1335	40	3150
13	1400	41	3215
14	1460	42	3285
15	1525	43	3350
16	1590	44	3415
17	1650	45	3480
18	1715	46	3550
19	1780	47	3620
20	1840	48	3690
21	1910	49	3755
22	1970	50	3820
23	2035	51	3890
24	2100	52	3955
25	2165	53	4025
26	2230	54	4090
27	2290	55	4155

H S Material

Referred to λ 3895.66

$Fc \lambda$	\overline{Comp}	ν	$+ (\overline{Comp} - 3895)$	Δ
3849.97	56.384	25974.2	-2.104 896	-61.29
3856.37	56.686	25931.1	-1.802	-52.49
3859.91	56.856	25907.3	-1.632	-47.32
3865.53	57.110	25869.3	-1.378	-40.14
3872.51	57.434	25823.0	-1.054	-30.70
D 3878.30	57.702	25784.5	-0.786	-22.96
→ 3895.66	58.488	25669.6	0.000	0.00 $\Delta \nu = 531$
3902.95	58.815	25621.6	+0.327	+9.53 $\Delta(\Delta \nu) = 115$
3906.48	58.974	25598.5	+0.486	+14.16
3918.86	59.506	25517.6	+1.018	+29.65
3922.92	59.697	25491.2	+1.209	+35.22
3927.93	59.912	25458.7	+1.424	+41.48
3930.30	60.018	25443.3	+1.530	+44.57
m A	57.167		-1.321	-38.48
B) 59.2	59.175		+ .687	+20.01 - 59.2 = -39.19

$$\begin{array}{r}
 -38.48 \\
 -39.19 \\
 \hline
 17.67 \\
 -38.83 \sim -38.8
 \end{array}$$

~~2.2~~

$H\beta = 3889.05$

$v_0 = 25713.2$

51

Δ	v	$\frac{v_0}{v}$	Δ	v		Δ	$\frac{v_0-1}{v^2}$	$c(\frac{v_0}{v}-1)$
			28	25528		+10	.00363	1088
			30	517		+13	.00422	1265
			35	492		15	.00461	1382
			40	466		20	.00563	1688
-66	25997	.98908	43	456		25	.00666	1997
65	25992	98927	45	439		28	.00725	2174
63	782	.98965	48	424		30	.00768	2302
59	962	.99041	50	413		35	.00867	2599
55	943	99113	<hr/>			40	.00970	2908
50	918	99209		$\frac{v_0-1}{v}$	$c(\frac{v_0}{v}-1)$	43	.01033	3097
45	893	99305	-66	.01092	-3274	45	.01077	3229
40	869	99397	65	.01073	-3217	48	.01137	3409
35	844	99493	63	.01035	-3103	50	.01180	3538
30	820	99586	59	.00959	-2875			
25	25795	99682	55	.00887	2659			
20	770	99779	50	.00791	2371			
18	760	99818	45	.00695	2084			
12	745	99876	40	.00603	1808			
-15	721	99969	35	.00506	1517			
-10	671		30	.00414	1241			
-5	25696		25	.00318	-953			
+0	645		20	.00221	-663			
+5	620		18	.00182	-546			
10	605		15	.00124	-372			
13	25595		10	.00031	-93			
15	569		-5	.00066	+198			
20	543		0	.00164	+492			
25			5	.00265	+794			

u vs Δ for H I

Δ	u	Δ	u	Δ	u
		49	2315	-21	725
		48	2260	20	665
		47	2205	19	610
		46	2145	18	550
		45	2090	17	-495
		44	2035	16	-440
		43	1980	15	-380
		42	1920	14	-325
		41	1865	13	-270
		40	1805	12	-210
		39	1750	11	-150
		38	1695	10	-90
		37	1635	9	-35
		36	1580	8	+25
		35	1525	7	+80
		34	1465	6	+140
		33	1410	-5	+200
		32	1355	-4	+255
		31	1295	-3	+310
		30	1240	-2	+370
		29	1180	-1	+430
		28	1125		
		27	1070		
		26	1010		
		25	955		
		24	895		
		23	840		
		22	780		
-69	-3440				
-68	3385				
67	3330				
66	3275				
65	3220				
64	3160				
63	3105				
62	3050				
61	2990				
60	2935				
59	2880				
58	2825				
57	2770				
56	2710				
55	2655				
54	2600				
53	2540				
52	2485				
51	2430				
50	2370				

U to A for H⁵

53

λA									
0	+495		28	2175					
1	+555		29	2235					
2	610		30	2295					
3	670		31	2345					
4	730		32	2415					
5	790		33	2480					
6	850		34	2540					
7	910		35	2605					
8	965		36	2665					
9	1025		37	2725					
10	1085		38	2785					
11	1145		39	2850					
12	1205		40	2910					
13	1265		41	2970					
14	1325		42	3035					
15	1385		43	3095					
16	1445		44	3155					
17	1505		45	3220					
18	1565		46	3280					
19	1630		47	3345					
20	1690		48	3410					
21	1750		49	3470					
22	1810		50	3535					
23	1870		51						
24	1930		52						
25	1995		53						
26	2045		54						
27	2115		55						

$$\alpha = 29.13$$

DAO 142			
HP	λ	Comp	Δ
B	51.656	-0.633	-18.43
4872	52.289	—	—
C	52.575	+0.286	+8.338
Comp - 4872			
HY B	39.701	+0.120	+3.50
A	40.916	+1.335	+38.89
4325	39.581	—	—
HS A	33.743	+0.835	+24.32
4118	32.908	—	—

He A	28.131	+0.384	-11.19
B (inter Cu)	25.649	-2.866	-83.49
3977	28.515	—	—

DAO 144			
HY	λ	Comp	Δ
A	36.825	+1.480	43.11
B	36.690	+1.345	3.92
4325	35.345	0.00	—
D	34.682	-0.663	19.31
HS A	29.506	+0.842	24.53
4118	28.664	0.00	—
C	26.414	-2.250	65.54
He A	22.883	Ca II	11.91
3977	23.292	Ca II	0.0
B	21.415	-1.877	54.68

DAO 143			
HY	λ	Comp	Δ
A	29.502	+1.348	3.93
B	30.731	+0.189	3.47
C	31.496	-0.646	-18.82
4325	30.850	—	—
Comp - 4118			
HS A	36.675	+0.859	25.02
(B)	37.362	(+0.172)	5.01
4118	37.534	—	—

Other lines too ft.

DAO 150			
HY	λ	Comp	Δ
C	46.402	+3.291	95.87
A	44.420	+1.309	38.13
B	43.198	+0.087	25.34
4325	43.111	0.0	—
D	42.597	-0.514	14.97
HS A	35.667	-0.778	22.66
C	34.722	-1.723	50.19
4118	36.445	0.0	—
Ca II?	He A	30.674	-0.391
	B	29.505	-1.560
Ca II?	C	29.192	1.873
3977	31.065	0.0	—

0

3

17

22

5.02 5'

5.01

4

6

DAO 142
H γ Use $I' = 24.0$

wave	n	u_0	u/u_0	$\log 5$	u'	u'/u_0	$\log I'$	I	I'
2630 -20	28.5	53.3	53.5	1.400	26.1	.490	1.340	25.12	21.88
2555 19	27.1		50.9	1.364				23.12	
2465 18	26.7		53.9	1.404				25.35	
2385 17	28.6		53.7	1.402				25.23	
	26.5		49.8	1.350				22.39	
2311 16	23.3		43.8	1.270				18.62	
	21.0		39.4	1.212				16.29	
2235 15	21.0		39.4	1.212	26.2	.491	1.341	16.29	21.93
	21.4		40.2	1.223				16.71	
2145 14	22.1		41.5	1.240				17.38	
	24.0		45.1	1.288				19.41	
2080 13	26.6		50.0	1.352				22.49	
	27.2		51.1	1.367				23.28	
2005 12	28.0		52.5	1.385				24.27	
	29.7		55.8	1.430				26.92	
1915 11	30.5		57.3	1.451				28.25	
	31.2		58.5	1.467				29.01	
1840 10	34.0		58.2	1.463	26.3	.494	1.345	29.04	22.13
	36.1							24.95	
1750 9	28.4		53.3	1.397					
1670 8	27.5		51.6	1.374				23.66	
1590 7	29.0		50.6	1.361				22.96	
1514 6	26.1	53.4	.490	1.340				21.88	
1435 5	27.0		.506	1.361	26.4	.495	1.346	22.96	22.18
	30.0		.561	1.434				27.16	
1360 4	33.0		.618	1.511				32.43	
1270 3	34.6		.630	1.529				33.81	
1195 2	36.0		.675	1.594				39.26	
1105 1	37.4		.701	1.634				43.05	
1010 0	38.0		.712	1.653	26.5	.496	1.347	44.98	22.23
935 1	38.4		.710	1.668				46.56	
855 2	38.2		.716	1.660				45.71	
765 3	37.0		.694	1.623				41.98	
	36.5		.720	1.668				46.56	
690 4	38.4		.720	1.668					
610 5	40.8		.764	1.748	26.6	.498	1.350	55.98	22.39
535 6	42.0		.786	1.792				61.94	
440 7	42.4		.795	1.815				65.31	
7.5	42.7		.806	1.827				67.14	

							I	U
8	42.1 41.8	53.5	.786	1.772			61.94	350
9	42.0		.784	1.788			61.38	275
10	42.5		.795	1.815	26.7	499	1.351	65.31 22.44 195
11	43.3		.810	1.852			71.12	105
12	44.1		.825	1.891			77.80	25
13	43.7		.817	1.870			74.13	50
14	44.2		.826	1.894			78.34	145
15	43.5 41.8		.814 .781	1.862 1.782	26.8	.501	1.353	72.78 22.54 220 60.53 300
17	40.0		.748	1.716			52.00	390
18	40.6		.760	1.740			54.95	485
19	40.8		.763	1.746			55.72	590
20	40.7		.761	1.742	26.9	.503	1.357	55.21 22.75 650
21	40.5		.758	1.736			54.45	730
22	38.0 37.2	53.6	.709	1.647			44.36	810
23	37.6		.701	1.634			43.05	900
24	39.6		.739	1.699			50.00	
25	39.3		.733	1.689	27.0	.504	1.358	48.87 22.80
26	39.2		.731	1.686			48.53	
27	39.1		.730	1.684			48.31	
28	39.0		.728	1.680			47.86	
29	37.1		.692	1.620			41.69	
30	33.6		.626	1.522	27.1	.506	1.361	33.27 22.96
31	32.8		.612	1.503			31.84	
32	33.0		.615	1.507			32.14	
33	34.2		.638	1.539			34.59	
34	35.1		.654	1.561			36.39	
35	35.1	53.7	.654	1.561	27.2	.508	1.363	36.39 23.07

DAO 142
H γ

			Log I						
36	33.8	³⁰ 670	1.529				33.81		
37	33.3	.620	1.513				32.58		
	31.1								
38	28.2	.525	1.520				33.11		
	25.1								
39	23.0	.428	1.257				18.07		
	25.0								
40	28.0	.521	1.381	27.2	.508	1.363	24.04	23.07	
	30.3								
41	30.8	.574	1.452				28.31		
42	30.0	.558	1.430				26.92		
43	26.9	.501	1.354				22.59		
44	28.5	.630	1.529	27.4	.510	1.365	33.81	23.17	

DA 0 142
H 8

59

	u	u ₀			u ₁			I	I'
-57	22.0	52.8			22.0	.416	1.241	I	17.42
54	21.0		.398	1217				16.48	
55	20.6								
54	20.1		.380	1.193				15.60	
53	20.0								
52	19.0								
52	15.5		.293	1.076	22.1	.418	1.244	11.91	
51	12.0								
51	8.7								
50	8.2								
50	8.7		.165	.865				7.33	
49	10.5								
48	13.8		.261	1.031				10.74	
48			.758	.808					
47	17.6								
46	20.1		.388	1.193	22.2	.420	1.246	15.60	
45	21.0								
44	21.2								
44	20.7		.392	1.209				16.18	
44				1.075					
43	19.0								
42	18.2		345	1.149				14.09	
	16.0				22.3	.422	1.248	17.70	
	15.3								
40	15.8		.299	1.086				12.19	
39	19.7								
38	23.4		.460	1.300				19.95	
37	27.7								
36	29.0		.549	1.419				26.24	
35	29.1				22.4	.424	1.251		
34	29.3		.555	1.426				26.67	
33	29.8								
32	29.3		.555	1.426				26.67	
31	29.2								
30	30.1		.570	1.447				27.99	
29	31.3				22.5	.426	1.254	17.95	

28	32.7	.626	1.513				32.58	
27	33.2							
26	34.1	.645	1.550				35.48	
25	35.0							
24	35.8	.678	1.599	22.6	.428	1.257	39.72	18.07
23	36.0	52.9						
22	36.6	.674	1.592				39.08	
21	36.0							
20	36.2	.685	1.610				40.74	
19	35.9							
18	35.9	.680	1.602	22.7	.430	1.260	39.99	
17	36.3							
16	37.0	.700	1.632				42.85	
15	36.6							
14	36.9	.699	1.630				42.66	
13	36.1			22.8	.432	1.263		
12	34.2	.648	1.555				35.89	
11	34.9							
10	35.0	.663	1.575				37.58	
9	35.1							
8	33.6	.636	1.536	22.9	.434	1.266	34.36	
7	33.2							
6	33.1	53.0	.626	1.522			33.27	
5	33.4							
4	33.5	.635	1.534				34.20	
3	33.8							
2	33.8	.640	1.542	23.0	.435	1.268	34.83	18.54
1	33.7							
0	33.4	.633	1.532				34.04	

1	33.6	1016						
2	32.6	.616	1.508	23.1	.437	1.270	32.21	
3	32.0	.605						
4	30.1	.569	1.446				27.93	
5	30.0	.568						
6	30.0	.567	1.443				27.73	
7	29.3	.554		23.2	.439	1.271		
8	30.0	.567	1.443				27.73	
9	29.1	.550						
10	28.2	53.1	.552	1.422			26.42	
11	28.2	53.4						
12	26.7	.505	1.360				22.91	
13	27.1	.513		23.3	.441	1.274		18.79
14	27.4	.518	1.377				23.82	
15	26.6	.512						
16	26.2	.495	1.346				22.18	
17	26.0	.511		23.4	.443	1.277		
18	25.2	.472	1.316				20.70	
19	25.4	.480						
20	25.5	.482	1.328				21.28	
21	24.8	.469						
22	23.2	.439	1.271	23.5	.445	1.280	18.66	
23	22.0 21.5	.407						
24	18.0 17.1	.340	1.142				13.87	
25	19.3 21.2	.346						
26	23.0 24.0	.435	1.268				18.54	
27	24.0			23.6	.446	1.281		19.10
28	23.3	.440	1.272				18.71	

Scale	u	u_0	u/u_0	$\log I$	u'	u'/u_0	$\log I'$	I		
-80	24.2	52.7	459	1.300	18.5			19.95	652	52
79	23.6		448	1.284	18.6			19.23	628	51
78	22.3		423	1.250	18.7			17.78	580	50
	21.0									
77	18.2		345	1.149	18.8			14.09	460	4
	15.0									
76	13.0		246	1.006	18.9			10.14	331	48
	12.2		231	982				9.59	313	4
75	12.2		231	982				9.59	313	4
	12.2		231	982				9.59	313	4
74	12.0		228	976				9.46	309	46
73	11.2		212	952				8.95	292	4
72	14.0		265	1.035	19.0			10.84	354	44
71	15.0		284	1.063				11.56	378	4
70	16.0		303	1.091				12.33	403	42
69	16.6		315	1.108	19.1			12.82	419	41
68	14.7		279	1.056				11.38	372	40
67	13.8		262	1.032	19.2			10.76	351	3
66	11.6		220	964				9.20	301	38
65	9.0		171	872				9.45	243	7
64	7.2		136	803	19.3			6.35	207	36
63	6.1		116	760				5.75	188	33
62	7.0		133	797	19.4			6.27	205	34
	9.5									
61	12.1 9.5		229	978				9.51	391	3
60	16.4 16.4		311	1.102	19.5			12.65	403	32
	20.0									
59	16.4		379	1.192				15.56	568	3
	21.3									
58	20.0		404	1.226	19.6			16.83	550	30
	21.8									
57	21.3 21.3		414	1.239				17.34	566	28
	23.9									
56	24.8 24.8		438	1.270	19.7			18.62	668	28
	24.0									
55	23.0 23.0				19.7					2
54	25.2		478	1.324				21.09	689	26
53	25.9				19.8					24

							I		
52	27.2	52.7	515	1.373	19.9		23.60	170	24
51	27.9		5						
50	28.4		539	1.404	20.0		25.35	828	22
49	29.0								
48	28.7		545	1.413			25.88	845	20
47	28.2								
46	29.0		550	1.420	20.1		26.20	860	18
45	29.6								
44	30.2		572	1.449			28.12	918	16
43	31.0								
42	30.3		575	1.453	20.2		28.38	925	14
41	30.0								
40	29.3		555	1.426	20.3		26.67	871	12
39	31.7								
38	31.7		582 ⁶⁰⁰	1.486			(3062)	1.00	10
37	31.6				20.4				
36	31.6		599	1.485			30.55	997	8
35	31.1				20.5				
34	31.2		591	1.474			29.79	973	6
33	31.2		591	1.474	20.6		29.79	973	5
32	(-)				20.7				4
31	30.5		578	1.457			28.64	936	3
30	30.0		569	1.446	20.8		27.93	912	2
29	29.0								
28	30.0		569	1.446	20.9		27.93	912	0
27	29.0								
26	29.3		555	1.426			26.67	872	2
25	28.7				21.0				
24	28.7		544	1.411			25.76	840	4

								I		
23	28.2	52.7								
22	28.2	535	1.400					25.12	820	6
21	28.1									
20	27.0 26.3	512	1.368	21.1				23.12	755	8
19	26.7									
18	25.2 26.7	535	1.400					25.12	820	10
17	25.7 28.1									
16	25.7 28.7	523	1.383					24.15	788	12
15	25.7 27.6			21.2						
14	26.0 26.5	493	1.344					22.08	722	14
13	25.9									
12	25.7 23.4	444	1.278					18.97	619	16
11	22.0 23.0	417	1.242					17.46	570	
10	24.3 24.6	436	1.269					18.58	606	
9	23.1 24.3	460	1.300					19.95	651	
8	22.5	466	1.307					20.28	662	18
7	22.5	438	1.270					18.62	609	
6	21.2	427	1.255	21.3				17.99	588	20
5	21.5	402	1.223					16.71	546	
4	21.5	408	1.232					17.06	557	22
3	22.2	421	1.247					17.66	576	
2	21.3	404	1.226					16.83	558	24
1	ε									
0										
-1										
-2										
-3										
-4										
-5										

DAO 143

M 9 4734

Cune α

65

H γ

↓

			λ_{uo}	$\log I$		$\log I'$	I	I'		\bar{v}	
-18	27.7	49.2	.563	1.437	27.7	.563	1.437	27.35	27.35	1.00	23230
17	28.4		.577	1.456				28.58	45	1.04	224
16	25.6		.520	1.380	27.8	.565	1.440	23.99	27.54	.871	218
	23.0		.468	1.310				20.42		.743	5
15	20.2		.410	1.234				17.14		.626	212
	20.2		.410	1.234				17.14			8
14	21.8		.443	1.277	27.9	.567	1.443	18.92	27.73	.619	205
										.681	
13	24.6		.500	1.352				22.19		.808	200
	26.2		.532	1.396				24.89		.891	
12	27.7		.567	1.443	28.0	.569	1.446	27.73	27.93	.991	194
	28.6		.581	1.461				28.91		1.035	
11	29.7		.604	1.492	29.1	.570	1.447	31.05	27.99		1.87
10	30.7		.624	1.519				33.04	28.12		
9	29.7		.604	1.492	28.2	.573	1.451	31.05	28.25		
	28.4		.577	1.456				28.58		.28	
8	27.6		.561	1.434				27.16		.31	
	27.8		.565	1.440				27.54		.34	
7	29.2		.553	1.424	28.3	.575	1.453	26.55	28.38		
6	27.0		.549	1.419				26.24	44		
5	27.7		.563	1.437	29.4	.579	1.455	27.35	28.51		
-4	30.7		.624	1.519	28.5	.579	1.459	33.04	28.77		
-3	33.2		.675	1.544				39.26	28.77		
	34.1		.693	1.622				41.88	28.84		
-2	35.7		.725	1.675	28.6	.581	1.461	47.32	28.91		
-1	37.2		.756	1.732				53.95	29.07		
0	38.0		.772	1.764	28.7	.584	1.466	58.08	29.24		
+1	38.0		.772	1.764	28.8	.585	1.467	58.08	29.31		
2	38.8		.789	1.800				63.10	37		
3	37.5		.762	1.744	29.9	.587	1.469	55.46	29.44		
4	37.0		.752	1.724				52.97	54		
5	40.0		.814	1.862	29.0	.589	1.472	72.78	29.65		
6	40.8		.829	1.903	29.1	.591	1.474	79.98	29.79		
7	41.3		.839	1.932				85.51	59		
8	42.0		.854	1.977	29.2	.593	1.477	94.84	29.99		
9	41.2		.837	1.926				84.33	70.10		

66

H8

DA0 143



			λ_{uo}		λ_{uo}	$\log I$	$\log I'$		
10	41.8	49.2	.850		.595	1.965	1.480	92.26	30.20
11	42.4		.861	29.3		2.003		100.7	30.25
12	42.8		.870			2.030		107.2	30
13	43.0		.874	29.4	.597	2.044	1.482	110.7	30.34
14	43.1		.875			2.047		111.4	41
15	42.7		.868			2.024		105.7	48
16	42.3		.859	29.5	.600	1.996	1.486	99.08	30.62
17	40.1		.815			1.865		73.28	64
18	40.4		.821			1.881		76.03	66
19	40.7		.827	29.6	.601	1.897	1.487	78.89	30.69
20	40.7		.827			1.897		78.89	76
21	41.0		.834			1.917		82.60	83
22	39.3		.799	29.7	.603	1.825	1.490	66.83	30.90
23	38.1		.774			1.768		58.61	97
24	39.7		.807			1.845		69.98	124
25	39.8		.809	29.8	.605	1.850	1.493	70.79	31.12
26	39.8		.809			1.850		70.79	21 19
27	40.0		.813			1.860		72.44	21 26
28	39.2		.796	29.9	.607	1.817	1.496	65.61	31.33
29	38.8		.789			1.800		63.10	31.48
30	37.8		.768			1.756		57.02	21.55
30.3	36.4		.740	30.0	.610	1.701	1.500	50.23	31.62
	35.3		.717			1.662		45.92	21.66
31	35.0		.710			1.649		44.57	31.70
32	35.0		.710	30.1	.611	1.649	1.502	44.57	31.77
33	36.2		.735			1.692		49.20	31.82
34	36.8		.747			1.714		51.76	21.87
35	32.3		.656	30.2	.613	1.564	1.504	36.64	31.92
36	31.7		.644			1.548		35.32	22.07
37	31.0		.630	30.3	.616	1.529	1.508	33.81	32.21

H8

67

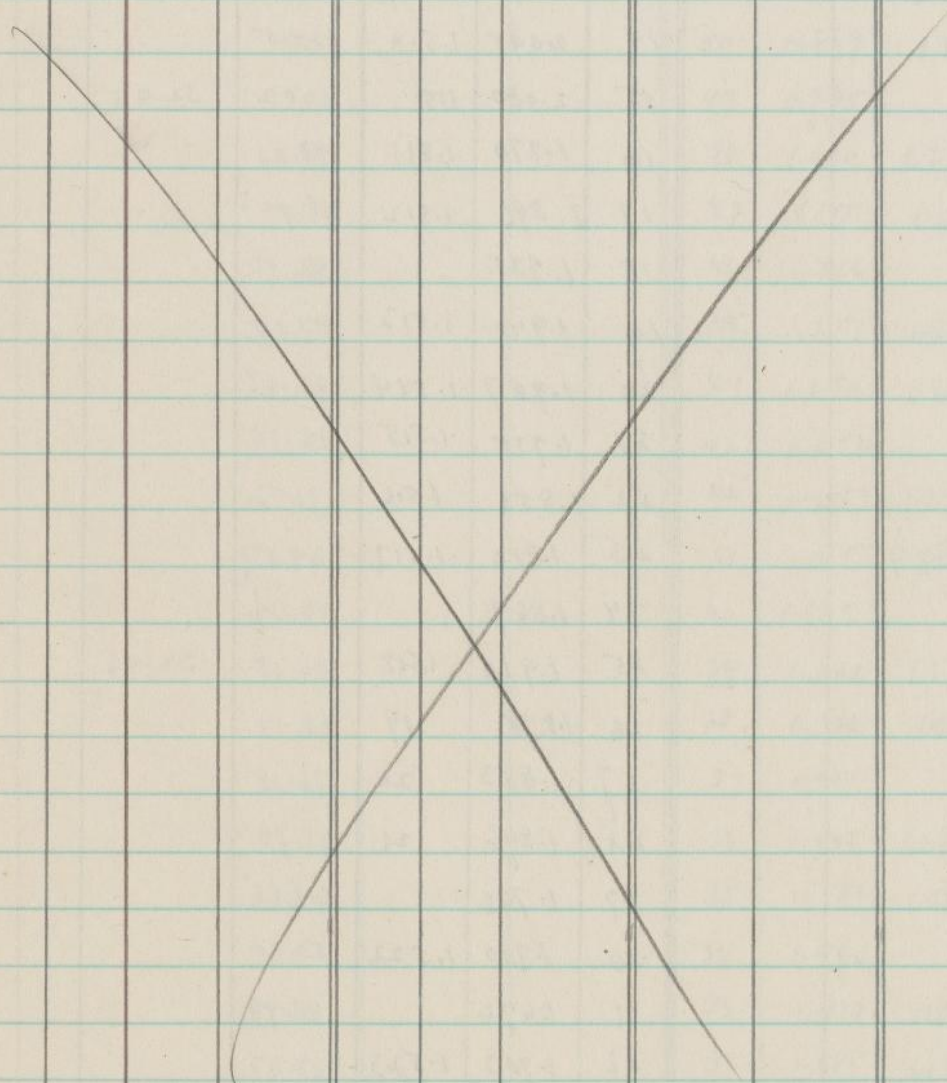
✓

				$\log I$			$\log I'$	I	
38	33.0	49.2	.676	1.586	30.4	.618	1.511	38.55	32.43
39	27.0		.549	1.419				26.24	32.50
40	29.5		.600	1.486	30.5	.620	1.513	30.62	32.58
41	32.2		.675	1.594				39.26	32.66
42	33.9		.689	1.616				41.30	32.74
43	30.3		.615	1.507	30.6	.622	1.516	32.14	32.81

	u	u ₀	$\frac{u}{u_0}$	Log I				I	
-55	9.3	48.9			10.0	205	0.940 205	8.71	
4	9.8		.200	0.930				8.51	
3	9.8				10.1	207			
2	8.3		.170	0.875	10.2	209		7.50	
1	7.2								
	4.4		.090	0.616				4.97	
-50	3.2		.065	0.630	10.3	211		4.27	
	2.7		.055	0.578				3.78	
9	2.8		.057	0.584	10.4	213		3.84	
8	3.7		.077	0.661				4.58	
	4.5		.092	0.702				5.04	
7	5.8		.119	0.767	10.5	215		5.85	
6	8.0		.164	0.863	10.6	217		7.30	
-45	9.2		.188	0.908				8.09	
4	10.0		.205	0.940	10.7	219		8.71	
	10.2								
3	9.8		.200	.930	10.8	221		8.51	
2	8.8		.180	.894				7.83	
1	7.1		.145	.812	10.9	223		6.64	
-40	7.4		.151	.835				6.84	
	6.3		.129	.789				6.15	
9	5.7		.117	.762	11.0	225		5.78	
	7.0		.143	.818				6.58	
8	2.15		.186	.905	11.1	227		8.04	
	11.6		.225	.971				9.35	
7	12.7		.260	1.030				10.72	
	15.0								
6	16.0		.327	1.121	11.2	229		13.21	
-35	17.8		.364	1.174	11.3	231	.982	9.59	
4	17.3		.354	1.161				14.49	
3	17.7		.362	1.171	11.4	233			
2	17.8		.364	1.174	11.5	235		14.93	
1	17.2			+					
-30	17.9		.366	1.176	11.6	237		15.00	
9	18.5								
8	19.9		.407	1.230	11.7	239		16.98	

							I	
7	21.3	48.9		11.7				
6	20.9							
	21.4	.437	1.270	11.8	241		18.62	
-2.5	22.4							
4	24.1	.493	1.344	11.9	243		22.08	
3	24.1			12.0	246			
2	25.3	.518	1.377				23.82	
1	24.9			12.1	248			
20	24.8	.507	1.362	12.2	250		23.01	
9	24.8							
8	24.8	.507	1.362	12.3	252		23.01	
7	24.3							
6	25.2	.515	1.373	12.4	254		23.60	
-1.5	26.1			12.5	256	1.022		10.52
4	25.8	.528	1.390				24.55	
3	26.0			12.6	258			
2	25.7	.525	1.385	12.7	260		24.27	
1	24.7							
-10	23.8	.487	1.335	12.8	262		21.63	
9	24.0			12.9	264			
8	24.7	.505	1.360				22.91	
7	23.1			13.0	266			
6	23.1	.472	1.316	13.1	268		20.70	
5	22.8							
4	23.6	.483	1.328	13.2	270	1.041	21.28	10.99
3	24.0							
2	23.7	.485	1.332	13.3	272		21.48	
1	23.9							
0	23.9	.489	1.331	13.4	274		21.43	

		$\frac{V}{c}$	$\frac{V}{c}$				I	
+1	22.9				13.5	276		
2	22.1	.452	.452	1.289	13.6	278	19.45	
3	22.3							
4	21.3		.436	1.269	13.7	280	18.58	
+5	19.4							
6	19.2 20.3		.415	1.240	13.8	.282	17.38	
7	21.0							
8	20.8		.425	1.252	13.9	.284	17.86	
9	20.4				14.0	.286		
10	19.5		.399	1.219			16.56	
1	18.7				14.1	.288		
2	19.2		.492	1.209			16.18	
3	18.9				14.2	.290		
4	18.1		.370	1.180			15.14	
15	18.3				14.3	.292	1.075	11.89
6	17.7		.362	1.171			14.83	
7	18.0				14.4	.295		
8	17.2		.352	1.158			14.39	
9	17.5				14.5	.296		
20	17.8		.364	1.174			14.93	
1	17.3				14.6	.299		
2	17.0		.348	1.153			14.22	
3	14.8				14.7	.301		
4	14.0		.286	1.065			11.61	
25	10.1				14.8	.303		
6	12.9		.264	1.034			10.81	
7	15.1				14.9	.305		
28	16.8		.344	1.148			14.06	
29	15.1							
30	14.8		.303	1.091	14.9	.305	1.093	12.33 12.39



Scale	log I	log I'	I log r	I' u	Scale	log I	log I'	I log r	u
-18	1.562	1.484	36.48	30.48	16	2.040	1.506	109.6	
17	1.534		34.20		11	2.090	1.507	123.0	
16	1.509		32.28		12	2.090	1.508	123.0	
	1.408		25.59		13	2.095	1.509	124.5	
15	1.375	1.486	23.71	30.62	14	2.095	1.510	124.5	
	1.360		22.91		15	2.080	1.5	120.2	32.40
14	1.384		24.21		16	1.970	1.511	93.32	
13	1.484		30.48		17	1.896	1.512	78.70	
12	1.549		35.40		18	1.935		86.10	
11	1.577	1.487	37.76		19	1.940	1.513	87.10	
10	1.584		38.37		20	1.967	1.514	92.68	
9	1.577		37.76		21	1.935	1.515	86.10	
8	1.524	1.488	33.42		22	1.852	1.516	71.12	
7	1.524	1.489	33.42		23	1.810	1.517	64.57	
6	1.499	1.490	31.55		24	1.867		73.62	
5	1.534	1.491	34.20	30.97	25	1.920	1.518	83.18	32.96
4	1.659	1.491	45.60		26	1.878	1.519	75.51	
-3	1.716	1.492	52.00		27	1.883	2.0	76.38	
-2	1.790	1.492	61.66		28	1.896	2.1	78.70	
-1	1.800	1.493	63.10		29	1.790		66.66	
0	1.860		72.44		30	1.700	1.522	50.12	
+1	1.860	1.494	72.44		31	1.672		46.99	
2	1.873	1.495	74.64		32	1.703	1.523	50.47	
3	1.800	1.496	63.10		33	1.734	1.524	54.20	
4	1.845	1.497	69.98		34	1.752	1.525	56.49	
5	1.965	1.499	92.26	31.55	35	1.750	1.526	56.23	33.57
6	1.985	1.500	96.61		36	1.720	1.526	52.48	
7	2.020	1.502	104.7		37	1.660	1.527	45.71	
8	2.020	1.503	104.7		38	1.619		41.59	
9	2.000	1.505	106.0						

DA 0 144 H8

H8

144

73

										I	I'
38			I		Scale	log I	log I'	log R	U		
38	1.521	1.528	33.19		-54	1.264	1.269	18.37	18.58		
	1.418		26.18								
39	1.423		26.49		53	1.229	1.270				
40	1.549	1.529	35.40	33.81	52	1.163		14.55			
					51	0.992	1.271				
					50	0.889	1.272	7.75			
					49	0.945					
						976					
					48	1.030	1.273	10.72			
					47	1.145	1.274				
					46	1.226		16.83			
					45	1.252	1.275				
					44	1.252	1.276	17.86			
					43	1.252					
					42	1.203	1.277	15.96			
					41	1.165	1.278				
					40	1.120		13.18			
					39	1.200	1.279				
					38	1.306	1.280	20.23			
					37	1.409					
					36	1.456	1.281	28.58			
					35	1.482	1.282				
					34	1.490		30.90			
					33	1.480	1.283				
					32	1.484	1.284	30.48			
					31	1.466					
					30	1.496	1.285	31.33	19.28		
					29	1.529	1.286				
					28	1.550		35.48			
					27	1.560	1.287				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

	$\log I$	I									
-50	1.274	1.092	19.01			23	1.368		23.33		
49	1.217	1.197	16.48			22	1.372	1.156	23.55		
48	1.145 1.064	1.202	13.96 11.59			21	1.405		25.41		
47	1.008	1.207	10.19			20	1.420	1.157	26.30		
46	1.000	1.212	10.00			19	1.390	1.158	24.55		
45	.955	1.214	9.02			18	1.410	1.160	25.70		
44	.940	1.217	9.77			17	1.414	1.161	25.94		
43	1.040	1.220	10.96			16	1.422	1.162	26.42		
42	1.098	1.225	12.53			15	1.433	1.164	27.10		
41	1.098	1.230	12.53			14	1.450	1.165	28.18		
40	1.064	1.132	11.59			13	1.459	1.167	28.77		
39	1.012	1.134	10.28			12	1.420	1.168	26.30		Ca II
38	.970	1.135	9.33			11	1.475	1.169	29.85		
37	.912	1.136	8.17			10	1.496	1.170	31.33		
36	.852	1.138	7.11			9	1.480	1.171	30.20		
35	0.817	1.139	6.56			8	1.450	1.172	30.20		
34	.725	1.140	5.01			7	1.480 1.480	1.174	30.20		
33	0.888	1.141	7.73			6	1.470	1.175	29.51		
32	1.040	1.143	10.96			5	1.454	1.176	28.44		
31	1.175	1.144	14.96			4	1.450	1.177	28.18		
30	1.205	1.145	16.03			3	1.446	1.178	27.93		
29	1.217	1.146	16.48			2	1.431	1.179	26.98		
28	1.244	1.148	17.54			1	1.407	1.180	25.53		
27	1.297	1.149	19.82			0	1.444	1.181	27.80		
26	1.308	1.152	20.22			1	1.431	1.183	26.98		
25	1.345	1.153	22.13			2	1.400	1.185	25.12		
24	1.388	1.155	24.43			3	1.420	1.187	26.30		
						4	1.440	1.189	27.54		

76

He 144

5	1.420	1.190	26.30	31	1.193	1.212	15.60
6	1.418	1.192	26.18	32	1.217	1.212	16.48
7	^{1.420} 1.420	1.194	26.30	33	1.257		15.07
8	^{1.494} 1.368	1.195	31.19	34	1.231	1.214	17.02
9	^{1.368} 1.381	1.196	23.33	35	1.193		15.60
10	^{1.381} 1.394	1.197	24.04	36	1.217	1.215	16.48
11	^{1.394} 1.394		24.77	37	1.244		17.54
12	^{1.394} 1.394		24.77	38	1.244	1.216	17.54
13	^{1.394} 1.372	1.198	24.77	39	1.244		17.54
14	^{1.372} 1.356		23.55	40	1.244	1.217	17.54
15	^{1.356} 1.350		22.70				
16	^{1.350} 1.293	1.199	21.08				
17	^{1.293} 1.308		19.63				
18	1.308		20.32				
19	1.293		19.63				
20	1.252	1.200	17.86				
21	1.249	201	17.74				
22	1.264	202	18.37				
23	1.249	203	17.74				
24	1.244	205	17.54				
25	1.250	206	17.78				
26	1.257	207	18.07				
27	1.257	208	18.07				
28	1.254	209	17.95				
29	1.217	210	16.48				
30	1.201	1.211	15.89				

$$\Delta = 29.13$$

77

DAO 156				
H γ	$\overline{6mp}$	Δ	Δ	
4325	39.966	---		
A	38.606	-	-1.360	-39.62
B	38.509	-	1.457	-42.44
C	36.424	-	3.542	-103.19

H δ				
B	31.568	-	1.727	-58.60
C	31.485	-	1.810	52.73
4118	33.295	---		

H ϵ				
A	27.516	-	0.412	12.00
B	26.351	-	1.577	45.94
C	26.054	-	1.874	54.59
2977	27.928	---		

DAO 157				
H γ	$\overline{6mp}$	Δ	Δ	
D	44.084	2.616	4.078	76.26
A	40.935	-0.531		15.47
C	40.006	-1.460		42.53
4325	41.466	---		

H δ B				
31.069	-3.733			49.90
4118	34.802			108.79
C	32.986	1.816		-52.90

H ϵ A				
29.019	-0.347			115.65
B	27.847	1.569		45.70
C	27.547	1.864		54.30
2977	29.416			

H ζ				
A	26.626			
3875	25.895			

78

DAO 150 H γ
m 9 1756

Curve d

Scale	$\log I$	I	I'	Scale	$\log I$	I	I'		
-25	1.314	1.227	20.61	16.87	4	1.675	1.252	47.32	17.86
24	1.291	1.228	19.54	16.90	5	1.696	1.253	49.66	17.91
23	1.291	1.229	19.54	92	6	1.724	1.254	52.97	17.95
22	1.291	1.229	19.54	16.94	7	1.752	1.255	56.49	17.99
	1.242	1.2	17.46	95	8	1.788	1.256	61.38	18.03
20	1.172		14.86	96	9	1.820	1.257	66.07	18.07
20	1.136	1.230	13.68	16.98	10	1.855	1.258	71.61	18.11
19	1.115	1.231	13.03	17.02	11	1.831	1.259	67.76	18.16
18	1.097	1.232	12.50	17.06	12	1.854	260	71.45	18.20
17	1.117	1.233	13.09	17.10	13	1.854	261	71.45	18.24
16	1.136	1.234	13.68	17.14	14	1.857	262	71.94	18.28
15	1.125	1.235	13.37	17.18	15	1.820	263	66.07	18.32
14	1.231	1.236	17.02	17.22	16	1.742	264	55.21	18.37
13	1.272	1.237	18.71	17.26	17	^{1.706} 1.726	265	50.82	18.41
12	1.302	1.238	20.04	17.30	18	1.742	266	55.21	18.45
11	1.345	1.239	22.13	17.34	19	1.708	267	51.05	18.49
10	1.332	1.240	21.48	17.38	20	1.685	1.268	48.42	18.54
9	1.314	1.241	20.61	17.42	21	1.675		47.32	56
8	1.293		19.63	17.44	22	1.656		45.29	57
7	1.352	1.242	22.49	17.46	23	1.675	1.269	47.32	18.58
-6	1.423	1.243	26.49	17.50	24	1.675		47.32	60
-5	1.535	1.244	34.28	17.54	25	1.665	1.270	46.24	18.62
-4	1.581		38.11	56	26	1.700		50.12	63
-3	1.578	1.245	37.84	17.58	27	1.700		50.12	65
-2	1.574	1.246	37.50	17.62	28	1.700	1.271	50.12	18.66
-1	1.600	1.247	39.81	17.66	29	1.645		44.16	68
0	1.608	1.248	40.55	17.70	30	1.590	1.272	38.90	18.71
1	1.616	1.249	41.30	17.74	31	1.581	1.273	38.11	18.75
2	1.574	1.250	37.50	17.78					
3	1.590	1.251	38.90	17.82					

DAO 150 H δ

DAO 150 H δ

79

4757

32	1.573	1.275	37.41	18.84
33	1.560	1.276	36.31	18.88
34	1.563	1.277	36.56	18.92
35	1.547	1.275 1.278	35.24	19.01
36	1.540	1.280	34.67	19.05
37	1.484	1.281	30.48	19.10
38	1.388	1.283	24.43	19.19
39	1.417	1.284	26.12	19.20
40	1.399	1.285	25.06	19.28
41	1.358	1.286	22.80	19.32
42	1.283	1.287	19.19	19.36
43	1.274	1.2	18.79	19.38
44	1.314	1.288	20.61	19.41
45	1.314	1.289	20.61	19.45

-55	.789	969	6.15
54	.770	971	5.89
53	.755	972	5.69
52	.778	974	6.00
51	.812	975	6.49
50	.758 .718 .784	6.46 0.976	5.73 5.22 6.08
49	.877	977	7.53
48	.981	979	9.57
47	1.018	981	
46	1.038	989	10.91
45	1.038	984	
44	1.016	986	10.38
3	1.001	987	
2	0.887	989	7.71
1	.845 .856	990	
40	.896	0.992	7.87
7	1.058	993	
8	1.135 1.172	995	14.86
7	1.192	996	
6	1.188	998	15.42
35	1.215	999	
4	1.224	1000	16.75
3	1.233	1002	
2	1.230	1.003	16.98
1	1.272	1.004	
30	1.303	1.005	20.09
9	1.308	1.007	
8	1.317	1.008	20.75

9.46

$\log I$ $\log I'$

65	0.960	0.957	9.12	9.06
64	.976	0.958	9.46	
63	.942	0.959	8.75	
62	.930	0.960	8.51	
61	.920	0.961	8.32	
60	.912	0.962	8.17	
59	.912	963	8.17	
58	.888	965	7.73	
57	.841	966	6.93	
-56	.810	968	6.46	

7	1.058	993	
8	1.135 1.172	995	14.86
7	1.192	996	
6	1.188	998	15.42
35	1.215	999	
4	1.224	1000	16.75
3	1.233	1002	
2	1.230	1.003	16.98
1	1.272	1.004	
30	1.303	1.005	20.09
9	1.308	1.007	
8	1.317	1.008	20.75

80

DAO 150 H 8
m 9 4757

Curve d

-7	1.363	1.010	
-6	1.374	1.012	23.66
35	1.385	1.013	
4	1.416	1.014	26.06
33	1.436	1.015	
2	1.484	1.016	30.48
1	1.492 1.508	1.017	
20	1.508 1.496	1.018	32.21
9	1.496 1.508	1.019	
8	1.508	1.020	32.21
7	1.513	1.021	
6	1.513	1.022	32.58
15	1.508	1.024	
4	1.508	1.026	32.21
3	1.484	1.027	
2	1.454	1.028	28.44
1	1.440		
-10	1.416	1.029	26.06 10.69
-9	1.393	1.030	
-8	1.411	1.031	25.76
-7	1.411	1.032	
-6	1.390	1.033	24.55
-5	1.390	1.035	
-4	1.390	1.036	24.55
-3	1.377	1.039	23.8
-2	1.377	1.039	23.82
-1	1.385	1.041	
0	1.411	1.043	25.76

+1	1.398	1.044	
+2	1.373	1.045	23.60
+3	1.358	1.046	
4	1.303	1.047	20.09
5	1.297		
6	1.279	1.048	19.01
7	1.251	1.049	
8	1.255	1.050	17.99
9	1.258	1.051	
10	1.219	1.052	16.56 11.27
1	1.219	1.053	
2	1.206	1.055	16.07
3	1.994	1.056	
4	1.176	1.057	15.00
15	1.158	1.058	
6	1.150	1.060	14.13
7	1.128	1.061	
8	1.112	1.063	12.94
9	1.123	1.065	
20	1.084	1.067	12.13
1	1.071	1.069	
2	1.076	1.070	11.91
3	1.030	1.072	
4	1.045	1.073	11.09
25	1.086	1.074	11.86

DAO 150
44757

Curve 2

H E

81

-55		858	
-53	.906	869	8.05
2	.884		7.66
1	.877	860	7.53
50	.871	861	7.43
9	.844		6.98
8	.836	862	6.86
7	.834		6.82
6	.832	863	6.79
	.797		6.27
45	.810		6.46
	.866		7.35
4	.928	864	8.47
3	.976		9.46
2	.976	865	9.46
1	.976		9.46
40	.992	866	9.82
9	.896	8	7.87
8	.842	867	6.95
7	.813		6.50
6	.791	868	6.18
35	.778	869	6.00
4	.812	870	6.49
	.856		7.18
3	.889		7.75
2	1.016	871	10.38
1	1.057		11.40
30	1.045	872	11.09
9	1.069		11.72
8	1.071		11.78

27	1.071	873	11.78
26	1.071		11.78
25	1.071		11.78
4	1.032	874	10.76
3	0.992		9.82
2	1.003		10.07
1	1.005		10.12
20	1.020	875	10.47
9	1.042		11.02
8	1.071	876	11.78
7	1.106		12.76
6	1.158	877	14.39
15	1.174	878	14.93
4	1.202		15.92
3	1.215	880	16.41
2	1.192		15.56
1	1.244		17.54
10	1.255	881	17.99
9	1.255		17.99
8	1.270	882	18.62
7	1.268		18.54
6	1.263	883	18.32
5	1.242	884	17.46
4	1.225	885	16.79
3	1.197		15.74
2	1.186	886	15.35
1	1.187		15.35
0	1.183	887	15.24

1	1.179	888	15.10	28	1.009		10.21
2	1.200	889	15.85	29	1.000		10.00
3	1.184	890	15.28	30	0.970	.901	9.23
4	1.174	890	14.93	31	0.952	902	8.95
5	1.182	891	15.21	32	^{0.961} 0.960	904	9.14
6	1.201		15.89	33	⁹⁶⁰ 928	906	9.12
7	1.212	892	16.29	34	²⁸ 936	908	8.47
8	1.214	893	16.27	35	906	.910	8.63
9	1.215		16.41				
10	1.206	894	16.07				
11	1.190		15.49				
12	1.175	895	14.96				
13	1.135	895	13.65				
14	1.204		16.00				
15	1.071	897	11.78				
16	1.047	896	11.14				
17	1.070	897	11.75				
18	1.073		11.83				
19	1.062		11.53				
20	1.061	897	11.51				
21	1.071		11.78				
22	1.076		11.91				
23	1.060	898	11.48				
24	1.052		11.27				
25	1.018		10.42				
26	^{1.018} 1.006		10.42				
27	^{1.006} 1.007	899	10.18				

DAO 156

Curve d : 4763

83

H 8

I

-25	1.604	1.097	40.18	37.50
24	1.585	1.099	38.46	55
23	1.597	1.000	39.54	60
22	1.572	1.102	37.32	65
21	1.522	1.104	30.27	70
20	1.500 1.510	1.105	31.61 22.36	37.74
19	1.543	1.108	34.91	37.81
8	1.518	1.110	32.96	37.89
7	1.448	1.113	28.05	37.96
6	1.448	1.116	28.05	38.04
15	1.436	1.119	27.29	38.11
4	1.481 1.550	1.122	30.27 34.67	38.19
3	1.575	1.125	37.58	38.26
2	1.604	1.128	40.18	38.34
1	1.616	1.130	41.30	38.50
10	1.590	1.133	38.90	38.58
9	1.575	1.134	37.58	38.62
8	1.585	1.135	38.46	38.66
7	1.632	1.136	42.85	38.70
6	1.696 1.768	1.138	49.66 58.61	38.74
5	1.843	1.139	69.66	38.78
-4	1.843	1.140	69.66	38.82
-3	1.848	1.141	70.47	38.86
-2	1.852	1.142	71.12	38.90
-1	1.852	1.144	71.12	38.93
0	1.852	1.145	71.12	38.96
1	1.841	1.147	69.34	39.02
2	1.841	1.149	69.34	39.08

3	1.879	1.151	75.68	39.14
4	1.919	1.152	82.99	39.20
5	1.933	1.154	85.70	39.26
6	1.959	1.156	90.99	39.32
7	1.959	1.158	90.99	39.38
8	2.004	1.160	100.9	39.44
9	2.015	1.162	103.5	39.50
10	2.015	1.163	103.5	39.55
1	2.019	1.164	104.5	39.60
2	2.019	1.166	104.5	39.65
3	2.020	1.167	104.7	39.70
4	2.028	1.169	106.7	39.75
15	1.959	1.171	90.99	39.80
6	1.954	1.173	89.95	39.85
7	1.959	1.174	90.99	39.90
8	1.946	1.176	88.31	39.95
9	1.932	1.177	85.51	40.00
20	1.935	1.178	86.10	40.07
1	1.906	1.180	80.54	40.13
2	1.906	1.181	80.54	40.19
3	1.906	1.183	80.54	40.25
4	1.906	1.185	80.54	40.31
25	1.936	1.187	86.30	40.37
6	1.938	1.188	86.70	40.43
7	1.973	1.190	93.97	40.49
8	1.978	1.192	95.06	40.55
9	1.946	1.194	88.31	40.61
30	1.906	1.196	80.54	40.70

84

DAO 156

HYS

DAO 156 H8

							$\log I$	$\log I'$	I	
31	1.874	1.198	75.68	40.77	-65	1.331	1.333	2		
32	1.857	1.200	71.94	40.84	64	1.306	1.334	20.23		
33	1.855	1.201	71.61	40.91	3	1.293	1.335			
4	1.829	1.203	67.45	40.98	2	1.276	1.336	18.88		
35	1.822	1.205	66.37	41.05	1	1.267	1.338			
6	1.788	1.206	61.38	41.12	60	1.261	1.339	18.24	21.83	
7	1.784	1.208	60.81	41.19	9	1.233	1.340			
8	1.713	1.210	51.64	41.26	8	1.200	1.341	16.22		
9	1.716	1.212	52.00	41.32	7	1.161	1.342			
40	1.666	1.214	46.34	41.37	6	1.161	1.343	14.49		
41	1.634	1.215	43.05	41.41	55	1.161	1.			
2	1.606	1.217	40.36	41.46	4	1.154	1.344	14.26		
3	1.590	1.218	38.90	41.50	3	1.096	1.345			
4	1.613	1.219	41.02	41.55	2	1.110	1.346	12.88		
45	1.618	1.220	41.50	41.60	1	1.056 1.068 940	1.347			
					50	1.056	1.348	11.38		
					49	1.233 1.339	349			
					8	1.372	350	23.55		
					7	1.375	351			
					6	1.392	352	24.66		
					45	1.405 1.355	353			
					4	1.294 1.233	354	19.68		
					3	1.185	355			
					2	1.134	356	13.61		
					1	1.183 1.269	357			
					40	1.430	1.358	26.92	22.80	
					9	1.535				
					8	1.558		36.14		

I					II				
7	1.567				9	1.702			
6	1.570		37.15		8	1.690		48.98	
35	1.572				7	1.690			
4	1.586		38.55		6	1.690		48.98	
3	1.577				-5	1.690			
2	1.603		40.09		-4	1.690		48.98	
1	1.618				-3	1.690			
30	1.628	1.368	42.46		-2	1.710		51.29	
9	1.662				-1	1.710			
8	1.645		44.16		0	1.750	1.396	56.23	24.89
7	1.670				1	1.738			
6	1.691		49.09		2	1.720		52.48	
25	1.705				3	1.679			
4	1.714		51.76		4	1.656		45.29	
3	1.738				5	1.635			
2	1.768		58.61		6	1.635 ²		42.85	
1	1.778				7	1.588			
-20	1.775	1.378	59.57	23.88	8	1.588		38.73	
9	1.780				9	1.572			
8	1.780		60.26		10	1.558	1.404	36.14	
7	1.780				11	1.558			
6	1.796		62.52		12	1.541		34.75	
15	1.780				3	1.531			
4	1.774		59.43		4	1.516		32.81	
3	1.745				15	1.493			
2	1.724		52.97		16	1.486		30.62	
1	1.697				17	1.464			
-10	1.690	1.386	48.98		18	1.480		30.20	
					19	1.464			
					20	1.442	1.415	27.67	26.00
					21	1.435			
					22	1.428		25.59	

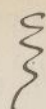
	Log I	Log I'							
-60	1.313	1.142	20.56		1	1.399 1.443		27.73	
59	1.330		21.38		30	1.419 1.438	1.192	27.42	
8	1.330		21.38		9	1.448 1.448		28.05	
7	1.325		21.13		8	1.434		27.16	
6	1.337		21.73		7	1.434		27.16	
	1.325		21.13						
55	1.245		17.58		6	1.412		25.82	
	1.215		16.41						
4	1.281		19.10		25	1.376		23.77	
3	1.269		18.58		4	1.350		22.39	
2	1.262		18.28		3	1.335		21.63	
1	1.230		16.98		2	1.348		22.28	
50	1.180	1.158	15.14		1	1.374		23.66	
9	1.178		15.07		20	1.394	1.211	24.77	
8	1.160		14.45		9	1.424		26.55	
7	1.107		12.79		8	1.460		28.84	
	1.070		11.83						
6	1.092		12.36		7	1.470		29.51	
	1.178		15.07						
45	1.275		18.84		6	1.497		31.41	
4	1.325		21.13		15	1.522		33.27	
3	1.320		20.89		14	1.536		34.36	
2	1.335		21.63		13	1.522		33.27	
1	1.325		21.13		2	1.489		30.83	
40	1.251	1.176	17.82		10	1.531		33.96	
	1.202		15.92						
9	1.155		14.29		10	1.570	1.228	37.15	
8	1.100		12.59		9	1.570		37.15	
7	1.184		13.00		8	1.570		37.15	
6	1.105		12.74		-7	1.570		37.15	
35	1.178		15.07		-6	1.562		36.48	
	1.251		17.82						
4	1.325		21.13		-5	1.536		34.36	
3	1.399		25.06		-4	1.534		34.20	
2	1.419		26.24						

-3	1.522		23.27			+26	1.391		24.60
2	1.529		33.81			7	1.3 ⁷⁹ 77		23.92
1	1.534		34.20			8	1.358		22.39
0	1.534	1.249	34.20			9	1.374		23.66
1	1.536		34.36			30	1.300	1.302	19.95
2	1.522		33.27						
3	1.536		34.36						
4	1.550		35.48						
5	1.563		36.56						
6	1.5 ⁶⁵ 70		36.73						
7	1.562		36.48						
8	1.575		37.58						
9	1.570		37.15						
10	1.580	1.265	38.02						
1	1.550		35.48						
2	1.522		33.27						
3	1.473		29.72						
4	1.452		28.31						
15	1.442		27.67						
6	1.428		26.79						
7	1.448		28.05						
8	1.436		27.29						
9	1.436		27.29						
20	1.450	1.283	28.18						
1	1.428		26.79						
2	1.4 ²⁸ 1.419		26.79						
3	1.419 1.407		26.24						
4	1.407 1.391		25.53						
25	1.391		24.60						

DAO 157 H Y
μ 4768

Curve 2

	$\log I$		I	I'				I	I'
-27	1.529	1466	33.81	29.24	1	1.710		51.29	30.13
6	1.505		31.99	29.25	2	1.720		52.48	30.20
25	1.497		31.41	26	3	1.753		56.62	30.27
4	1.464		29.11	27	4	1.784		60.81	30.34
3	1.476		29.92	28	5	1.807		64.12	30.41
2	1.444		27.80	29	6	1.829		69.02	30.48
1	1.404		25.94	30	7	1.841		69.34	30.55
20	1.418	1467	26.18	29.31	8	1.876		75.16	30.62
9	1.450		28.18	29.37	9	1.900		79.43	30.69
8	1.402		25.23	29.42	10	1.882	1488	76.21	30.76
7	1.357		22.75	29.49	1	1.885		76.74	30.82
6	1.319		20.84	29.55	2	1.891		77.80	30.88
15	1.352		22.49	29.61	3	1.907		80.72	30.94
	1.426		26.67		4	1.882		76.21	30.00
4	1.458		28.71	29.67	15	1.865		73.28	31.06
3	1.470		29.51	29.73	6	1.817		65.61	31.12
2	1.507		32.14	29.99	7	1.817		65.61	31.18
1	1.520		33.11	29.35	8	1.817		65.61	31.24
10	1.476	1.476	29.92	29.92	9	1.790		61.66	31.30
9	1.468		29.38	29.93	20	1.796	1.496	62.52	31.33
8	1.446		31.33	29.95	1	1.779		60.12	31.37
7	1.563		36.56	29.96	2	1.769		58.75	31.40
	1.638		43.45		3	1.779		60.12	31.43
6	1.679		47.75	29.98	4	1.779		60.12	31.47
5	1.705		50.70	29.99	25	1.809		64.42	31.51
4	1.718		52.24	30.01	1	1.830		67.61	31.55
3	1.718		52.24	30.02		1.844		69.82	31.58
2	1.711		51.40	30.04	7	1.796			
1	1.721		52.60	30.05	8	1.850		70.79	31.62
0	1.710	1.478	51.29	30.06		1.764			



H 8 DAO 157

- 8 4768

89

			I		S	log I	I	
9	1796		62.52	31.66	-67	1.238		
30	1748 1764 1740	1.501	58.08	31.70	6	1.240	17.38	
1	1740		54.95	31.75	5	1.230 1.248		17.70
2	1740		54.95	31.80	4	1.212	16.29	
3	1720		52.48	31.85	3	1.208		
4	1695		49.55	31.90	2	1.183	15.24	
5	1686		48.53	31.95	1	1.175		
6	1686		48.53	32.00	60	1.169 1.250	14.76	
7	1638		43.45	32.05	9	1.165		
8	1595		39.36	32.10	8	1.165	14.62	
9	1600		39.81	32.15	7	1.140		
40	1560	1.508	36.31	32.21	6	1.087 1.060	12.22	
1	1529		33.81	32.24	55	1.066		
2	1501		31.70	32.27	4	1.097	12.50	
3	1481		30.27	32.30	3	1.090		
4	1505		31.99	32.33	2	1.019 975	10.45	
45	1538	1.510	34.57	32.36	1	1.004		
					50	.910 1.256	8.13	18.03
					9	.877 .995 1.022		
					8	1.087	10.76	
					7	.262 1.057		
					6	1.285	19.28	
					45	1.295		
					4	1.310 1.277	20.42	
					3	1.277 1.163		
					2	1.115 1.087	13.03	
					1	1.055 1.041		
					40	1.065 1.262	11.61	

90

DAO 157
HS

I

39	1.126	13.37		
8	1.225		16.79	
	1.337			
7	1.420			
6	1.461		28.91	
35	1.460			
4	1.460		28.84	
3	1.469			
2	1.469		29.44	
1	1.494			
30	1.498	1.272	31.48	18.71
9	1.521			
8	1.530		33.88	
7	1.550			
6	1.562		36.48	
25	1.570			
4	1.588		38.73	
3	1.605			
2	1.631		42.76	
1	1.650			
20	1.658	1.277	45.50	
9	1.656			
8	1.665		46.24	
7	1.672			
6	1.679		47.75	
15	1.679			
4	1.670		46.77	
3	1.658			
2	1.647		44.36	
1	1.622			

10	1.602	1.287	39.99	
9	1.673			
8	1.586		38.55	
7	1.586			
6	1.591		38.99	
5	1.588			
4	1.581		38.11	
3	1.588			
2	1.607		38.73	
1	1.607			
0	1.621	1.292	41.78	19.59
+1	1.626		41.27	
2	1.621		41.78	
3	1.608			
4	1.578		37.84	
5	1.562			
6	1.539		34.59	
7	1.512			
8	1.496		31.33	
9	1.486			
10	1.473	1.300	29.72	
1	1.458			
2	1.461		28.91	
3	1.453			
4	1.437		27.35	
15	1.411			
6	1.401		25.18	
7	1.383			
8	1.372		23.55	

DA 6 160
HY
ny 4779.

91

							I	I
9	1.361				-25	1.500	31.62	27.90
20	1.347	1.308	20.32		4	1.500	31.62	
1	1.349				3	1.500	31.62	
2	1.337		21.73		2	1.463	29.04	
3	1.314				1	1.485	30.55	
4	1.312		20.51		20	⁴⁹⁰ 1.490	30.90	28.00
25	1.324	1.312		20.51	9	1.508	32.21	
					8	1.480	30.20	
					7	1.465	29.17	
					6	1.401	25.18	
						1.390	24.55	
					15	1.415	26.00	28.10
					4	1.435	27.23	
					3	1.470	29.51	
					2	1.532	34.04	
					1	1.556	35.97	
					10	1.532	34.04	28.20
					9	1.488	30.76	
					8	1.553	35.93	
					7	1.736	54.45	
					6	1.954	89.95	
					5	1.964	92.04	28.30
					4	1.980	95.50	
					-3	1.970	93.33	
					-2	1.954	89.95	
					-1	1.954	89.94	
					±0	1.940	87.10	28.40
					1	1.936	86.30	
					2	1.970	93.33	
					3	2.021	105.0	

		I				I		
4	2.057	114.0			3	1.884	76.56	
5	2.094	124.2	28.50		4	1.841	69.34	
6	1.020	104.7			35	1.800	67.61	29.10
7	1.035	108.4			6	1.751	56.36	
8	2.202	159.2			7	1.710	51.64	
9	2.236	172.2			8	1.666	46.34	
10	2.236	172.2	28.60		9	1.600	39.81	
1	2.219	165.6			40	1.492	31.05	29.10
2	2.219	165.6			1	1.450	28.18	
3	2.240	173.8			2	1.425	26.61	
4	2.219	165.6			3	1.443	27.73	
15	2.202	159.2	28.70		4	1.488	30.76	
6	2.135	136.5			5	1.503	31.84	29.30
7	2.125	133.4			6			
8	2.120	131.8			7			
9	2.080	120.2			8			
20	2.076	119.1	28.80		9			
1	2.048	111.7			10			29.0
2	2.080	120.2						
3	2.080	120.2						
4	2.094	124.2						
25	2.130	134.9	28.90					
6	2.145	139.6						
7	2.174	149.3						
8	2.174	149.3						
9	2.120	131.8						
30	2.048	111.7	29.00					
1	1.991	97.95						
2	1.945	88.10						

DAO 160

DAO 161

93

HY	λ	A	ΔA
A	58.731	+1.882	54.82
B	58.273	+1.424	41.48
C	56.565	-0.284	8.27
D	56.308	-0.541	15.76
4325	56.849	—	—

HS	A	48.733	-1.441	41.98
	B	48.430	-1.744	50.80
4118	50.174	—	—	—

He	A (Ca II)	44.387	Burned out -0.398	
	B	43.170	-1.615	47.04
	D	42.920	-1.865	54.33
3977	44.785	—	—	—

HS	A	41.977	+0.720	20.97
	C	39.594	-1.663	48.44
3895	41.257	—	—	—

HY	λ	A	ΔA
D	43.285	-0.536	-15.61
E	42.444	-1.377	-40.11
F	42.355	-1.456	-42.41
4325	43.821	—	—

HS	A	43.501	-1.448	-42.18
	B	43.206	-1.743	-50.77
4118	44.949	—	—	—

He	A	45.161	-0.397	-11.56
	B	43.971	-1.587	-46.23
	C	43.693	-1.865	-54.33
3977	45.558	—	—	—

HS	A	42.745	+0.714	+20.80
	C	40.368	-1.663	-48.44
3896	42.031	—	—	—

94

DAO 160 H 8
C- β
mg 4779

			I					I		
-70	1.403	1.410	25.35	25.70		1	1.224 1.224 → 1.270 1.363 1.211 → 1.460 ^{1.415}	28.84		
9	1.414					40	1.630 1.270 → 1.724			
8	1.403		25.35			9	1.750	56.23		
7	1.401					8	1.750			
6	1.497		31.41			7	1.770	58.88		
65	1.363					6	1.770			
4	1.338		21.78			35	1.770			
3	1.314					4	1.770	58.88		
2	1.280		19.05			3	1.776			
1	1.270					2	1.805	63.83		
60	1.284	1.411	19.23			1	1.838			
9	1.277					30	1.845	1.415	69.98	26.00
8	1.270		18.62			9	1.852			
7	1.266					8	1.887	77.09		
6	1.263		18.32			7	1.903			
55	1.278					6	1.933	85.70		
4	1.301		20.00			25	1.960			
3	1.338					4	1.970	93.33		
2	1.363		23.07			3	2.043			
1	1.301					2	2.086	121.9		
50	1.272 1.272 → 1.340 1.448 1.458	1.414	21.88	25.94		1	2.086			
9	1.448					20	2.086	1.415	121.9	
8	1.448		28.71			9	2.086			
7	1.463 1.458					8	2.086	121.9		
6	1.504		31.92			7	2.086			
45	1.500					6	2.086	121.9		
4	1.452		28.31			15	2.086			
3	1.585 1.585 → 1.290 1.224					4	2.086	121.9		
2	1.290 1.290 → 1.211		16.26							

3	2.082				15	1.581			
2	2.031		107.4		6	1.549		35.40	
1	2.011				7	1.535			
10	1.970	1.415	93.33	26.00	8	1.520		33.11	
9	1.996				9	1.488			
8	1.970		93.33		20	⁴⁷⁴ 1.505	1.415	29.79	
7	1.965				1	⁶⁰ 1.480			
6	1.965		92.26		2	^{1.458} 1.484		28.71	
5	1.970				3	1.445			
4	1.980		95.50		4	1.460		28.84	
-3	2.001				5	1.460	1.415		26.00
-2	2.011		102.6						
-1	2.015								
0	2.051	1.415	112.5						
+1	2.050								
2	2.045		110.9						
3	2.005								
4	1.960		91.20						
5	1.880								
6	1.822		66.37						
7	1.785								
8	1.755		56.89						
9	1.724								
10	1.703	1.415	50.47	26.00					
1	1.677								
2	1.630		42.95						
3	1.620								
4	1.600		39.81						

96

DAO 161 HV
m 4785

			I	I'				I	
-20	1.523	1.456	33.34	28.58	9	2.220		166.0	29.16
9	1.514		32.66	28.59	10	2.190	1.465	154.9	29.17
8	1.475		29.85	28.61	1	2.210		162.2	29.18
7	1.475		29.85	28.62	2	2.220		166.0	29.20
586 6	1.446		27.93		3	2.220		166.0	29.21
	1.386		24.32	28.64	4	2.240		173.8	29.22
	1.386		23.23		15	2.190		154.9	29.24
15	1.432		27.04	28.65	6	2.130		134.9	29.25
4	1.448		28.05		7	2.130		134.9	29.26
	1.456		28.58	28.66	8	2.082		123.6	29.28
3	1.480		30.20	28.67	9	2.066		116.4	29.30
2	1.546		35.16	28.69	20	2.066	1.469	116.4	29.31
1	1.572		37.33	28.70	1	2.045		110.9	29.32
10	1.532	1.458	34.04	28.71	2	2.045		110.9	29.34
9	1.496		31.33	28.74	3	2.066		116.4	29.35
8	1.565		36.73	28.78	4	2.092		123.6	29.37
	1.620		41.69		25	2.130		134.9	29.38
7	1.739		54.83	28.81	6	2.155		142.9	29.39
	1.910		81.28		7	2.155		142.9	29.41
6	1.975		94.41	28.85	8	2.170		147.9	29.42
5	1.975		94.41	28.88	9	2.120		131.8	29.43
-4	1.965		92.26	28.92	30	2.066	1.469	116.4	29.44
-3	1.975		94.41	28.95	31	1.996		99.08	29.46
-2	1.940		87.10	28.98	2	2.930		85.11	29.48
-1	1.945		88.10	29.02	3	1.980		75.86	29.50
0	1.925	1.463	84.14	29.04	4	1.850		70.79	29.52
1	1.925		84.14	29.05	35	1.819		65.92	29.54
2	1.955		90.16	29.07					
3	2.016		103.8	29.08					
4	2.039		109.4	29.09					
5	2.065		116.1	29.11					
6	2.110		128.8	29.12					
7	2.130		134.9	29.13					
8	2.210		162.2	29.15					

$\frac{161}{H\delta}$

u p 4786

97

			I					I	
6	1.749		56.10	29.56	-70	1.497	1.458	31.41	28.71
7	1.700		50.12	29.58	9	1.487			
8	1.640		43.65	29.60	8	1.471		29.58	
9	1.563		36.56	29.62	7	1.467			
40	1.475	1.472 1.47	29.85	29.65	6	1.446		27.93	
1	1.427		26.73	29.68	65	1.426			
2	1.432		27.04	29.71	4	1.402		25.23	
3	1.456		28.58	29.74	3	1.372			
4	1.490		30.90	29.77	2	1.347		22.23	
45	1.506	1.474	32.06	29.79	1	1.349			
					60	1.336		21.68	
					9	1.333			
					8	1.326		21.18	
					7	1.309			
					6	1.312		20.51	
					55	1.347			
					4	1.372		23.55	
					3	1.396			
					2	1.446		27.93	
						1.433			
					1	1.339			
						1.300			
					50	1.396		24.89	
						1.477			
					9	1.500			
						1.510			
					8	1.396		32.36	
					7	1.538			
					6	1.552		35.65	
					45	1.552			
					4	1.500		31.62	
						1.420			
					3	1.326			
						1.250			

98

 H8 161
 m9 4786

			I						I	
42	1.264	1.458	18.37	28.71		4	2.140	1.458	138.0	28.71
	1.285									
1	1.336					3	2.100			
	1.420									
40	1.576		37.67			2	2.070		117.5	
9	1.840					1	2.045			
8	1.822		66.37			10	2.020		104.7	
7	1.830					9	2.020			
6	1.822		66.37			8	2.020		104.7	
35	1.840					7	2.015			
4	1.840		69.18			6	2.020		104.7	
3	1.840					5	2.010			
2	1.870		74.13			-4	2.020		104.7	
1	1.900					-3	2.045			
30	1.912		81.66			-2	2.070		117.5	
9	1.942					-1	2.085			
8	1.952		89.54			+0	2.085		121.6	
7	1.962					1	2.090			
6	2.002		100.5			2	2.075		118.9	
25	2.015					3	2.045			
4	2.042		110.2			4	1.970		93.33	
3	2.080					5	1.912			
2	2.110		128.8			6	1.876		75.16	
1	2.110					7	1.822			
20	2.110		128.8			8	1.770		58.88	
9	2.110					9	1.750			
8	2.170		131.8			10	1.715		51.88	
7	2.130					11	1.700			
6	2.130		134.9			12	1.675		47.32	
15	2.150									

H 8 166

u p 4721

99

							I	I'	
3	¹⁶⁶⁴ 1.642	1.458	28.71	15	1.500	1.481	31.62	30.27	17
4	¹⁶⁴² 1.605	43.85		4	1.500		31.62		16
15	⁴⁶⁰⁵ 1.570			3	1.470		29.51	30.30	15
6	1.570	37.15		2	1.470		29.51		14
7	⁷⁶ 1.532			1	1.505		31.99		13
8	⁵⁷⁶ 1.507	37.67		10	1.527	1.482	33.65	30.34	12
9	³⁴ 1.520			7	1.484		30.48	30.39	11
20	1.507	32.14		8	1.430		26.92		10
1	1.520				^{1.465} 1.522		29.17		9
2	1.487	30.69		6	1.715		51.88	30.50	8
3	1.492			35	1.910		81.28		7
4	1.500	31.62		4	1.939		86.90		6
25	1.507			3	1.948		88.72	30.60	5
				2	1.984		96.38		4
				1	1.992		98.17		3
				0	2.000	1.487	100.0	30.69	2
				9	2.014		103.3		1
				8	2.020		104.7		0
				7	2.020		104.7		1
				6	2.037		108.9		2
				25	2.082		120.8	30.80	3
				4	2.082		120.8		4
				3	2.125		133.4		5
				2	³⁵ 2.167		136.5		6
				1	2.167		146.9		7
				20	2.210	1.490	162.2	30.90	8
				19	2.200		158.5		9
				8	2.178		150.7	31.00	10
				7	1.190		154.9		11

			I					I		
16	2.200		158.5	31.1	11	11	1.645	44.16	31.50	38
15	2.210		162.2		12	2	1.580	38.02		39
4	2.210		162.2	31.2	13	3	1.547	35.24	31.60	40
2	2.190		154.9		14	4	1.560	36.31		41
2	2.190		154.9	31.3	15	15	1.566	1.514	36.81	32.66
1	2.176		150.0		16	6				42
16	2.133	1.498	135.8	31.48	17	7				
9	2.122		132.7		18	8				
8	2.133		135.8		19	9				
7	2.167		146.9	31.58	20	20				
6	2.178		150.7		21					
5	2.210		162.2		22					
4	2.210		162.2		23					
-3	2.210		162.2	31.68	24					
-2	2.210		162.2		25					
-1	2.210		162.2		26					
0	2.195	1.502	156.7	31.77	27					
11	2.114		130.0		28					
2	2.037		108.9	31.85	29					
3	1.934		85.90	31.95	30					
4	1.876		75.16		31					
5	1.830		67.61	32.05	32					
6	1.810		64.57	32.15	33					
7	1.775		59.57	32.25	34					
8	1.775		59.57	32.35	35					
9	1.767		58.48	32.45	36					
10	1.715	1.512	51.88	32.51	37					

DAO 166

DAO 180

101

λ
 H δ A 42.560 Δ -1.308 -38.10
 4325 42.868 —

H δ A 43.314 -1.473 42.91
 4118 44.787

He A 44.690 -0.404 11.77
 B 43.798 -1.296 37.75
 C 43.219 1.875 54.62
 3977 45.094 —

H γ A 45.335 + 0.690 20.09
 B 43.309 - 1.336 38.92
 3895 44.645

λ
 H γ A 51.866 Δ -0.306 -1.694 8.91
 4325 52.172 —

H δ A 52.639 -1.472 42.48
 54.111 —

He A 52.292 -0.398 11.59
 3977 52.690 —
 D β 51.821 -1.869 54.44

H γ A 51.756 + 0.684 19.92
 B 49.725 -1.337 38.95
 3895 51.072

и ф 4792

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

DAO 166 μ p 4792
H S

103

			I					I				
14	1.907		80.72					15	1.446			
3	1.907							6	1.434	27.16		
2	1.892		77.98					7	1.420			
1	1.837							8	1.420	26.30		
10	1.837	1.329	68.71	21.33				9	1.416			
9	1.825							20	1.396	1.351	24.89	
8	1.837		65.71					1	1.390			
7	1.845							2	1.370	23.44		
6	1.850		70.79					3	1.374			
5	1.862							4	1.370	23.44		
-4	1.874		74.82					25	1.362			
-3	1.904							6	1.351	22.44		
-2	1.900		79.43					7	1.351			
-1	1.900							8	1.361	22.96		
0	1.894	1.335	78.34					9	1.352			
+1	1.874							10	1.351	1.356	22.70	22.70
2	1.830		67.61									
3	1.795											
4	1.730		50.70									
5	1.665											
6	1.625		42.17									
7	1.585											
8	1.555		35.89									
9	1.535											
10	1.524	1.341	33.42	21.93								
1	1.524											
2	1.512		32.51									
3	1.502											
4	1.461		28.91									

		I			I'	
-45	1.275	18.84		7	1.456	28.58
4	1.290	19.50		6	1.490	30.90
3	1.321	20.94		15	1.505	31.99
2	1.310	20.42		4	1.505	34.28
1	1.305	20.18		3	1.523	33.24
40	1.258	18.11		2	1.488	30.76
	1.204	16.00		1	1.535	34.28
9	1.154	14.26		10	1.550	35.48
	1.116	13.06		9	1.552	35.65
8	1.093	12.39		8	1.569	37.07
	1.090	12.30		7	1.573	37.41
7	1.113	12.97		6	1.577	37.76
	1.163	14.55		-5	1.573	37.41
6	1.234	17.14		-4	1.569	37.17
	1.300	19.95		-3	1.550	35.48
35	1.343	22.03		-2	1.538	34.51
	1.374			-1	1.538	34.51
4	1.406	23.66		0	1.546	35.16
3	1.420	25.47		+1	1.556	35.97
2	1.440	26.30		2	1.553	35.73
1	1.446	27.54		3	1.569	37.07
30	1.436	27.93		4	1.582	38.19
9	1.425	27.29		5	1.605	40.27
8	1.425	26.61		6	1.608	40.55
7	1.425	26.61		7	1.608	40.55
6	1.398	26.61		8	1.610	40.74
25	1.386	25.00		9	1.607	40.46
4	1.382	24.32		10	1.589	38.82
3	1.384	24.10				
2	1.400	24.21				
1	1.422	25.12				
20	1.422	26.42				
9		26.42				
8	1.444	27.80				

		I		
11	1.569	37.07	9	1.260
2	1.552	35.65	40	1.253
3	1.488	30.76	1	1.250
4	1.463	29.04	2	1.253
15	1.446	27.93	3	1.253
6	1.428	26.79	4	1.253
7	1.408	25.59	45	1.253
8	1.408	25.59	6 ⁶	1.240
9	1.379		7	1.244
20	1.374	23.66	8	1.260
1	1.372		9	1.266
2	1.374	23.66	50	1.272
3	1.376			
4	1.374	23.66		
25	1.370			
6	1.353	22.54		
7	1.341			
8	1.322	21.93		
9	1.322			
30	1.300	19.95		
1	1.396	24.89		
2	1.392	24.66		
3	1.272	18.71		
4	1.270	18.62		
35	1.267			
6	1.261	18.24		
7	1.258			
8	1.258	18.11		

H S DAO 166 - ny 4792

I/195

	log I	I				I	
-45	.956	9.04	4.64		17	1.153 1.167	14.69 751 240
4	.964	9.20	4.71		16	1.183	15.24 781
3	.956	9.04	4.64		15	1.192	15.56 797
2	.956	9.04	4.64		4	1.227	16.89 865
1	.950	8.91	4.56		3	1.236	17.22 883
	.938	8.67	4.45		2	1.236	17.22 883
	.921	8.34	4.27		1	1.252	17.86 915
40	.878	7.55	3.97		10	1.245	17.58 900
	.805	6.38	3.27		9	1.257	18.07 925
7	.724	5.30	2.92		8	1.263	18.32 940
	.677	4.75	2.43		7	1.266	18.45 945
8	.665	4.62	2.37		6	1.270	18.62 955
	.708	5.11	2.62		5	1.268	18.54 950
7	.818	6.88	3.37		4	1.275	18.84 965
	.902	7.98	4.09		-3	1.270	18.62 955
6	.956	9.04	4.63		-2	1.264	18.37 941
	.995	9.89	5.06		-1	1.231	17.02 870
35	1.031	10.74	5.57		0	1.220	16.60 851
4	1.041	10.99	5.63		+1	1.207	16.11 826
3	1.027	10.64	5.45		2	1.207	16.11 826
2	1.040	10.96	5.61		3	1.220	16.60 850
1	1.041	10.99	5.64		4	1.220	16.60 850
30	1.050	11.22	5.75		5	1.221	16.63 852
7	1.055	11.35	5.81		6	1.227	16.87 865
8	1.052	11.27	5.77		7	1.226	16.83 862
7	1.062	11.53	5.91		8	1.253	17.91 919
6	1.059	11.46	5.87		9	1.270	18.62 955
25	1.065	11.61	5.95		10	1.270	18.62 955
4	1.073	11.83	6.11				
3	1.085	12.16	6.23				
2	1.096	12.16	6.23				
1	1.118	12.47	6.38				
20	1.135	13.12	6.73				
9	1.153	13.65	7.00				
8	1.153	14.22	7.30				

		I		
11	1.288	19.41	995	39
2	1.290	(19.50)	1.00	40
3	1.290	(19.50)	1.00	41
4	1.282	19.14	981	42
15	1.260	18.20	933	43
6	1.257	18.07	926	44
7	1.226	16.83	863	45
8	1.190	15.49	784	
9	1.154	14.26	730	
20	1.107	12.79	655	
1	1.047	10.99	564	
	0.9713	9.40	482	
	0.966	9.25	474	
	1.041	10.99	564	
2	1.091	12.33	632	
	1.130	12.49	691	
3	1.167	14.69	752	
	1.193	15.60	800	
4	1.215	16.41	840	
25	1.236	17.22	883	
6	1.236	17.22	883	
7	1.244	17.54	900	
8	1.252	17.86	915	
9	1.231	17.02	873	
30	1.231	17.02	873	
1				
2				
3				
4				
35				
36				
37				
38				

			I	I'					I		
-20	1.478	1.478	30.06	30.06		8	2.080		120.2		
9	1.493		31.12	30.10		9	2.090		123.0		
8	1.473		29.72			10	2.100	1.491	125.9	30.97	
7	1.456		28.58			1	2.100		125.9		
6	1.445		27.86	30.20		2	2.100		125.9	31.10	
15	1.458		28.71			3	2.100		125.9		
4	1.493		31.12			4	2.106		127.6	31.20	
3	1.538		34.51			15	2.106		127.6		
2	1.598		39.63	30.30		6	2.100		125.9	31.30	
1	1.603		40.09			7	2.090		123.0		
10	1.559		36.22			8	2.066		116.4	31.40	
	1.583	1.482	31.84	30.34		9	2.050		112.2		
	1.410		25.70			20	2.066	1.498	116.4	31.48	
7	1.367		23.28			1	2.066		116.4	31.60	
	1.382		24.10			2	2.066		116.4		
8	1.461		28.91			3	2.076		119.1	1.70	
7	1.627		42.36			4	2.080		120.2	1.80	
	1.792		61.44	30.40		25	2.106		127.6		
	1.850		70.79			6	2.110		128.8	1.90	
6	1.880		75.86			7	2.100		125.9		
5	1.895		78.52			8	2.090		123.0	2.0	
4	1.895		78.52			9	2.066		116.4	2.1	
-3	1.915		82.22	30.56		30	2.010	1.508	102.3	32.21	
-2	1.910		81.28			1	1.915		82.22		
-1	1.945		88.10			2	1.822		66.37	2.3	
0	1.953	1.486	89.74	30.62		3	1.788		61.38		
1	1.953		89.74			4	1.740		54.95	2.4	
2	1.988		97.27			5	1.720		52.48		
3	2.000		100.0	30.70		6	1.720		52.48	2.5	
4	2.020		104.7			7	1.679		47.75		
5	2.030		107.2			8	1.628		42.46		
6	2.050		112.2	30.80		9	1.618		41.50	32.66	
7	2.066		116.4			40	1.570	1.514	37.15		
						41	1.570		37.15		

			I	I'	a					
-70	1.373	1.358	23.60	22.80	.	1	1.318	20.80	20.80	
9	1.373		23.60			40	1.484	38.48	30.48	
8	1.338		21.78			9	1.641	1.373	43.75	
7	1.265		18.41			9	1.660		45.71	
6	1.210		16.22			8	1.662		45.92	
65	1.188		15.42			7	1.700		50.12	
4	1.144		13.93			6	1.705		50.70	
3	1.155		14.29			35	1.718		52.24	
2	1.155		14.29			4	1.736		54.45	
1	1.140		13.80			3	1.774		59.43	
60	1.120	1.360	13.18	22.91		2	1.774		59.43	
9	1.120		13.18		28.15	1	1.787		61.24	
8	1.133		13.58		27.50	30	1.805	1.377	63.83	
7	1.140		13.80		26.80	9	1.812		64.86	
6	1.188		15.42		26.20	8	1.842		69.50	
55	1.217		16.48		25.50	7	1.864		73.11	
4	1.255		17.99		24.90	6	1.870		74.13	
3	1.280		19.05		24.15	25	1.880		75.86	
2	1.318		20.80		23.40	4	1.900		79.43	
1	1.331		21.43		22.80	3	1.955		90.16	
50	1.360	1.370	22.91	23.44	22.10	2	1.976		94.62	
7	1.380		23.99			1	1.983		96.16	
8	1.400		25.12			20	1.983	1.387	96.16	
7	1.434		27.16			1	1.983		96.16	
6	1.449		28.12			8	1.983		96.16	
45	1.449		28.12			7	1.983		96.16	
4	1.387		24.38			6	1.980		95.50	
4	1.267		18.49			15	2.000		102.3	
3	1.118		13.12			4	2.010		102.3	
3	1.050		11.22							
2	1.071		11.78							
2	1.150		14.13							

			I	I'				I		
13	1.990		97.72			15	1.548	35.32		
2	1.960		91.20			6	1.530	33.88		
1	1.935		86.10			7	1.513	32.58		
10	1.935	1.393	86.10	24.72		8	1.505	31.99		
9	1.935		86.10			9	1.484	30.48		
8	1.935		86.10			20	1.465	29.17	26.00	
7	1.950		89.13							
6	1.950		89.13							
5	1.960		91.20							
4	1.960		91.20							
3	1.970		93.33							
2	1.980		95.50							
1	1.970		93.33							
0	1.960	1.401	91.20	25.18						
1	1.950		89.13							
2	1.930		85.11							
3	1.878		75.51							
4	1.792		61.94							
5	1.736		54.45							
6	1.662		45.92							
7	1.641		43.74							
8	1.630		42.66							
9	1.610		40.74							
10	1.595	1.406	39.36	25.47						
11	1.595		39.36							
2	1.569		37.07							
3	1.569		37.07							
14	1.548		35.32							

Δ
 H β A 51.405 + 0.707 20.67
 B 52.387 - 0.275 8.04
 4872 52.112

H γ A 52.411 - 0.296 8.65
 4325 52.707

H δ A 53.208 - 1.365 39.90
 4118 54.673

H ϵ A 55.599 - 0.405 - 11.83
 B 54.733 - 1.271 - 37.15
 C 54.661 - 1.343 - 39.26
 D 54.132 - 1.872 - 54.72
 3977 56.004

H ζ A 56.771 + 0.697 20.37
 B 54.753 - 1.321 38.61
 3895 56.074

	$\log I$		I	I'				I		
						812	2.170	1.087	147.9	12.22
						+11	2.207		161.1	12.17
				31		210	2.237		172.6	12.12
37	1.118					93	2.240		173.8	12.07
-25	1.128	1.128	13.12	13.42		84	2.305		201.8	12.02
26	1.126		13.37	38		75	2.290		195.0	11.97
35	1.125		13.12	33		66	2.295		197.2	11.92
24	1.118		12.68	13.27		57	2.305		201.8	11.87
53	1.074		11.86	23		48	2.310		204.2	11.82
22	1.071		11.78	19		39	2.242	1.070	174.6	11.75
51	1.050		11.22	15		210	2.232		170.6	11.69
30	1.046		11.12			14	2.232		170.6	11.63
18	1.063	1.118	11.56	13.12		012	2.242		174.6	11.57
29	1.090		12.30	13.08		113	2.260		182.0	11.51
28	1.103		12.68	13.03		214	2.260		182.0	11.45
27	1.140		13.80	12.99		315	2.250	1.056	177.8	11.38
26	1.181		15.17	12.94		416	2.260		182.0	11.32
25	1.202		15.92	12.90		517	2.250		177.8	11.22
15	1.212		16.29	12.86		618	2.235		171.8	11.14
24	1.238		17.30	12.81		719	2.110		128.8	11.06
22	1.230		16.98	12.77		820	1.786	1.041	61.09	10.99
21	1.310		20.42	12.73		921	1.490		29.51	10.92
20	1.739	1.103	54.82	12.68		1022	1.300		19.95	10.85
19	2.018		104.2	12.62		1123	1.229		16.94	10.77
18	2.045		110.9	12.56		1224	1.200		15.85	10.69
17	2.094		124.2	12.50		1325	1.210	1.026	16.22	10.62
16	2.110		128.8	12.44		1426	1.239		17.34	10.55
15	2.137		137.1	12.38		1527				
14	2.160		144.5	12.32		1628				
13	2.167		146.9	12.26		1729				

16.4 161.4
11.4 161.4
R₁ = 9.84
14

	Log I		I	I'					
					1	2.205	160.3	40.90	119.4
1527	1.625	1.621	42.17	41.78	2	2.247	176.6	40.86	
1426	1.623		41.98		3	2.258 2.258	194.1	40.81	153.3
1325	1.600		39.81	-1.97	4	2.288	194.1	40.78	
1224	1.634		43.05		5	2.288	194.1	40.78	153.3
1123	1.745		55.59	-13.81	6	2.238	173.0	40.74	
1022	1.922		83.56		7	2.120	131.8	40.64	91.2
91	2.1120		131.8	-90.0	8	2.894	78.34	40.53	
820	2.219		165.6		9	1.704	50.58	40.42	10.2
719	2.238		173.0	-131.2	10	1.625	42.17	40.32	
618	2.226		168.3		11	1.615	41.21	40.20	1.0
517	2.226		168.3	-126.50	12	1.657	45.60	40.09	
416	2.176		150.0		25				
315	2.164		145.9	-104.1					
214	2.194		156.3						
113	2.164		145.9	-104.1					
12	2.120	1.621	131.8	41.78					
11	2.119		131.8	41.71					
10	2.110		128.8	41.63					
9	2.110		128.8	41.56					
8	2.064		115.9	41.49					
7	2.050		112.2	41.41					
6	2.064		115.9	41.33					
5	2.127		134.0	41.25					
4	2.098		125.3	41.17					
3	2.100		125.9	41.10					
2	2.142	1.613	138.7	41.02					
1	2.154		142.6	40.98					
0	2.194		156.3	40.94					

19161

	Log I		I					I	
27	0.987	0.979	9.71	9.53					
26	0.979		9.53						
25	1.005		10.12	9.51					
24	0.944		8.79						
23	0.953		8.97	9.50					
22	1.028		10.67						
21	1.488		15.42	9.49					
20	1.371		23.50						
19	1.575		37.58	9.48					
18	1.628		42.46						
17	1.632		42.85	9.47					
16	1.630		42.66						
15	1.644		44.04	9.46					
14	1.628		42.46						
13	1.655		45.19	9.45					
12	1.680		47.86						
11	1.683	0.975	48.19	9.44					
10	1.708		51.65	9.42					
9	1.693		49.32	9.40					
8	1.757		57.15	9.38					
7	1.750		56.23	9.36					
6	1.753		56.62	9.34					
5	1.792		61.94	9.32					
4	1.776		59.70	9.30					
3	1.787		61.24	9.28					
2	1.778		59.98	9.26					
								</	

	log I		I				I			
					7	2.107	127.9	28.61		
35	1.536	1.500	34.36	31.62	6	2.103	126.8	28.48		
34	1.502		31.77	31.54	5	2.110	128.8	28.35		
33	1.490		30.90	31.46	4	2.110	128.8	28.22		
32	1.487		30.69	31.38	3	2.094	1.449	124.2	28.12	
31	1.481		30.27	31.30	2	2.082	120.8	28.00		
30	1.465		29.17	31.22	1	2.061	115.1	27.87		
29	1.487		30.69	31.14	0	2.061	115.1	27.74		
28	1.487		30.69	31.06	1	2.052	112.7	27.61		
27	1.513		32.58	30.98	2	2.061	115.1	27.48		
26	1.532		34.04	30.90	3	2.070	117.5	27.35		
25	1.536	1.489	34.36	30.83	4	2.082	120.8	27.22		
24	1.553		35.72	30.71	5	2.082	120.8	27.09		
23	1.605		40.27	30.59	6	2.085	121.6	26.96		
22	1.620		41.69	30.47	7	2.033	107.9	26.83		
21	1.630		42.66	30.35	8	1.965	92.26	26.70		
20	1.722		57.94	30.23	9	1.830	1.424	67.61	26.55	715
19	1.770		83.56	30.11	10	1.685	48.42	26.41		
18	1.995		93.33	29.99	11	1.626	42.27	26.27		
17			98.86	29.87	12	1.593	39.17	26.13		
16	2.002		100.5	29.75	13	1.536	34.36	26.00		
15	2.015	1.472	103.5	29.65	14	1.560	36.31	25.86		
14	2.040		109.6	29.52	15	1.608	1.410	40.36	25.70	705
13	2.040		109.6	29.39						
12	2.040		109.6	29.26						
11	2.040		109.6	29.13						
10	2.082		120.8	29.00						
9	2.070		117.5	28.87						
8	2.094		124.2	28.74						

	$\log I$	$\log I'$	I	I'					
					12	1.733	54.08		
15	1.160	1.174	14.45	14.93	13	1.752	56.49		
14	1.190		15.49		14	1.793	1.195 62.09	15.67	
13	1.198		15.78		15	1.823	66.53		
12	1.169		14.76		16	1.793	62.09		
11	1.182		15.21		17	1.827	67.14		
10	1.182		15.21		18	1.814	65.16		
9	1.221		16.63		19	1.789	61.52		
8	1.258		18.11		20	1.776	59.70		
7	1.284		19.23		21	1.758	57.28		
6	1.360		22.91		22	1.779	60.12		
5	1.523		33.34		23	1.779	60.12		
4	1.580	1.182	38.02	15.21	24	1.771	59.02		
3	1.592		39.08		25	1.755	56.89		
2	1.606		40.36		26	1.755	56.89		
1	1.606		40.36		27	1.766	58.34		
0	1.621		41.78		28	1.757	57.15		
1	1.620		41.69		29	1.754	56.75		
2	1.621		41.78		30	1.755	1.208 56.89	16.14	
3	1.635		43.15		31	1.732	53.95		
4	1.635		43.15		32	1.703	50.47		
5	1.653		44.98		33	1.635	43.15		
6	1.645		44.16		34	1.579	37.93		
7	1.667		46.45		35	1.523	33.34		
8	1.692		49.20		36	1.505	31.99		
9	1.684		48.31		37	1.495	31.26		
10	1.735		54.33		38	1.470	29.51		
11	1.737		54.58		39	1.433	27.10		
					40	1.431	26.98		

H 8 287

H 8 287

121

41	1.445	27.86	
42	1.455	28.51	
43	1.451	26.98	
44	1.426	26.67	
45	1.415	26.00	
46	1.416	26.06	
47	1.438	27.42	
48	1.407	25.53	
49	1.377	23.82	
50	1.451	1.220 26.98	16.60
51	1.367	23.28	
52	1.355	22.65	
53	1.274	18.79	
54	1.208	16.14	
55	1.230	16.98	

70	1.245	17.58
68	1.270	18.62
66	1.312	20.51
64	1.300	19.95
62	1.258	18.11
60	1.221	16.63
58	1.214	16.37
56	1.240	17.38
54	1.275	18.84
52	1.270	18.62
50	1.295	19.72
48	1.303	20.09
46	1.292	19.59
44	1.317	20.75
43	1.262	
42	1.262	18.28
41	1.430	26.92
40	1.472	29.65
38	1.467	29.31
36	1.482	30.34
34	1.497	31.41
32	1.490	30.90
30	1.522	33.27
28	1.512	32.51
26	1.538	34.51
24	1.550	35.48

122

H 8 287

H \neq 264
8

	$\log I$	I			
22	1.586	38.55			
20	1.596	39.45	56	1.665	46.24
18	1.613	41.02	55	1.668	46.56
16	1.633	42.95	54	1.676	47.42
14	1.631	42.76	53	1.679	47.75
12	1.589	38.82	52	1.663	46.03
10	1.573	37.41	51	1.653	44.98
8	1.589	38.82	50	1.676	47.42
6	1.584	38.37	49	1.700	50.12
4	1.577	37.76	48	1.724	52.97
2	1.575	37.58	47	1.808	64.27
0	1.563	36.56	46	1.866	73.45
2	1.536	34.36	45	1.968	92.90
4	1.436	27.29	44	1.990	95.50
6	1.290	19.50	43	1.990 2.022	95.50
8	1.224	16.75	42	2.022	105.2
10	1.230	16.98	41	2.060	114.8
12	1.213	16.33	40	2.115	130.3
14	1.208	16.14	39	2.135	136.5
16	1.206	16.07	38	2.145	139.6
18	1.245	17.58	37	2.135	136.5
20	1.220	16.60	36	2.115	130.3
22	1.201	15.89	35	2.115	130.3
24	1.195	15.67	34	2.115	130.3
26	1.195	15.67	33	2.110	128.8
28	1.195	15.67	32	2.100	125.9
30	1.173	14.89	31	2.110	128.8
32	1.137	13.71	30	2.110	128.8
34	1.119	13.15	29	2.080	120.2
36	1.111	12.91			

		I				
28	2.065	116.1	4	2.260	1	182.0
27	2.049	111.9	2	2.263		183.2
26	2.050	112.2	3	2.200		158.5
25	2.045	110.9	4	2.095		124.5
24	2.004	100.9	5	2.022		105.2
23	2.034	108.1	6	1.906		80.54
22	2.004	100.9	7	1.788		61.38
21	2.004	100.9	8	1.691		49.09
20	2.004	100.9	9	1.684		48.31
19	2.004	100.9	10	1.653		44.98
18	2.015	103.5	11	1.652		44.87
17	2.004	100.9	12	1.652		44.87
16	2.004	100.9	13	1.642		43.85
15	2.034	108.1	14	1.672		46.99
14	2.065	116.1	15	1.658		45.50
13	2.075	118.9	16	1.670		46.77
12	2.040	109.6	17	1.884		48.31
11	2.070	117.5	18	1.670		46.77
10	2.095	124.5	19	1.665		46.24
9	2.125	133.4	20	1.670		46.77
8	2.145	139.6	21	1.665		46.24
7	2.155	142.9	22	1.637		43.35
6	2.183	152.4	23	1.632		42.85
5	2.213	163.3	24	1.600		39.81
4	2.240	173.8	25	1.570		37.15
3	2.267	184.9	26	1.550		35.48
2	2.294	196.8	27	1.553		35.73
1	2.321	209.4	28	1.568		36.98
0	2.267	184.9				

-10	1.630	1.625	42.66	42.17	-15
9	1.625		42.17		14
8	1.633		42.95		13
7	1.625		42.17		12
6	1.618		41.50		11
5	1.655		45.19		10
4	1.684		48.31		9
3	1.750		56.23		8
2	1.810		64.57		7
1	1.910		81.28		6
0	1.926		96.83		-5
1	1.986		96.83		4
2	1.986		96.83		3
3	1.968		92.90		2
4	1.970		90.33		1
5	1.956		90.36		0
6	1.939		86.90		1
7	1.968		92.90		2
8	1.960		91.20		3
9	1.934		85.90		4
10	1.932		85.51		5
11	1.900		79.43		6
12	1.910		81.28		7
13	1.902		79.80		8
14	1.968		92.90		9
15	1.920		83.18		10

14	1.939	86.90	2	11
17	1.932	85.51		12
18	1.968	92.90		13
19	1.986	96.83		14
20	2.004	100.9		15
21	2.002	100.5		16
22	2.000	100.0		17
23	2.004	100.9		18
24	2.002	100.5		19
25	2.026	106.2		20
26	2.034	108.1		21
27	2.049	111.9		22
28	2.095	124.5		23
29	2.095	124.5		24
30	2.155	142.9		25
31	2.213	163.3		26
32	2.200	158.5		27
33	2.206	160.7		28
34	2.210	162.2		29
35	2.206	160.7		30
36	2.095	124.5		31
37	⁸⁰ 1.928	95.50		32
38	1.906	80.54		33
39	1.872	74.47		34
40	1.837	68.71		35
41	1.827	67.14		36
42	1.796	62.52		37

264 HY

HS 220

125

			I	
38	43	1.798	62.81	
39	44	1.796	62.52	
40	45	1.784	60.81	
41	46	1.784	60.81	
42	47	1.776	59.70	
43	48	1.780	60.26	
44	49	1.800	63.10	
	50	1.814	65.16	
	51	1.842	69.50	
	52	1.837	68.71	
	53	1.847	70.31	
	54	1.818	65.77	
	55	1.772	59.16	
	56	1.708	51.05	
	57	1.696	49.66	
	58	1.691	49.09	
	59	1.690	48.98	
	60	1.702	50.35	48.31

70	1.124
68	1.072
66	0.998
64	0.942
62	0.918
60	0.898
58	0.898
56	0.936
54	0.989
52	1.038
50	1.102
48	1.124
46	1.180
44	1.172
42	1.132
40	1.048
38	0.990
36	1.000
34	1.116
32	1.254
30	1.331
28	1.373
26	1.454
24	1.493
22	
20	
18	

I

70	0.955	9.02
68	0.892	7.80
66	0.757	5.71
64	0.588	3.87
62	0.510	3.24
60	0.423	2.65
58	0.423	2.65
56	0.570	3.71
54	0.733	5.41
52	0.841	6.93
50	0.935	8.61
48	0.954	9.00
46	1.006	10.14
44	1.001	10.02
	0.964	9.20
43	0.856	7.18
42	0.744	5.55
	0.744	6.70
	0.976	9.46
41	1.081	12.05
40	1.185	15.31
38	1.245	17.58
36	1.273	18.75
34	1.304	20.14
32	1.327	21.23
30	1.355	22.65
28	1.379	23.93
26	1.396	24.89
	1.409	
24	1.409	25.64
	1.468	
22	1.468	29.38
	1.460	
20	1.460	28.84
18	1.473	29.72
16	1.485	30.55

I

14	1.498	31.48
12	1.454	28.44
10	1.444	27.80
8	1.460	28.84
6	1.460	28.84
4	1.468	29.38
2	1.493	31.12
0	1.446	27.93
2	1.398	25.00
4	1.265	18.41
6	1.151	14.16
8	1.091	12.33
10	1.060	11.48
12	1.056	11.38
14	1.056	11.38
16	1.032	10.76
18	1.005	10.12
20	0.958	9.08
22	0.933	8.57
24	0.922	8.36
26	0.911	8.15
28	0.885	7.67
30	0.881	7.60

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

128

H R 49

H S 219

		I
35	1.458	28.71
36	1.546	35.16
37	1.546	35.16
38	1.571	37.24
39	1.571	37.24
40	1.566	36.81
41	1.555	35.89
42	1.538	34.51
43	1.529	33.81
44	1.546	35.16
45	1.509	33.81
46	1.529	33.81
47	1.509	32.28
48	1.485	30.55
49	1.458	28.71
50	1.445	27.86
51	1.432	27.04
52	1.432	27.04
53	1.405	25.41
54	1.400	25.12
55	1.400	25.12

		I
70	1.384	24.21
68	1.320	20.89
66	1.257 ¹⁸⁹	15.45
64	1.052 ¹⁰⁵²	11.27
62	1.046	11.12
60	1.013	10.30
58	1.005	10.12
56	1.066	11.64
54	1.196	15.70
52	1.276	18.88
50	1.361	22.96
48	1.327	24.95
46	1.445	27.86
44	1.435	27.23
42	1.272 1.238 1.234 1.202 1.435 1.600 1.710	17.30 15.92 39.21 51.29
40	1.710	
38	1.772	59.16
36	1.854	71.45
34	1.870	74.13
32	1.900	79.43
30	1.940	87.10
28	1.955	90.16
26	1.980	95.50
24	1.975	94.41
22	2.065	116.1
20	2.065	116.1
18	2.065	116.1
16	2.085	121.6

I

1918phae.proj.11635

130

H β 138 Material I 90

S	log I	log I'	S	log I	log I'
			9		1.429
			8		1.426
			7		1.425
			6		1.422
			5		1.420
30			4		1.419
29			3		1.416
28		1.479	2		1.411
27		1.473	1		1.405
26		1.471	0		1.403
25		1.468	1		1.400
24		1.467	2		1.397
23		1.466	3		1.394
22		1.466	4		1.391
21		1.463	5		1.385
20		1.460	6		1.382
19		1.458	7		1.380
18		1.453	8		1.377
17		1.451	9		1.374
16		1.448	10		1.366
15		1.447	11		1.361
14		1.445	12		1.360
13		1.443			
12		1.440			
11		1.435			
10		1.433			

	$\log I$	I			I
-15	1.475	29.85	12	2.378	238.8
14	1.475	29.85	13	2.400	251.2
13	1.500	31.62	14	2.430	269.0
12	1.529	33.81	15	2.420	263.0
11	1.544	34.99	16	2.400	251.2
10	1.475	29.85	17	2.385	242.7
9	1.424 1.408	26.55	18	2.357	227.5
8	1.529	33.81	19	2.346	221.8
7	1.872	74.47	20	2.357	227.5
6	1.972	93.76	21	2.400	251.2
5	2.017	104.0	22	2.400	251.2
4	2.030	107.2	23	2.400	251.2
3	2.074	118.6	24	2.420	263.0
2	2.082	120.8	25	2.440	275
1	2.074	118.6	26	2.430	269
0	2.100	125.9	27	2.415	260
1	2.122	132.4	28	2.400	251.2
2	2.1 ⁴⁵ 1.85	139.3	29	2.346	221.3
3	2.180	151.4	30	2.259	173.4
4	2.185	153.1	31	2.048	111.7
5	2.190	154.9	32	1.892	77.98
6	2.228	169.0	33	1.820	66.07
7	2.220	166.0	34	1.769	58.75
8	2.346	221.8	35	1.740	54.95
9	2.370	234.4	36	1.739	54.83
10	2.346	221.8	37	1.728	53.46
11	2.346	221.8	38	1.740 1.704	54.95
			39	1.704 1.687	50.58
			40	1.687	48.64

		I					I
41	1.652	44.87			66	1.332	21.48
42	1.655	45.19			64	1.336 ³⁹	21.83
43	1.672	47.00			62	1.208	16.14
44	1.662	45.92			60	1.080	12.02
45	1.664	46.12			58	1.053 ³⁹ 1.085	12.16
46	1.688	48.75			56	1.108	12.82
47	1.684	48.31			54	1.057	11.40
48	1.686	48.53			52	1.093	12.39
49	1.664	46.13			50	1.201	15.89
50	1.660	45.71			48	1.272	18.71
51	1.662	45.92			46	1.353	22.54
52	1.650	44.67			44	1.384	24.21
53	1.635	43.15			42	1.392	24.66
54	1.622	41.88			40	1.366 1.331 1.272 1.166 1.094 1.028 1.007 1.005	21.43 14.66 25.06 38.46
55	1.588	38.73			38	1.076	47.42
	1.586	38.55			36	1.700	50.12
					34	1.722	52.72
					32	1.766	58.34
					30	1.824	66.68
					28	1.848	70.47
					26	1.884	76.56
					24	1.928	84.72
					22	1.975	94.41
					20	2.000	100
					18	2.026	106.2
					16	2.026	106.2
					14	2.040	109.6
					12	2.062	115.3

I

10	2.026	108.6
8	2.000	100.0
6	2.005	101.2
4	2.026	106.2
2	2.026	106.2
0	2.057	114.0
2	2.030	107.2
4	2.026	106.2
6	⁸⁸⁴ 1.980	76.56
8	⁷³² 1.824	53.95
10	1.624	42.07
12	1.600	39.81
14	1.549	35.40
16	1.524	33.42
18	1.494	31.19
20	1.470	29.51
22	1.450	26.92
24	1.408	25.59
26	1.398	25.00
28	1.386	24.32
30	1.260	22.91
32	1.366	23.23
34	1.370	23.44
36	1.384	24.20

H E 210

135

$$R = \frac{1}{10} I_0 = 58.6$$

S	Log I	I	
45	1.323	21.04	359
44	1.335	21.63	369
43	1.331	21.43	366
42	1.337	21.73	371
	1.337	21.73	371
41	1.328	21.28	363
	1.305	20.18	344
40	1.254	17.95	366
	1.194	15.63	267
39	1.208	15.89	271
	1.226	16.83	281
38	1.194	15.63	267
	1.178	15.07	257
37	1.208	16.14	275
	1.288	19.41	
36	1.380	23.99	409
35	1.418	26.18	446
34	1.445	27.86	475
32	1.482	30.34	518
30	1.488	30.76	525
28	1.488	30.76	525
26	1.514	32.66	557
24	1.533	34.12	581
22	1.553	35.73	609
20	1.553	35.73	609
18	1.574	37.50	640
16	1.638	43.45	746
14	1.645	44.16	753
	1.635		
12	1.606	40.36	688
10	1.662	45.92	782
8	1.680	47.86	815
6	1.704	50.58	862
4	1.680	47.86	815
2	1.676	47.42	809

S	Log I	I	
0	1.720	52.48	895
2	1.723	52.84	895
4	1.746	55.72	950
6	1.746	55.72	950
8	1.768	58.61	100
10	1.730	53.70	916
12	1.694	49.43	842
14	1.606	40.36	687
16	1.501	31.70	540
18	1.448	28.05	479
20	1.448	28.05	479
22	1.430	26.92	459
24	1.442	27.67	472
26	1.403	25.29	432
28	1.366	23.23	396
30	1.349	22.34	381
32	1.339	21.83	373
34	1.323	21.04	359
36	1.305	20.18	344
38	1.296	19.77	337
40	1.296	19.77 ⁵⁰	332
42	1.268	18.54	316
44	1.254	17.95	306

$$R = \frac{I}{I_0} \approx 2$$

S	Log I	I	
-44	0.973	9.40	.388
43	1.981	9.57	.376
42	1.977	9.48	.392
41	1.969	9.31	.385
40	1.969	9.31	.385
39	1.931	8.95	.370
38	1.882	4.02	.166
37	1.859	6.01	.248
36	1.859	7.23	.299
35	1.847	8.89	.371
34	1.809	10.21	.422
33	1.862	11.53	.472
32	1.087	12.22	.505
31	1.117	13.09	.540
30	1.108	12.82	.530
29	1.104	12.71	.525
28	1.146	14.00	.598
27	1.149	14.09	.581
26	1.149	14.09	.581
25	1.161	14.49	.599
24	1.186	15.35	.634
23	1.208	16.14	.667
22	1.234	17.14	.708
21	1.257	18.07	.745
20	1.321	20.94	.865
19	1.311	20.46	.845
18	1.305	20.18	.833
17	1.328	21.28	.880
16	1.337	21.73	.898
15	1.337	21.73	.898
14	1.305	20.18	.833
13	1.278	18.97	.784

S	Log I	I	
2	1.288	19.41	.802
4	1.311	20.61	.851
6	1.336	21.68	.895
8	1.364	23.12	.955
10	1.384	24.21	1.00
12	1.376	23.77	.980
14	1.380	23.99	.991
16	1.348	21.28	.879
18	1.227	16.87	.696
20	1.228	16.90	.698
21.5	1.060	11.48	.474
21	1.109	12.85	.531
22	1.175	14.96	.618
23	1.201	17.02	.704
24	1.240	17.38	.718
25	1.266	18.45	.762

1	56.622	^Δ -0.786	-22.80
2	56.749	-0.659	-19.20
Ref	57.408	—	
3	58.770	+1.362	+39.68
4	58.898	+1.490	+43.40

	HS	Δ	
1	50.069	?	-65.28
Ref	52.310	-2.241	
3	53.169	+0.859	+25.02

$$R = I/119$$

$$R = I/119$$

Scale	Log I		^{60.26} (1.780)	\bar{z} Δ					
-21	1.80	63.10	1.05	23249	.530	7	2.010	102.2	860
20	1.774	59.42	.986	23243	.499	8	2.010	102.3	860
19	1.705	50.70	.842	237	.479	9	2.020	104.7	874
18	1.734	54.20	.900	230	.455	10	2.031	107.4	901
17	1.708	51.05	.848	224	.429	11	2.070	117.5	986
16	1.666	46.34	.769	211		12	2.060	114.8	965
16	1.645	44.16	.733	218	.371	13	2.076	119.1	1.00
15	1.627	42.36	.702	215		14	2.076	119.1	1.00
15	1.628	42.46	.705	212	.356	14	2.076	119.1	1.00
14	1.671	46.88	.778	205	.394	15	2.063	115.6	970
13	1.715	51.88	.860	200	.435	16	2.050	112.2	942
12	1.739	54.83	.910	194	.460	17	2.070	93.33	.783
11	1.762	57.81	.960	187	.485	18	1.970	93.33	.783
10	1.768	58.61	.974	184		19	1.990	97.72	.820
10	1.765	58.21	.967	181	.489	19	1.990	97.72	.820
9	1.750	56.23	.935	177		20	1.995	98.86	.830
9	1.735	54.33	.901	174	.456	20	1.995	98.86	.830
8	1.703	50.47	.837	171		21	1.980	95.50	802
8	1.676	47.42	.793	168	.399	21	1.980	95.50	802
7	1.633	42.95	.713	162	.360	22	1.903	79.98	.672
6	1.585	38.46	.639	156	.323	23	1.872	74.47	.625
5	1.557	36.06	.599	153		24	1.872	74.47	.625
5	1.525	33.50	.556	151	.282	24	1.955	90.16	756
4	1.537	34.42	.571	147		25	1.972	93.76	787
4	1.585	38.46	.639	144	.323	25	1.972	93.76	787
3	1.689	48.87	.811	140		26	1.975	94.41	794
3	1.760	57.54	.955	137	.484	26	1.975	94.41	794
2	1.800	63.10	1.05	134		27	1.972	93.76	787
2	1.838	68.87	1.14	121	.579	27	1.972	93.76	787
1	1.910	81.28			.683	28	1.972	93.76	787
0	1.950	89.13			.750	29	1.927	84.53	710
1	1.980	95.50			.802	30	1.824	66.68	560
2	1.990	97.72			.821	31	1.793	62.09	521.575
3	1.904	80.17			.674	32	1.795	62.07	523
4	1.904	80.17			.674	33	1.842	69.50	584
5	1.950	89.13			.750	34	1.903	79.98	671
6	2.010	102.3			.860				

139 H 8

H 8 139

139

I₀ = 62

R

				S	log I	$\frac{2.8.31}{1.452}$	$\frac{2.8.31}{1.452}$	
35	1.906	80.54	677	57	1.490	30.90	1.20	24600 .498
36	1.903	79.98	671	56	1.481	30.27	1.18	595 .489
37	1.857	71.94	604	55	1.483	30.41	1.18	589 .491
38	1.820	66.07	546	54	1.486	30.62	1.19	584 .495
	1.770	58.82	494					91
39	1.662	45.92	385	53	1.463	29.04	1.13	578 .469
40	1.689	48.87	410		1.418	26.18	.890	75 .422
41	1.780	60.26	506	52	1.334	21.58	.763	572 .348
	1.813	65.01			1.281	19.10	.675	70 .308
42	1.795	62.37	523	51	1.228	16.90	.598	567 .273
43	1.724	52.94	445		1.203	15.96	.564	64 .257
44	1.780	60.26	506	50	1.206	16.07	.568	561 .259
45	1.838	68.87	586		1.221	16.63	.588	59 .268
46	1.832	67.92	570	49	1.240	17.28	.614	556 .280
				48	1.281	19.10	.675	53 .308
				47	1.308	20.32	.718	550 .328
					1.342	21.98	.777	47
				46	1.365	23.17	.819	544 .373
				45	1.400	25.12	.888	529 .405
				44	1.417	26.12	.924	523 .421
				43	1.429	26.85	.950	528 .433
				42	1.413	25.88	.915	522 .417
				41	1.400	25.12	.888	516 .405
				40	1.382	24.10	.851	510 .389
					1.358	22.80	.806	08
				39	1.358	20.56	.726	506 .368
						18.79	.664	03
				38	1.340	17.66	.624	500 .285
					1.274	17.70	.625	97
				37	1.247	17.66	.624	24494 .285
					1.247	17.78	.629	91
				36	1.247	18.84	.866	485 .304
					1.250	22.71	.838	86
				35	1.275	21.12	1.10	483 .502
					1.375	36.81		86
				34		39.17		483 .502
				33	1.493	42.95		631 .692
				32	660	45.71		737 .737
				31	680	47.86		771 .771
				30	671	46.88		755 .755
				29	646	44.26		714 .714

		Log I					
29	1.674	47.21	761	26	1.506	32.06	.518
28	1.687	48.64	785	27	1.568	36.98	.596
26	1.734	54.20	875	28	1.560	36.31	.585
24	1.774	59.42	959	30	1.507	34.42	.555
22	1.784 ⁸⁴	58.08	936	32	1.560	36.31	.585
20	1.767	58.48	944	32	1.577	37.76	.609
18	1.753	56.62	914	32			
16	1.757	57.15	922	32			
14	1.797	62.66	1.00	32			
12	1.756	57.02	.920	32			
10	1.739	54.83	.885	32			
8	1.732	53.95	.870	32			
6	1.726	53.21	859	32			
4	1.739	54.83	885	32			
2	1.734	54.20	875	32			
0	1.732	53.95	870	32			
2	1.723	52.84	852	32			
4	1.655	45.19	728	32			
6	1.660	45.71	738	32			
8	1.691	49.09	791	32			
10	1.643	43.95	716	32			
12	1.633	42.95	694	32			
14	1.621	41.78	674	32			
16	1.629	42.56	686	32			
18	1.617	41.40	668	32			
20	1.626	42.27	681	32			
22	1.585	38.46	620	32			
24	1.475	29.85	481	32			
25	1.439	27.48	444	32			

H γ

		λ	$\alpha \lambda$
1)	52.129	- 0.813	- 23.68
Ref	52.942	0.0	0.0
2)	54.266	+ 1.324	38.57
3)	54.395	1.453	42.33

H δ

		Best	
1)	53.142	- 2.243	- 65.34
Ref	55.385	0.0	
2)	55.568	+ 1.183	+ 34.46

H ϵ

1)	46.135	- 1.472	- 42.88
2)	49.607	0.0	
Ref	50.004	0.397	+ 11.56

Ca + inter

Ca + inter

142

HY 138

~~Plot~~

I/129.4

Scale	log I	I	I' = 62.00	Σ					
-23	1.756	57.02			.441	4	1.934	85.90	665
22	1.820	66.07	1.066	23256	.504	5	2.000	100.0	774
21	1.785	60.95	0.984	49	.472	6	2.038	109.1	845
20	1.734	54.20	0.875	43	.420	7	2.025	105.9	820
	1.718	52.24	0.833	40	.404	8	2.034	108.1	836
19	1.739	54.83	0.884	37	.324	9	2.051	112.5	870
18	1.718	52.24	0.833	30	.404	10	2.087	122.2	945
	1.676	47.42	0.765	27					
17	1.652	44.87	0.723	24	.347	11	2.100	125.9	.965
	1.636	43.25	0.697	21					
16	1.645	44.16	0.712	18	.342	12	2.100	125.9	.965
15	1.662	45.92	0.741	12	.355	13	2.112	129.4	1.00
	1.678	47.64	0.769	8					
14	1.718	52.24	0.842	5	.405	14	2.100	125.9	.965
13	1.750	56.23	0.906	200	.436	15	2.077	119.4	.924
12	1.765	58.21	0.940	194	.454	16	1.992	98.87	760
11	1.793	62.09	1.00	187	.481	17	1.958	90.78	703
10	1.739	54.83	0.884	181	.424	18	1.990	97.72	756
9	1.706	50.82	0.820	174	.394	19	2.000	100.0	.774
8	1.664	46.13	0.745	168	.358	20	2.010	102.3	791
	1.633	42.95	0.692	65					
7	1.570	37.15	0.599	162	.287	21	1.903	79.98	.619
	1.547	35.24	0.569	59					
6	1.533	34.12	0.550	156	.264	22	1.880	75.86	.586
	1.509	32.28	0.520	53					
5	1.520	33.11	0.524	150	.256	23	1.904	85.90	665
	1.610	40.74	0.657	47	.316				
4	1.708	51.05	0.824	144	.395	24	1.950	89.13	690
	1.780	60.26	0.972	40					
3	1.832	67.92	1.095	137	.525	25	1.975	94.41	730
	1.857	71.94	1.160	34					
2	1.868	73.79		131	.571	26	1.955	90.16	698
1	1.960	91.20			.706	27	1.980	95.50	740
0	1.988	97.27			.754	28	1.934	85.90	665
1	2.000	100.0			.774	29	1.820	66.07	512
2	1.938	86.70			.671	30	1.764	58.61	454
3	1.875	74.99			.580				

HY 108

H5
R $I_0 = 78.5$ H S

143

						$\log I$	I	$I' = 1.560$ 36.30	
31	1.770	58.88	454	.519	59	1.610	40.74		
32	1.800	63.10	489	.525	58	1.615	41.21		
33	1.866	73.45	569	.516	55	1.608	40.55		
34	1.888	77.27	598	.512	54	1.604	40.18		
35	1.886	73.45	569	.485	53	1.581	38.11	1.05	24584
36	1.857	71.94	557	.439	52	1.537	34.43	0.950	78
37	1.810	64.57	500	.342	51	1.479	30.13	0.830	5
38	1.734	54.20	344	.300	50	1.429	26.85	0.740	72
39	1.648	44.46	315	.299	49	1.400	25.12	0.691	70
40	1.610	40.74	332	.311	48	1.372	23.55	0.649	67
41	1.633	42.95	378	.353	47	1.369	23.39	0.644	64
42	1.689	48.87	420	.412	46	1.370	23.44	0.646	61
43	1.735	54.33		.439	45	1.388	24.40	0.672	56
44	1.763	57.94		.439	44	1.443	27.73	0.764	50
45	1.792	62.09		.412	43	1.478	30.06	0.827	47
46	1.696	49.66		.439	42	1.510	32.36	0.891	44
47	1.729	52.58		.439	41	1.537	34.43	0.950	39
48	1.790	61.66		.439	40	1.537	34.43	0.950	33
49	1.820	66.07		.439	39	1.549	35.40	0.975	28
50				.439	38	1.537	34.43	0.950	22
				.423	37	1.521	33.19	0.915	16
				.387	36	1.503	31.84	0.877	12
				.330	35	1.483	30.41	0.838	10
				.286	34	1.445	27.86	0.768	8
				.292	33	1.414	25.94	0.715	06
				.325	32	1.368	23.33	0.643	03
				.462	31	1.351	22.44	0.619	500
				.565	30	1.360	22.91	0.631	494
				.665	29	1.355	22.65	0.625	91
					28	1.407	25.53	0.709	488
					27	1.560	36.31	0.725	85
					26	1.648	44.48	0.224	483
					25	1.676	47.42		
					24	1.718	52.24		478
					23	1.739	54.83		
					22	1.765	58.21		
					21	1.780	60.26		
					20	1.770	58.88		
					19	1.775	59.57		

144

HS 138

R

Pluto

HS 138

R

Scale	log I	I					
29	1.788	61.38	.786		2	1.837	68.71 .875
28	1.812	64.86	.826		1	1.848	70.47 .896
27	1.842	69.50	.885		0	1.845	69.98 .891
26	1.872	74.47	.948		1	1.829	67.45 .860
25	1.880	75.86	.965		2	1.820	66.07 .841
24	1.888	77.27	.984		3	1.780	60.26 .768
23	1.872	74.47	.948		4	1.735	54.33 .691
22	1.864	73.11	.931		5	1.750	56.23 .715
21	1.880	75.86	.965		6	1.765	58.21 .741
20	1.857	71.94	.915		7	1.765	58.21 .741
19	1.872	74.47	.948		8	1.770	58.88 .750
18	1.857	71.94	.915		9	1.750	56.23 .716
17	1.865	73.28	.934		10	1.750	56.23 .716
16	1.895	78.52	1.00		11	1.729	53.58
15	1.886	76.91	.979		12	1.718	52.24 .665
14	1.900	79.43	1.01		13	1.718	52.24
13	1.880	75.86	.965		14	1.718	52.24 .665
12	1.836	68.55	.874		15	1.715	51.88
11	1.831	67.76	.863		16	1.706	50.82 .646
10	1.831	67.76	.863		17	1.718	52.24
9	1.831	68.55	.874		18	1.716	52.00 .662
8	1.820	66.07	.841		19	1.699	50.00
7	1.810	64.57	.822		20	1.701	50.23 .646
6	1.800	63.10	.804		21	1.682	48.08
5	1.836	68.55	.874		22	1.648	44.46 .565
4	1.829	67.45	.860		23	1.617	41.40
3	1.845	69.98	.891		24	1.585	38.46
					25	1.545	35.08 .446
					26	1.537	34.43
					27	1.537	34.43 .439
					28	1.635	42.15 .550
					29	1.662	45.92
					30	1.629	42.56 .442
					31	1.617	41.40 .439
					32	1.617	41.40 .439

He		Δ	$\alpha \Delta$
B	39.632	-	1.365
Ref	40.997		-39.78

H β		Δ	$\alpha \Delta$
A	43.289	-	1.240
Ref	44.529		-36.12

264	He	Δ	$\alpha \Delta$	H β	
	A	44.902	-1.855	-54.04	A _{He} 50.045
	B	46.359	-0.398	-11.59	Ref 48.377
	Ref	46.757	0.0		$\Delta = + 1.668$
					$\alpha \Delta = 48.59$

220	He	Δ	$\alpha \Delta$	H β	Δ
	Ref	49.677	0.0	Ref	53.212
	A	50.075	-0.398	-11.59	C 51.553
	B	50.952	-1.275	-6.01	$\alpha \Delta = 48.36$
	C	51.552	-1.875	54.62	

217	He	Δ	$\alpha \Delta$	H β	
	C	52.708	1.873	-54.56	C 52.708
	B	53.305	-1.276	37.17	Ref 51.053
	A	54.178	-0.403	11.74	$\Delta = 1.655$
	Ref	54.581			$\alpha \Delta = 48.21$

$\frac{I}{26.42}$

1918

26.42

Scale	Log I	I							
37.5 40.5	0.830	6.76	.256		12	15	1.268	18.54	.700
37 40	0.830	6.11	.231		11	14	1.331	21.43	810
36.7 39.7	.767	5.85	.222		10	13	1.341	21.93	828
36.3 39.5	.795	6.24	.236		9	12	1.331	21.43	810
					8	11	1.353	22.54	851
36 39	.920	8.32	.315		7	10	1.400	25.12	950
35.5 38.5	1.000	10.00	.378		5	8	1.422	26.42	1.00
35 38	1.026	10.62	.402		4	7	1.367	23.28	.880
34 37	1.057	11.40	.431		3	6	1.507	20.28	767
33 36	1.061	11.51	.436		2	5	1.550	20.38	809
32 35	1.096	12.47	.461		-1	4	1.376	23.77	898
31 34	1.104	12.71	.480		+1	2	1.395	24.83	.940
29 32	1.083	12.11	.458		2	1	1.395	24.83	.940
28 31	1.028	13.43	.508		3	0	1.360	22.91	.866
27 30	1.110	12.88	.486		5	2	1.360	22.91	.866
26.5 29.5	1.098	12.53	.473		7	4	1.381	24.04	910
25 28	1.122	13.24	.500		9	6	1.358	22.80	862
23 26	1.163	14.55	.550		11	8	1.327	21.23	804
21 24	1.059	14.42	.545				1.342	21.98	831
19 22	1.218	16.52	.625		13	10	1.276	18.88	911
18 20	1.241	17.42	.659				1.261	18.24	690
17 20	1.210	16.22	.613		15	12	1.222	16.67	630
16 19	1.276	18.88	.714		17	14	1.104	12.71	481
15 18	1.313	20.56	.776		19	16	1.091	12.33	466
14 17	1.266	18.45	.697		21	18	1.096	12.47	471
13 16	⁵² 1.271	17.86	.675		23	20	1.120	13.18	498
					25	22	1.077	11.94	452
					27	24	1.061	11.51	.435

E

I/12.37

I

Scale	Log I								
33	0.652	4.49	336	37	6	1.083	12.11	.965	10
	0.467	5.85	438		4	1.085	12.16	.909	8
32	0.778	6.00	449	36	3	1.104	12.71	.950	
	0.760	5.75	430		2	1.106	12.76	.954	6
31	0.783	6.07	454		0.7	1.126	13.37	1.00	5
30	807	6.41	479	34	0	1.091	12.33	.921	4
28.5	.782	6.05	452		1	1.013	10.30	.770	
28	.828	6.76	506	32	2	1.036	10.86	.811	2
29	863	7.30	546		3	1.029	10.69	.799	
26	830	6.76	506	30	4	1.004	10.09	.754	0
25	860	7.24	541		5	1.036	10.86	.811	
24	863	7.30	546	28	6	1.061	11.51	.861	2
23	836	6.86	513		8	1.075	11.89	.890	0
22	832	6.79	508	26	10	1.042	11.02	.824	6
20	830	6.76	506	24	11	1.068	11.69	.874	
19	878	7.55	565	20	12	1.028	10.67	.797	8
18	863	7.30	546	22	14	1.076	11.91	.890	10
16	892	7.80	584	20	16	1.059	11.46	.856	12
14	934	8.59	642	18	18	1.020	10.47	.783	14
12.7	908	8.09	605		20	.929	8.49	.635	16
12	970	9.33	697	16	22	.760	5.75	.430	18
11	1.028	10.67	797		23	.648	4.45	.333	
10	1.013	10.30	770	14	24	.603	4.01	.300	20
9	1.026	10.62	795		25	.570	3.72	.278	
8	1.026	10.62	.795	12	26	.628	4.25	.318	22
					27	.570	3.72	.278	
					28	.619	4.16	.311	24

H6

scale setting see v 145

264

	Log I		I/81.28				
50	1.249	17.74	.218	10	1.613	41.02	.505
48	1.239	17.34	.213	8	1.650	44.67	.550
46	1.266	18.45	.227	6	1.704	50.58	.622
44	1.271	18.66	.229	4	1.746	55.72	.685
42	1.310	20.42	.251	2	1.748	55.98	.688
40	1.354	22.59	.278	0	1.810	64.57	.795
38	1.420	26.30	.322	2	1.816	65.46	.805
36	1.551	35.56	.437	4	1.842	69.50	.855
35	1.634	43.05	.530	6	1.862	72.78	.896
34	1.663	46.03	.566	8	1.905	80.35	.988
33	1.678	47.64	.586	10	1.908 ^{7.10}	(81.28)	1.00
32	1.675	47.32	.582	12	1.895	78.52	.966
31	1.670	46.77	.575	13	1.880	75.46	.933
30	1.678	47.64	.586	14	1.790	61.66	.759
28	1.653	44.98	.554	16	1.614	41.11	.506
26	1.632	42.85	.527	18	1.486	30.62	.377
25	1.634	43.05	.530	20	1.417	26.12	.321
24	1.646	44.26	.545	22	1.404	25.35	.312
22	1.618	41.50	.510	24	1.426	26.67	.328
20	1.592	39.08	.481	26	1.397	24.95	.307
18	1.609	40.64	.506	28	1.444	27.80	.342
19	1.589	38.82	.478	30	1.515	32.73	.403
16	1.597	39.54	.486	32	1.585	38.46	.473
15	1.648	44.46	.546	34	1.622	41.88	.515
14	1.603	40.09	.494	36	1.645	44.16	.543
12	1.568	36.98	.455	38	1.679	47.75	.588
11.5	1.542	34.83	.429	40	1.663	46.03	.566
				42	1.686	48.53	.597
				44	1.594	39.26	.483
				46	1.508	32.21	.396
				48	1.503	31.77	.390

H S

264

149

I/54.0

	$\log I$						
-44	1.025	10.59	.196	2	1.417	26.12	482
43	0.997	9.93	.182	2	1.450	28.18	521
42	1.049	11.19	207	2	1.537	34.43	638
41	1.097	12.50	231	4	1.571	37.24	690
40	1.109	12.85	238	6	1.610	40.74	754
39	1.180	15.14	280	8	1.644	44.06	816
38	1.258	18.11	335	10	1.711	51.40	951
37	1.361	22.96	425	12	1.732	(53.95)	1.00
36	1.444	27.80	507	14	1.720	52.48	970
35	1.465	29.17	530	15	1.715	51.88	960
34	1.498	31.48	582	16	1.665	46.24	8856
33	1.518	32.96	610	18	1.426	26.67	494
22	1.518	32.96	610	20	1.156	14.32	265
32	1.509	32.28	597	22	1.110	12.88	238
30	1.520	33.11	612	24	1.041	10.99	204
29	1.528	33.73	624	26	1.050	11.22	208
26	1.488	30.76	569	28	1.058	11.43	212
24	1.521	33.19	614				
22	1.493	31.12	577				
20	1.484	30.48	564				
18	1.447	27.99	509				
16	1.413	25.88	479				
15	1.464	29.11	540				
14	1.440	27.54	510				
12	1.385	24.27	450				
10	1.373	23.66	436				
9	1.385	24.27	450				
8	1.367	23.28	431				
8	1.361	22.96	425				
7	1.361						
6	1.444	27.80	514				
4	1.469	29.14	544				

HE 253

I/2184

Healo								
					10	764	5.81	266
					18	803	6.35	290
-48					7	845	7.00	320
					6	867	7.26	337
-44	0.485	3.06	.140		5	.898	7.91	362
42	0.566	3.68	.168		4	983	9.62	440
40	0.485	3.06	.140		3	1.047	11.14	509
39	0.600	3.98	.182		2	1.115	13.03	595
38	0.646	4.42	.202		1	1.066	11.64	532
37	0.588	3.87	.177		0	1.097	12.50	571
36	0.632	4.29	.196		2	1.153	14.22	650
35	0.770	5.89	.269		4	1.213	16.33	746
34	0.814	6.52	.298		6	1.267	18.49	845
33	0.878	7.55	.345		8	1.303	20.09	917
32	0.937	8.65	.395		10	1.340	(21.88)	1.00
31.5	0.924	8.40	.384		10	1.328	21.28	972
31	0.955	9.62	.412		12	1.335	21.63	990
30	0.974	9.42	.430		14	1.276	18.88	861
28	0.964	9.20	.420		15	1.445	15.31	700
26	0.946	8.83	.403		16	1.046	11.12	508
25	0.908	8.09	.369		18	0.908	8.09	370
24	0.907	8.65	.395		18	0.774	5.94	271
22	0.920	8.32	.380		19	0.669	4.67	213
22	0.895	7.85	.359		20	.647	4.44	203
20	0.890	7.71	.355		22	0.525	3.35	153
19	0.805	6.38	.292		24	.550	3.55	162
18	0.845	7.00	.320		27	.625	4.22	193
16	0.803	6.35	.290		28	.582	3.82	175
14	0.805	6.38	.291		30	.589	3.88	177
13.5	0.837	6.87	.314		32	702	5.04	230
12	0.800	6.31	.289		34	803	6.35	290
12	763	5.79	.264		36	861	7.26	332
11	751	5.64	.258		38	893	7.82	358

He

40	923	8.38	382
42	944	8.79	401
44	870	7.41	388
46	870 ⁷⁶⁰	5.75	263
48	632	4.29	196

E/13.20

10	992	9.82	746
12	1.082	12.08	914
14	1.120	13.18	1.00
16	1.047	11.14	.842
18	0.803	6.35	481
20	0.534	3.42	260

H₂

Anden

exp. 1!

37	0.485	3.06	232
35	.632	4.29	325
32	.669	4.67	355
30	.780	6.03	458
28	.781	6.04	458
26	755 ⁷⁵⁵	5.69	401
24	755 ⁷⁵⁵	5.69	431
22	762 ⁷⁶²	5.92	450
20	772 ⁶⁶⁹	4.67	354
18	691	4.91	372
16	632	4.29	325
14	650 ⁶¹⁰	4.07	369
13	650	4.17	339
12	507	3.21	294
10	599	3.97	301
8	485	3.06	232
6	534	3.42	259
4	582	3.82	290
2	630	4.27	324
0	647	4.44	336
2	691	4.91	372
4	775	5.96	451
6	845	7.00	531
8	896	7.87	596
10	955	9.02	684

		I	I/21.2					
				4	6	1.258	18.11	851
				2	8	1.252	17.86	840
-48	.900	7.94	.374	0	10	1.271	18.66	880
46	.928	8.47	398	2	12	1.297	19.82	932
44	.928	8.47	398	4	14	1.289	19.45	916
42	.917	8.26	388	6	16	1.298	19.86	936
41	.907	8.07	380	7	17	1.326	21.18	11.00
40	.888	7.73	364	8	18	1.317	20.75	.978
39	.861	7.26	341	10	20	1.280	19.05	.898
38	.766	5.83	2.75	12	22	1.226	16.83	793
37.5	.715	5.19	2.44	14	24	1.155	14.29	672
37	.760	5.75	2.71	16	26	1.117	13.09	617
36	.947	8.85	416	18	28	1.071	11.78	554
35	1.029	10.69	503	20	30	1.036	10.86	512
34	1.065	11.61	547	22	32	1.008	10.19	480
32	1.099	12.56	590	24	34	1.017	10.40	490
31	1.070	11.75	553	26	36	1.022	10.52	495
30	1.104	12.71	598	28	38	1.029	10.69	502
28	1.110	12.88	609	30	40	0.987	9.71	456
26	1.119	13.15	619	32	42	.973	9.40	443
24	1.160	14.45	680	34	44	.973	9.40	443
22	1.174	14.96	.704	36	46	.976	9.46	445
20	1.172	14.86	700	38	48	950	8.91	420
18	1.197	15.74	740	40	50	952	8.95	421
16	1.213	16.33	769	42	52	935	8.61	408
14	1.233	17.10	805	44	54	880	7.59	.357
12	1.229	16.94	798	46	56	843	6.97	.328
11.5	1.200	15.85	747	48	58	825	6.68	314
11	1.185	15.31	720					
10	1.205	16.03	755					
10	1.243	17.50	823					
8.2	1.243	17.50	823					
6.4	1.276	18.88	890					

1918phae.proj.11658

H S 220

I/10.7

-44	441	2.76	258
42	438	2.74	256
41	403	2.53	237
40	356	2.127	212
39	262	1.83	171
38	190	1.55	145
37	413	2.59	242
36	662	4.59	429
35	696	4.97	465
34	701	5.02	470
33	701	5.02	470
32	757	5.72	534
30	780	6.03	563
28	793	6.21	581
26	810	6.46	602
24	825	6.68	624
22	861	7.26	679
20	874	7.48	699
18	880	7.59	710
16	908	8.09	757
14	967	9.27	867
12	967	9.27	867
12	947	8.85	828
10	959	9.10	850
8	965	9.23	862
6	979	9.53	891
4	979	9.53	891
2	947	8.85	828
0	935	8.61	807
2	947	8.85	828

4	971	9.35	873
6	987		
6	1.005	9.71	910
8	1.005		
8	1.029	10.12	956
10	1.029	(10.69)	1.00
12	1.002	10.05	940
12	1.002	10.05	940
14	987	9.71	910
16	931	8.53	798
18	834	6.82	638
20	602	4.00	374
22	746	5.57	520
24	808	6.43	601
26	808	6.43	601

115 213

I/29.04

-44	1.018	10.42	358	2	1.356	22.70	78
42	1.012	10.28	354	4	1.371	23.50	810
41	1.012	10.28	354	6	1.395	24.83	855
40	0.980	9.55	³²⁹ 275	8	1.432	27.04	951
39	902	7.98	275	10	1.463	29.04	1.00
38	859	7.22	249	12	1.436	27.29	.940
38	872	7.45	257	14	1.418	26.18	901
37	1.002	10.05	346	16	1.342	21.98	756
36	1.114	13.00	448	18	1.261	18.24	628
35	1.164	14.59	502	19	1.186	15.35	529
34	1.164	14.59	502	20	1.079	11.99	378
33	1.158	14.29	495	21	1.171	14.83	511
32	1.172	14.86	511	22	1.231	17.02	586
30	1.196	15.70	541	23	1.270	18.62	641
28	1.196	15.70	541	24	1.283	19.19	660
26	1.202	15.92	549				
24	1.223	16.71	579				
22	1.240	17.38	599				
20	1.257	17.82	614				
18	1.276	18.88	650				
16	1.317	20.75	715				
14	1.365	23.23	800				
12	1.356	22.70	781				
10	⁶³ 1.370	23.07	795				
8	1.380	23.99	825				
6	1.407	25.53	879				
4	1.392	24.66	850				
2	1.363	23.07	795				
0	1.330	21.38	735				
	1.345	22.12	761				

I/74.13

-46	1.361	22.96	310	4	14	1.784	60.81	820
44	1.353	22.54	304	2	12	1.756	57.02	790
42	1.338	21.78	294	0	10	1.796	62.52	844
42	1.353	22.54	304	2		1.810	64.57	871
41	1.376	23.77	320	4		1.832	67.92	915
40	1.297	19.82	267	6		1.870	74.13	1.00
39.5	1.257	18.07	244					
39	1.270	18.62	251	8		1.868	73.79	995
38	1.183	15.24	205	10		1.806	63.79	860
	1.143	13.90	188					
37	1.193	15.60	211	12		1.710	51.29	691
36	1.426	26.67	360	14		1.624	42.07	567
35	1.484	30.48	411	16		1.524 1.485	33.42	451
34	1.535	34.28	462	18		1.485 1.444	30.55	412
32	1.540	34.67	468	20		1.441	27.61	372
30	1.570	37.15	501	22		1.455	28.51	385
28	1.583	38.28	516	24		1.485	30.55	412
						1.490	30.70	416
26	1.624	42.07	568	26		1.460	28.84	389
24	1.637	43.35	584	28		1.423	26.49	357
22	1.657	44.87	605	30		1.409	25.64	346
20	1.657	45.39	611	32		1.420	26.30	355
18	1.700	50.12	676	34		1.401	25.18	340
16	1.700	50.12	676	36		1.378	23.88	322
14	1.736	54.45	734	38		1.384	24.21	326
13	1.736	54.45	734	40		1.356	22.70	306
12	1.607	46.45	626	42		1.315	20.65	279
11	1.723	52.84	712	44		1.268	18.54	250
10	1.736	54.45	734	46		1.257	18.07	244
18	1.771	59.02	796	48				
16	1.814	65.16	880					

HJ 219

I/30.2

-44	1.003	10.07	333		8	1.472	29.65	981
42	0.986	9.68	320		9	1.480	(30.20)	1.00
40	0.982	9.59	317		10	1.460	28.84	955
40	0.837	6.87	227		12	1.435	27.22	903
	806	6.40	212		14	1.390	24.55	814
39	852	7.11	236		16	1.297	19.82	656
38	1.052	11.27	373		17	1.270	18.62	616
37	1.163	14.55	481		18 ^{18.5}	1.242	17.46	578
36	1.202	15.92	524		18	1.173	14.89	493
34	1.212	16.30 15.28	540 650	18	1.090 ₈₃	12.30	407	
32	1.228	16.90	560		19	1.090	12.30	407
30	1.238	17.20	573		20	1.163	14.55	481
28	1.250	17.78	589		21	1.214	16.37	542
26	1.266	18.45	610		22	1.232	17.06	565
24	1.292	19.59	648		23	1.249	17.74	586
22	1.317	20.75	687		24	1.252	17.86	591
20	1.319	20.84	690					
18	1.330	21.38	707					
16	1.399	25.06	830					
14	1.405	25.41	841					
12	1.394	24.97	820					
10	1.396	24.89	825					
8	1.422	26.42	875					
6	1.441	27.61	915					
	1.435	27.23	901					
4	1.394	24.77	819					
	1.360	22.91	759					
2	1.372	23.55	774					
0	1.373	23.60	781					
2	1.403	25.29	837					
4	1.430	26.92	890					
6	1.435	27.23	902					

138 H E

157

627

I/57.02

						26	1.690	48.98	858	21
						24	1.689	48.87	856	19
						22	1.735	54.33	952	17
						20	1.734	54.20	950	15
53	48	1.591	38.99	.684		18	1.726	53.21	936	13
51	46	1.586	39.45	691	1748	16.7	1.697	49.77	873	
49	44	1.452	28.31	496		16	1.717	55.98	980	11
47	42	1.355	22.65	397		14	1.7 ⁵⁶ 1.716	(57.02)	1.00	9
45	50	1.312	20.51	360	1.739	12	1.7 ²⁶ 1.712	53.21	934	7
43	48	1.324	21.09	370		11	1.750	56.23	986	
42	-47	1.350	22.39	392		10	1.708	54.83	960	5
41	-46	1.351	22.44	394		8	1.739	54.83	960	3
40	45	1.313	20.56	360		6	1.708	51.05	895	-1
39	44	1.217	16.48	289		4	1.705	50.70	890	+1
38	43	1.176	15.00	263		2	1.700	50.12	879	3
37	42	1.1099	12.56	220		0	1.703	50.47	884	5
36	41	1.020	10.47	183		2	1.690	48.98	875	7
35	40	1.8964	9.20	161		4	1.669	46.67	817	
34	39	1.2891	7.78	136		4	1.627	42.38	741	7
33	38	9.7843	6.92	121		6	1.664	46.13	809	11
32	37	1.950	8.91	156		8	1.6 ⁹⁰ 1.670	48.98	876	13
31	36	1.8084	12.13	213		10	1.689	48.87	856	15
30	35	1.324	21.09	370		12	1.563	36.56	640	-17
29	34	1.412	25.82	452		14	1.591	38.99	683	17
28	33	1.493	31.12	545		16	1.610	40.79	715	21
27	32	1.549	35.40	620		18	1.591	38.99	684	23
26	31	1.585	38.46	675		20	1.604	40.18	705	25
25	30	1.618	41.50	727		22	1.616	41.30	724	27
24	29	1.627	42.36	741		24	1.579	37.93	665	27
23	28	1.660	45.71	801		26	1.545	35.08	615	31
						28	1.560	36.31	636	33
						30	1.545	35.42	675	35
						32	1.560	36.31	636	37
						34	1.537	34.43	604	39
						36	1.560	36.31	636	41
							1.579	37.93	665	
							1.579	37.93	665	

He

140

 $\lambda_0 = 74.7$

I/88.5

	u	$\log I$							
					24	56.2	1.726	53.21	602
					22	58.7	1.864	63.68	720
-53	53.4	1.658	45.50	514	20	60.5	1.852	71.12	804
51	53.4	1.658	45.50	514	18	60.6	1.857	71.94	813
50	51.9	1.624	42.07	475	16	61.8	1.894	78.34	885
49	47.6	1.537	34.43	389	14	61.9	1.903	79.98	904
48	43.0	1.453	28.38	320	13	62.4	1.920	83.18	940
47	40.3	1.405	25.41	287 (11.5)	12.5	60.7	1.860	72.44	819
46	38.8	1.379	23.93	270	10	62.8	1.935	86.10	973
45	38.1	1.365	23.17	262	8	62.3	1.920	83.18	940
44	38.4	1.371	23.50	266	6	62.9	1.939	86.90	988
43	38.1	1.365	23.17	262	4	63.0	1.947	(88.51)	1.00
42	40.7	1.416	26.06	295	2	62.2	1.917	82.60	935
41	39.7	1.394	24.77	280	0	61.2	1.878	75.51	855
40	38.0	1.364	23.12	261	2	61.6	1.891	77.80	867
39	33.6	1.287	19.36	219	4	61.3	1.880	75.86	857
38	29.3	1.209	16.18	191	8	60.5	1.852	71.12	804
37	27.0	1.170	14.79	167	9	58.6	1.790	61.66	697
36	22.2	1.083	12.11	137	10	58.5	1.788	61.38	693
35	18.5	1.009	10.21	115	12	60.6	1.857	71.94	812
34	16.2	960	9.12	103	14	60.8	1.862	72.78	825
33	15.1	885	7.67	087	16	59.1	1.804	63.68	720
32	20.0	1.039	10.94	124	17.5	56.2	1.726	53.21	601
31	26.0	1.153	14.22	161	18	57.0	1.746	55.72	630
30	39.0	1.204	16.00	181	20	58.0	1.772	59.16	669
29	46.4	1.514	32.66	369	22	58.0	1.772	59.16	669
28	47.5	1.575	37.58	424	24	58.0	1.772		669
27	52.5	1.637	43.35	490	28	58.0	1.772		669
26	55.0	1.694	49.43	559	30	56.5	1.732	53.95	610
25	56.0	1.720	52.48	593	32	54.3	1.677	47.53	337

I/30.6

	Log I							
					16	1.404	25.35	829
					14	1.432	27.04	885
					12.5	1.437	27.35	894
					12	1.424	26.55	869
					11.5	1.403	25.29	826
					11	1.430	26.92	880
					10	1.461	28.91	945
					8	1.467	29.31	958
					6	1.486	(30.62)	1.00
					4	1.456	28.58	935
					2	1.432	27.04	885
					0	1.411	25.76	841
					0	1.432	27.04	885
					2	1.437	27.35	884
					4	1.455	28.51	932
					6	1.469	29.44	963
					8	1.473	29.72	971
					10	1.486	(30.62)	1.00
					12	1.449	28.12	919
					14	1.379	23.93	782
					16	1.343	22.03	720
					18	1.347	22.23	726
					20	1.361	22.96	750
					22	1.332	21.48	702
					24	1.329	21.33	697
					26	1.293	19.63	642
					28	1.286	19.05	622
					30	1.250	17.78	581
					32	1.258	18.11	592
-53	1.180	15.14	495					
51	1.163	14.55	476					
50	1.122	13.24	433					
49	1.104	12.71	416					
48	1.046	11.12	364					
47	1.040	10.96	368					
46	0.983	9.62	315					
45	1.087	12.22	400					
44	1.221	16.63	544					
43	1.232	17.06	557					
42	1.254	17.95	586					
41	1.260	18.20	595					
40	1.180	15.14	495					
39	1.119	13.15	430					
38	1.018	10.42	341					
37	1.009	10.21	334					
36	998	9.95	325					
35	1.018	10.42	341					
34	1.160	14.45	472					
33	1.250	17.78	581					
32	1.313	20.56	671					
30	1.320	20.89	684					
28	1.326	21.18	691					
26	1.337	21.72	677					
	1.318	20.80	680					
24	1.256	18.03	590					
	1.244	17.54	574					
22	1.257	18.07	590					
20	1.287	19.36	633					
18	1.356	22.70	741					

H e 160

I/80.17

	Log I							
-50	1.440	27.54	343		6	1.892	77.98	961
48	1.462	29.04	362		4	1.862	72.78	906
47	1.448	28.05	350		2	1.806	63.97	798
46.5	1.432	27.04	337		0	1.814	65.16	804
46	1.448	28.05	350		2	1.814	65.16	804
45	1.524	33.42	416		4	1.831	67.76	845
43	1.579	37.92	473		6	1.874	74.82	931
42	1.575	37.58	469		8	1.868	73.79	920
40	1.554	35.81	446		10	1.904	(80.17)	1.00
39	1.451	28.25	352		12	1.823	66.53	830
38	1.325	21.12	263		14	1.757	57.15	713
37	1.316	20.70	258		16	1.680	47.86	596
36	1.318	20.80	259		18	1.664	46.13	575
35	1.367	23.28	290		20	1.638	43.45	541
34	1.524	33.42	417		22	1.614	41.11	513
33	1.660	45.71	570		24	1.584	38.57	479
32	1.694	49.43	615		26	1.549	35.40	441
30	1.710	51.29	639		28	1.517	32.89	410
28	1.697	49.77	620		30	1.484	30.48	380
26	1.660	45.71	570		32	1.469	29.44	367
24	1.557	36.06	450		34	1.440	27.54	343
22	1.555	35.89	447		36	1.446	27.93	348
20	1.620	41.69	520					
18	1.664	46.13	575					
16	1.760	57.54	7518					
14	1.812	64.86	808					
12	1.796	62.52	780					
11.5	1.770	58.88	733					
10	1.812	72.78	906					
8	1.868	73.79	920					

I/50.8

-43	1.387	24.38	480
42	1.387	24.38	480
41	1.395	24.82	490
40	1.331	21.43	423
39	1.232	17.06	336
38	1.155	14.29	282
	1.140	13.80	272
37	1.140	13.80	272
36	1.280	19.05	375
35	1.449	28.12	554
34	1.485	30.55	602
32	1.513	32.58	641
30	1.537	34.42	679
28	1.498	31.48	420
26	1.475	29.85	588
24	1.495	31.26	616
22	1.527	33.65	663
20	1.537	34.42	679
18	1.556	35.97	708
16	1.620	41.69	821
14	1.607	40.46	796
11.5	1.579	37.93	748
10	1.630	42.66	841
8	1.640	43.65	861
6	1.662	45.92	905
4	1.640	43.65	861
2	1.630	42.66	841
0	1.635	43.15	850

2	1.652	44.87	884
4	1.662	45.92	905
6	1.706	(50.82)	1.00
8	1.698	49.89	982
10	1.658	45.50	896
12	1.682	43.85	884
14	1.620	41.69	821
16	1.527	33.65	664
18	1.490	30.90	609
20	1.466	29.24	576
22	1.449	28.12	554
24	1.435	27.23	536
26	1.435	27.23	536
28	1.402	25.23	497
30	1.387	24.38	480

180 115

I/22.80

-43	1.000	10.00	438
42	1.016	10.38	446
41	0.993	9.84	431
40	0.989	8.11	356
	0.803	6.35	279
39	695	4.96	218
	675	4.73	207
38	730	5.41	237
	845	7.00	307
37	962	9.16	407
36	1.075	11.89	521
35	1.107	12.79	560
34	1.125	13.34	585
	1.118	13.12	575
33	1.127	13.40	589
32	1.128	13.43	589
		13.09	574
31	1.117		574
30	1.127	13.40	588
28	1.133	13.58	595
26	1.169	14.76	647
24	1.180	15.14	664
22	1.188	15.42	676
20	1.215	16.41	720
18	1.246	17.62	773
16	1.288	19.41	851
14	1.311	20.46	898
12	1.315	20.65	905
10	1.331	21.43	940
8	1.331	21.43	940
6	1.343	22.03	966
4	1.339	21.83	958
2	1.310	20.42	895

0	1.285	19.28	845
2	1.277	19.36	849
4	1.305	20.18	885
6	1.314	20.61	905
8	1.331	21.43	940
10	1.358	22.70	995
12	1.358	(22.80)	1.00
			1.00
14	1.347	22.23	975
16	1.295	19.72	865
18	1.239	17.04	760
19	1.149	14.09	618
20	1.043	11.04	485
21	1.125	13.34	585
22	1.251	17.82	781
23	1.295	19.72	865
24	1.311	20.46	896
25	1.297	19.82	870

Continuous Absorption

Scale	λ	$\frac{u}{u_0}$	$\log I$	I	μ_{true}
137	3734	27 ³¹⁸ 312	1.022	10.5	26960
140	3724	.438	.998	9.95	27620
2	3717	22.7 284	.970	9.34	27080
145	3708	244	.928	8.47	27150
7	3701	17.5 219	.896	7.87	27200
150	3691	188	.852	7.11	27270
2	3685	14 175	.830	6.76	317
155	3675	13 163	.808	6.43	384
7	3669	12 150	.783	6.06	424
160	3659	10 125	.724	5.30	505
2	3653	8.5 106	.671	4.69	565
165	3643	7.5 094	.628	4.25	625
7	3636	6 075	.558	3.61	675
170	3626	4.5 056	.466	2.92	745
2	3620	4 050	.434	2.72	770
175	3610	3 038	.358	2.28	865
7	3604	2 025	.260	1.82	920
180	3594	1.7 021	.228	1.69	985

164

DAO 202

Cont Als.

 $u_0 = 89$

scale	u	log I	I	λ
139	66.2	1.466	29.2	3727
140	65.0	1.446	27.9	3723
142	62.5	1.408	25.6	3717
145	59.5	1.364	23.1	3708
147	55.0	1.305	20.2	3701
150	52.7	1.289	19.5	3691
151	53.0	1.280	19.0	3688
153	52.0	1.270	18.6	3682
155	50.0	1.244	17.5	3675
157	48.0	1.223	16.7	3669
159	45.0	1.190	15.5	3663
160	43.5	1.171	14.8	3659
162	39.5	1.127	13.4	3653
165	35.5	1.082	12.1	43
167	33.0	1.053	11.3	36
170	28.0	1.000	10.0	26
172	25.0	968	9.29	20
175	21.5	925	8.41	10
177	18.0	873	7.46	04
180	14.0	797	6.27	3594
182	11.0	721	5.26	3588
185	9.0	616	4.13	3578
190	4.5	460	2.88	3562

25 No. 8

Unsöld Formula

$$\frac{I_\nu}{I_0} = \frac{1}{1 + N_2 a_\nu} \quad a_\nu = \frac{c^2}{32 \pi^3 \nu^2} \frac{g_n}{g_m} A_{nm} \Gamma_{nm} \left(\frac{1}{(\nu - \nu_0)^2 + \left(\frac{\Gamma_{nm}}{4\pi} \right)^2} \right)$$

We use the form

$$a_\nu = 7.42 \times 10^{-25} \text{ f. } \Gamma_{nm} \frac{\nu_0^2}{(\nu - \nu_0)^2}$$

$$\lambda \text{ in cm} = \frac{1}{\tilde{\nu}} \quad \Gamma = 6.5 \times 10^8$$

(Menzel Lick Publ. 17, 231, eqn 7.68)

Note: the numbers calculated in this book (referred to on pp 10, 17, 43, 48, 52) are wave-numbers $\tilde{\nu}$)

$$\begin{aligned} a_\nu &= [(7.42)(6.5) 10^{-17}] \text{ f. } \frac{1}{\tilde{\nu}^2} \frac{\tilde{\nu}_0^2}{(\tilde{\nu} - \tilde{\nu}_0)^2} \\ &= (4.83 \times 10^{-16}) \frac{1}{\tilde{\nu}^2} \frac{\tilde{\nu}_0^2}{(\tilde{\nu} - \tilde{\nu}_0)^2} \text{ f.} \quad \frac{1}{\tilde{\nu}^2} \frac{\tilde{\nu}_0^2}{(\tilde{\nu} - \tilde{\nu}_0)^2} = Z \end{aligned}$$

Here $\tilde{\nu}_0$ is taken as the wave number of the line center: I_ν/I_0 is a min.

$$\left. \begin{array}{ll} \text{H}\beta \quad f=0.019 & a_\nu = 5.75 \times 10^{-17} \text{ Z} \\ \text{H}\gamma \quad f=0.0447 & a_\nu = 2.16 \times 10^{-17} \text{ Z} \\ \text{H}\delta \quad f=0.0221 & a_\nu = 1.07 \times 10^{-17} \text{ Z} \end{array} \right\} \frac{\tilde{\nu}_0^2}{\tilde{\nu}^2} \sim 1$$

Then

$$\frac{I_v}{I_0} = \frac{1}{1 + N_2 \alpha_v}$$

$$N_2 \alpha_v = \frac{1}{I_v/I_0} - 1$$

$$N_2 = \frac{\left(\frac{1}{I_v/I_0} - 1 \right)}{\alpha_v}$$

For $I_v/I_0 = 0.9$

$$\frac{1}{(I_v/I_0)} - 1 = 1.11 - 1 = 0.11 = 11 \times 10^{-2}$$

H β

Calculations

$$I_{\beta}/I_0 = 0.9$$

u	DAO	\tilde{v}	\tilde{v}_0	\tilde{v}^2	\tilde{v}_0^2	$(v-v_0)^2$	$(v-v_0)^2$	
1400	138	20679	20666			13	169	6.69×10^2
1500		20657	20666			9	81	8.1×10^2
2200	138	20737	20725			12	144	1.44×10^2
		20705				20	400	4.00×10^2
1400	139	20674	20662			12	144	1.44×10^2
		20653				11	121	1.21×10^2
2200	139	20733	20722			11	121	1.21×10^2
		20705				17	289	
1400	141	20679	20665			14	196	
		20658				7	49	
2200	141	20739	20723			16	256	
		20702				21	441	
2200	142	20740	20724			16	256	
		20713				11	121	
2200	143	20742	20726			16	256	
		20714				12	144	
2200	148	20768	20730			38	1440	1.440×10^3
		20713				17	289	
2200	150	20773	20741			32	1020	1.020×10^3
		20720				21	441	

$$z = \frac{\tilde{v}_0^2}{B^2(\tilde{v} - \tilde{v}_0)^2} = \frac{G}{2C}$$

177

$$z = \frac{1}{(\tilde{v} - \tilde{v}_0)^2}$$

$$H_2 = \frac{11 \times 10^{-2}}{2v}$$

$$d_{\nu} = 5.75 \times 10^{-17} z$$

$$= \frac{3.40 \times 10^{-19}}{7.1 \times 10^{-19}}$$

$$= \frac{3.24 \times 10^{17}}{1.55 \times 10^{17}}$$

$$3.24 \times 10^{17}$$

$$\frac{3.99 \times 10^{-19}}{1.44 \times 10^{-19}}$$

$$\frac{2.75 \times 10^{17}}{7.64 \times 10^{17}}$$

$$\frac{3.99 \times 10^{-19}}{4.75 \times 10^{-19}}$$

$$\frac{2.75 \times 10^{17}}{2.32 \times 10^{17}}$$

$$2.75 \times 10^{17}$$

$$\frac{4.75 \times 10^{-19}}{1.99 \times 10^{-19}}$$

$$\frac{2.32 \times 10^{17}}{5.52 \times 10^{17}}$$

$$\frac{2.93 \times 10^{-19}}{11.7 \times 10^{-19}}$$

$$\frac{3.42 \times 10^{17}}{9.40 \times 10^{16}}$$

$$3.42 \times 10^{17}$$

$$\frac{2.24 \times 10^{-19}}{1.30 \times 10^{-19}}$$

$$\frac{4.91 \times 10^{17}}{8.45 \times 10^{17}}$$

$$\frac{2.24 \times 10^{-19}}{4.75 \times 10^{-19}}$$

$$\frac{4.91 \times 10^{17}}{2.32 \times 10^{17}}$$

$$\frac{2.24 \times 10^{-19}}{3.99 \times 10^{-19}}$$

$$\frac{4.91 \times 10^{17}}{2.75 \times 10^{17}}$$

$$3.99 \times 10^{-20}$$

$$2.75 \times 10^{18}$$

$$1.99 \times 10^{-19}$$

$$5.52 \times 10^{17}$$

$$5.64 \times 10^{-20}$$

$$1.95 \times 10^{18}$$

$$1.30 \times 10^{-19}$$

$$8.45 \times 10^{17}$$

H γ

Calculations

$$z = \frac{L}{\Delta v}$$

u	DA_0	$\tilde{\nu}$	$\tilde{\nu}_0$	Δv ($\tilde{\nu} - \tilde{\nu}_0$)	Δv^2	$z = \frac{21.6 \times 10^{-18}}{2.16 \times 10^{-17}} z$
2200 1400	138	23241	23220	21	4.41×10^2	4.90×10^{-20}
		23200		20	4.00×10^2	5.40×10^{-20}
22						
2400 2200	138	23182	23153	19	3.61×10^2	5.98×10^{-20}
		23143		10	1.0×10^2	2.16×10^{-19}
2200	139	23250	23214	16	2.56×10^2	8.43×10^{-20}
		23195		19	3.61×10^2	6.98×10^{-20}
1400	139	23174	23149	25	6.25×10^2	3.46×10^{-20}
		23138		11	1.21×10^2	8.20×10^{-20}
2200	148	23250	23220	30	9.00×10^2	2.4×10^{-20}
		23204		16	2.56×10^2	8.43×10^{-20}
2200	150	23257	23230	27	7.30×10^2	1.37×10^{-20}
		23299		31	9.61×10^2	2.25×10^{-20}

$$N_2 = \frac{11 \times 10^{-2}}{2.2}$$

$$2.24 \times 10^{18}$$

$$2.03 \times 10^{18}$$

$$1.84 \times 10^{18}$$

$$5.09 \times 10^{17}$$

$$1.30 \times 10^{18}$$

$$1.84 \times 10^{18}$$

$$5.18 \times 10^{18}$$

$$1.22 \times 10^{18}$$

$$4.58 \times 10^{18}$$

$$1.30 \times 10^{18}$$

$$8.02 \times 10^{18}$$

$$4.88 \times 10^{18}$$

HS

$$z = \frac{1}{\Delta \tilde{\nu}}$$

$$d_{\nu} = 10.7 \times 10^{-18} z$$

u	DA_0	$\tilde{\nu}$	$\tilde{\nu}_0$	$(\Delta \tilde{\nu})$	$\Delta \tilde{\nu}^2$	d_{ν}
2200	138	24577	24564	13	169×10^2	6.34×10^{-20}
		24543		21	$121 (10^2)$	8.85×10^{-20}
1400	138	24515	24497	18	$3.24 (10^2)$	3.30×10^{-20}
		24485		12	$144 (10^2)$	7.44×10^{-20}
2200	139	24575	24563	12	$144 (10^2)$	7.44×10^{-20}
		24538		25	$625 (10^2)$	1.71×10^{-20}
1400	139	24519	24495	24	$576 (10^2)$	1.86×10^{-20}
		24485		10	$100 (10^2)$	1.07×10^{-19}
2200	150	24613	24580	33	$1090 (10^3)$	9.82×10^{-21}
		24554		26	$676 (10^2)$	1.58×10^{-20}

$$N_2 = \frac{11 \times 10^{-2}}{\alpha_2}$$

$$1.73 \quad \times 10^{18} \quad -$$

$$1.24 \quad (10^{18})$$

$$3.33 \quad (10^{18}) \quad -$$

$$1.48 \quad (10^{18})$$

$$3.33 \quad (10^{18}) \quad -$$

$$6.44 \quad (10^{18})$$

$$5.92 \quad (10^{18}) \quad -$$

$$1.03 \quad (10^{18})$$

$$1.12 \quad (10^{19}) \quad -$$

$$6.96 \quad (10^{18})$$

Emission Beyond H δ

Scale(=x)	u	u ₀	Log I	2	I	Price
				Not corr for Doppler shift		\bar{v}
95		13.5		2 to large $6+2 \times 10^2$	6.55	25880
96	26.0		1.005	25733	10.12	25910
97	26.0	81.0	1.005	25760	10.12	25940
98	30.0		1.052	25790	11.27	25967
99	40.0		1.177	25817	15.03	25990
100	44.0		1.228	25845	16.90	26020
101	42.0		1.201	25875	15.89	26050
102	40.5		1.182	25900	15.24	26075
	42.5		1.208		16.14	
103	40.5		1.183	25927	15.24	26100
104	38.5		1.158	25955	14.39	26120
105	38.5		1.099	25975	12.56	26160
6	32.0		1.077	26010	11.94	26185
7	29.5		1.048	26037	11.17	26214
8	29.0		1.041	26065	10.99	26240
also 8.8	(16.5)		0.856		7.18	
9	30.0		1.052	26093	11.27	26275
110	29.0		1.041	26120	10.99	26305
11	27.0		1.017	26145	10.40	330
12	30.0		1.052	26170	11.27	352
13	28.5		1.035	26195	10.84	380
14	29.0		1.041	26220	10.99	400
15	30.0		1.052	26250	11.27	427
16	34.5		1.110	26275	12.88	450
17	34.0		1.103	26300	12.68	475
18	35.5		1.120	26325	13.18	500
also 18.8	(16.0)					
19	29.0		0.866	26350	7.35	525
			1.041		10.99	
20	34.0		1.103	26375	12.68	548

Log I

	21	35.5	1.120	26 395	\bar{X} 13.18	26573	
	22	38.0	1.151	26 420	14.16	26 600	
	23	36.0	1.128	26 445	13.43	26 620	
	24	35.0	1.114	26 465	13.00	26 645	
	25	37.0	1.140	26 490	13.80	26 670	
	26	39.5	1.170	26 515	14.79	26 693	
④	also →	(22.0)	(0.959)		9.10		
	27	24.0	1.104	26 535	12.71	26 720	
	28	30.5	1.060	26 560	11.48	26 744	
	29	29.0	1.042	26 585	11.02	26 770	
	30	30.0 80.8	1.053	26 620	11.30	26 790	
	31	29.5	1.049	26 640	11.19	26 818	
⑤	also	32	27.0	1.019	10.45	26 840	
	32.2	(19.0)	(0.916)		8.24		
	33	24.5	0.988	26 685	9.73	26 864	
	34	24.5	0.988	26 710	9.73	26 888	
	35	25.0	0.890	26 735	10.00	26 910	
	36	27.0	1.019	26 755	10.45	26 937	
	(36.8)	19.5	(.923)		8.38		
also λ	37	21.0	946	26 780	8.85	26 960	105
	38	26.5	1.012	26 805	10.28	26 980	
	39	26.0	1.005	26 830	10.12	27 007	
	40	25.5	1.000	26 855	10.00	27 030	92
also μ	(40.5)	18.0	0.901		7.96		
	41	23.0	0.970	26 875	9.33	27 055	
	42	23.5	.965	26 900	9.23	27 080	7.34
	43	22.0	.959	26 925	9.10	27 104	
2	(41.5)	15.5			7.20		
	44	20.5	.939	26 950	8.69	27 127	
	45	19.5	.923	26 975	8.38	27 150	247
	46	18.5	.909	27 000	8.11	27 177	
also λ	(46.2)	(14.0)	(.826)		6.70		
	47	17.5	.893	27 020	7.82	27 200	717
	48	16.5	.877	27 045	7.53	27 224	
also μ	(48.1)	(13.5)	(.816)		6.55		

I for p
163

	scale	u	log I	\tilde{v}	I		
(P)	49 (47.8)	16.0 (12.5)	.866 (.793)	27065	7.35 (6.21)	27247	211
	50	15	.849	27090	7.06	27270	
(M) P	51 (51.3)	15 (12.5)	.849 (.793)	27115	7.06 (6.21)	27295	
	52	14	.826	27140.	6.70	27317	6.76
J	51.6 (12.0)		(.784)	2766.0	6.04	340	
	53	14.0	.826	27185	6.70	360	
	54	13.0	.805	27210	6.38	384	6.43
	55	14.0	.826	27230	6.21	410	
	56	12.5	.793	27255	6.04	434	6.66
	57	12.0	.781	27280	6.04	460	
	58	12.0	.781	27300	5.46	484	
	59	10.5	.737	27325	5.46	505	530
	60	10.5	.737				

$$\Delta v = 1.592 \text{ km}^{-1}$$

	\tilde{v}	$\Delta \tilde{v} =$
H β	20571	137
H γ	23039	154
H δ	24280	

H ₂₈	3664.7	27287.3
H ₂₉	3663.4	27297.0
H ₃₀	3662.3	27305.2
H ₃₁	3661.2	27313.4
H ₃₂	3660.3	27320.2
H ₃₃	3659.4	27326.9
H ₃₄	3658.6	27332.9
H ₃₅	3657.9	27338.1

DAO 202

H

$$\Delta \tilde{\nu} = \tilde{\nu} \frac{\lambda}{\lambda} \times 10^{-2}$$

	n	scale	$\tilde{\nu}$	$\Delta \tilde{\nu}$	$\tilde{\nu}'$
H δ		48.5	24380.	163	24543
ϵ		76.2	2 ⁵¹ 25 85	176	25354
ζ		95.2	25713	172	25885
η		108.2	26073	175	26248
θ		118.8 126.3	26330	176	26506
κ_1		126.3 132.2	26521	178	26699
κ		132.2 136.9	26665	179	26844
λ		136.9 140.6	26778	179	26957
μ		140.6 143.6	26868	180	27048
ν		143.6	26940		27120
ξ		146.0	26999	181	27180
ζ		148.1	27047	181	27228
η		149.1	27089	181	27270
ρ		151.3	27124	182	27306
σ		152.6	27153	182	27335
τ		153.7	27178	182	27360
ν		154.7	27201	182	27383
ϕ		155.5	27220	182	27402
χ		156.2	27237	182	27419
ψ		156.8	27252	183	27435
ω		157.4	27265	183	27448
$\omega+1$		158.0	27277	183	27460

C

159

 $\Delta \tilde{\nu} =$

Interstellar K 39.3

$$\tilde{\nu}_H = \frac{1}{3646} = 27427$$

$$\Delta \tilde{\nu}_H = 183 \quad \frac{183}{27610}$$

$$\frac{20719}{20511} = 1.008$$

$$\frac{d\tilde{\nu}}{d\lambda} = 23.9$$

H β 2 19

For construction of violet end. He p 182

$$\tilde{\nu}_0 = 20571$$

Scale	I	$\tilde{\nu}$	$\Delta \tilde{\nu}$	$H\eta$ factor = $\frac{d\rho}{d\nu} \cdot \frac{f_H}{f_P}$ $= (1.39) 4.56 \times 10^{-2}$ $= 6.35 \times 10^{-2}$ I $\Delta \tilde{\nu}$	$H\eta$ factor $\tilde{\nu}_0 = 26073$ $0.72 \times 4.56 \times 10^{-2}$ $= 3.38 \times 10^{-2}$ I $\tilde{\nu}$	$H\theta$ factor $\tilde{\nu}_0 = 26330$ $0.72 \times 3.24 \times 10^{-2}$ $= 2.33 \times 10^{-2}$ I $\tilde{\nu}$
25		20719	146			
23	7.93	20704	+ 133	0.5	0.26 26258	0.18 26515
21	10.26	20688	117	0.6	0.34 26236	0.24 26493
19	46.45	20673	102	3.0	1.52 26215	1.08 26472
17	88.10	20658	87	5.6	2.89 26194	2.06 26451
15	108.4	20642	71	6.9	3.56 26182	2.53 26429
13	133.0	20628	57	8.4	4.36 26152	3.10 26409
11	139.6	20611	40	8.9	4.58 26129	3.25 26386
9	148.5	20596	25	9.2	4.74 26108	3.37 26365
7	152.8	20580	+ 9	9.7	5.01 26086	3.56 26343
5	152.8	20565	- 6	9.7	5.01 26065	3.56 26328
-3	166.0	20549	22	10.5	5.45 26042	3.87 26300
-1	117.5	20534	37	7.5	3.86 26022	2.74 26279
+1	144.5	20519	52	9.2	4.74 26001	3.37 26258
3	134.9	20504	67	8.6	4.43 25980	3.14 26237
5	133.0	20488	83	8.45	4.36 25958	3.10 26215
7	75.7	20471	100	4.81	2.48 25934	1.77 26191
9	11.38	20458	113	.66 6.59	.37 25916 25894	.27 26173
11	7.10	20442	129	.45	.23 25894	.16 26151
13	8.0	20426	145	.51	.26 25871	.19 26128

$$d_\rho = \left(\frac{d\nu}{d\lambda} \right)_\rho = \frac{33.2}{\text{mm}}$$

$$d_\nu = \left(\frac{d\nu}{d\lambda} \right)_\nu = 23.9 = \text{const}$$

for $H\eta$ to $H\alpha$

$H\beta$ intensities should be increased by $\frac{d\rho}{d\nu}$ when compared for violet

$$\left(\frac{d\rho}{d\nu} \right)^{-1} = (1.39)^{-1} = .72$$

Each $H\beta$ intensity should be multiplied by $\left(\frac{d\rho}{d\nu} \right)^{-1}$, and then by f_H/f_P , where f_H & f_P are the radiating factors for within H and line P . These factors are given in book I, p 218

Sketch the dispersion for $H\beta$, and square the intensities!

$$\Delta \bar{v} = \Delta \bar{v}_p \cdot 1.29$$

H _i		H _K		H _L		H _M		H ₂		
factor = 1.72 x 10 ⁻² $\bar{\nu} = 26551$		factor = 1.3 x 10 ⁻² $\bar{\nu} = 26665$		factor = 1.01 x 10 ⁻² $\bar{\nu} = 26778$		0.77 x 10 ⁻² $\bar{\nu} = 26868$		factor = .65 x 10 ⁻² $\bar{\nu} = 26940$		$\Delta \bar{\nu}$ $\Delta \bar{\nu}$
I		I	$\bar{\nu}$	I	$\bar{\nu}$					
0.14	26706	.10	26850	.08	26963	.07	27053	.05	27125	185
.18	26684	.13	26828	.10	26941	.09	27031	.07	27103	163
.80	26663	.60	26807	.47	26920	.43	27010	.31	27082	142
1.52	26642	1.15	26786	.89	26899	.82	26989	.58	27061	121
1.86	26620	1.41	26764	1.09	26877	1.00	26967	.90	27039	99
2.29	26600	1.73	26744	1.34	26857	1.23	26947	.86	27017	79
2.40	26577	1.81	26721	1.41	26834	1.29	26924	.91	26996	56
2.49	26586	1.88	26700	1.46	26813	1.33	26903	.94	26975	+ 35
2.63	26534	1.99	26678	1.54	26791	1.41	26879	.99	26953	+ 13
2.63	26513	1.99	26657	1.54	26770	1.41	26860	.99	26932	- 8
2.86	26490	2.16	26634	1.68	26747	1.53	26837	1.08	26909	01
2.02	26471	1.53	26614	1.89	26727	1.08	26817	.76	26889	51
2.49	26449	1.88	26593	1.46	26706	1.33	26796	.94	26868	72
2.32	26428	1.76	26572	1.36	26685	1.25	26775	.87	26847	93
2.29	26406	1.73	26550	1.34	26663	1.23	26753	.86	26825	115
1.30	26382	0.99	26526	0.77	26639	.70	26729	.49	26801	139
1.96	26364	1.54	26508	0.11	26621	.10	26711	.07	26783	159
0.12	26342	.09	26486	.07	26599	.07	26689	.05	26761	179
.14	26319	.10	26463	.08	26576	.07	26666	.05	26738	202

		H_0		H_{II}		H_p		H_E	
$f = 5.3 \times 10^{-3}$		$f = 4.4 \times 10^{-3}$		$f = 3.7 \times 10^{-3}$		$f = 3.1 \times 10^{-3}$		$f = 2.68 \times 10^{-3}$	
$\bar{v}_0 = 27047$		$\bar{v}_0 = 27159$		$\bar{v}_0 = 27124$		$\bar{v}_0 = 27153$			
I	i	v		v		v		v	
7.93	185	.04	27185	.03	27232	.03	27274	.02	27309
10.26	163	.05	27163	.05	27210	.04	27252	.03	27287
46.45	142	.25	27142	.20	27189	.17	27231	.05	27266
88.10	121	.47	27121	.39	27168	.32	27210	.28	27245
108.4	99	.57	27099	.48	27146	.39	27188	.34	27223
133.0	79	.70	27079	.59	27126	.48	27168	.42	27203
139.6	56	.74	27056	.61	27103	.50	27145	.44	27180
144.5	35	.77	27035	.64	27082	.52	27124	.45	27159
152.8	13	.81	27013	.67	27060	.55	27102	.48	27137
152.8	-8	.81	26992	.67	27039	.55	27081	.48	27116
166.0	31	.88	26969	.73	27016	.60	27058	.52	27093
117.5	51	.62	26949	.52	26996	.42	27038	.37	27073
144.5	72	.77	26928	.64	26975	.52	27017	.45	27052
134.9	92	.71	26907	.59	26954	.48	26996	.42	27031
133.0	115	.70	26885	.59	26932	.48	26974	.42	27009
75.7	139	.40	26861	.33	26908	.27	26950	.24	26985
11.38	157	.06	26843	.05	26890	.041	26932	.04	26967
7.10	279	.04	26821	.03	26868	.03	26910	.02	26945
8.0	202	.04	26798	.04	26845	.03	26887	.03	26922

H γ	H δ	H ϵ	H ζ	H η	H θ	H ι
$f = 1.3 \times 10^{-3}$	$f = 2 \times 10^{-3}$	1.74×10^{-3}	1.53×10^{-3}	1.354×10^{-3}	1.204×10^{-3}	
$\delta_0 = 27178$	27201	27220	27207	27252	27265	
.02 27363	.02 27386	.01 27405	.01 27422	.01 27437	.01 27450	
.02 27341	.02 27364	.02 27383	.01 27400	.01 27415	.01 27428	
.11 27320	.09 27343	.09 27362	.07 27379	.06 27394	.06 27407	
.21 27299	.18 27322	.15 27341	.13 27358	.12 27373	.11 27386	
.25 27277	.22 27300	.19 27319	.17 27336	.15 27351	.13 27364	
.31 27257	.27 27280	.23 27299	.20 27316	.18 27331	.16 27344	
.32 27234	.28 27257	.24 27276	.21 27293	.20 27308	.17 27321	
.33 27213	.29 27236	.25 27255	.22 27272	.20 27287	.17 27300	
.35 27191	.30 27214	.27 27233	.23 27250	.21 27265	.18 27278	
.35 27170	.30 27193	.27 27212	.23 27229	.21 27244	.18 27257	
.38 27147	.33 27170	.29 27189	.25 27198	.22 27213	.20 27224	
.27 27127	.23 27150	$\frac{20}{25}$ 27169	.18 27186	.16 27200	.14 27214	
.33 27106	.29 27129	$\frac{24}{25}$ 27148	.22 27165	.20 27180	.17 27193	
.31 27085	.27 27108	$\frac{23}{25}$ 27127	.21 27144	.18 27160	.16 27172	
.31 27063	.27 27086	$\frac{13}{25}$ 27055	.20 27122	.18 27137	.16 27150	
.17 27039	.15 27062	$\frac{13}{25}$ 27081	.12 27098	.10 27113	.09 27126	
.03 27021	.02 27044	.02 27063	.01 27080	.01 27105	.01 27108	
.02 27000	.01 27022	.01 27041	.01 27058	.01 27073	.01 27086	
.02 26976	.02 26999	.01 27018	.01 27035	.01 27050	.01 27063	

DAO 219 Composite Intensities.

λ	$I = \sum i$	λ	I	λ	I
		⁵¹⁰ 26470	2.96	27140	364
25870	0.26	26530	^{2.62} 3.19	27165	352
94	.23	50	4.22	27185	343
914	.37	75	4.24	27205	³⁶³ 350
934	2.48	26600	4.25	27220	354
958	4.36	620	3.50	27245	290
980	4.43	40	4.45	27260	274
26000	4.74	62	4.20	27290	217
26023	3.86	83	3.60	27310	194
26043	5.45	26705	3.58	27325	177
64	5.01	25	3.70	27350	146
85	5.01	26748	4.69	27375	125
26108	4.74	770	4.29	27390	95
26130	4.77	90	4.55	27410	72
26152	4.52	26812	4.04	27425	50
26180	3.83	26840	4.04	27450	22
26194	4.66	26850	4.22	27470	14
26214	4.62	26880	4.02		
26234	3.48	26900	4.37		
26260	3.63	26920	4.18		
26280	2.74	26950	3.84		
26300	3.87	⁷ 26960	4.10		
26325	3.70	⁷⁰⁰⁰ 26990	3.85		
26342	3.68	27015	4.02		
26335	4.55	27035	^{3.64} 2.94		
26408	5.39	55	3.98		
26430	4.85	80	3.72		
26450	4.55	27100	3.65		
26470	3.20	27120	3.80		
26490	¹⁹ 3.62				

H_{27}
 1.07×10^{-3}
 H_{27}
 1.07×10^{-3}
 H_{28}
 9.61×10^{-4}
 H_{29}
 8.6×10^{-4}
 H_{30}
 7.8×10^{-4}
 H_{31}
 7.08×10^{-4}

i 27277

27287

27297

27305

27313

I_p

7.93	185	.01	27462	.01	27472	.01	27482	.01	27490		
10.26	163	.01	27440	.01	27450	.01	27450	.01	27458		
46.45	142	.05	27419	.04	27429	.04	27439	.04	27447	.03	27455
88.10	121	.09	27398	.08	27408	.08	27418	.07	27425	.06	27433
108.4	99	.12	27376	.10	27386	.09	27396	.08	27404	.08	27412
133	79	.14	27356	.13	27366	.11	27376	.10	27384	.09	27392
139.6	56	.15	27333	.13	27343	.12	27353	.11	27364	.10	27369
144.5	35	.15	27312	.14	27322	.12	27332	.11	27340	.10	27348
152.8	13	.16	27290	.15	27300	.13	27310	.12	27318	.11	27326
152.8	-8	.16	27269	.15	27279	.13	27289	.12	27297	.11	27305
166	31	.18	27246	.16	27256	.14	27266	.13	27274	.12	27282
117.5	51	.13	27226	.11	27236	.10	27246	.09	27254	.08	27262
144.5	72	.15	27205	.14	27215	.12	27225	.09	27233	.10	27241
134.9	93	.14	27184	.13	27194	.12	27204	.11	27212	.10	27220
133.0	115	.14	27162	.13	27172	.11	27182	.11	27190	.09	27198
75.7	139	.08	27138	.07	27148	.07	27158	.06	27166	.05	27174
11.38	157	.01	27120	.01	27130	.01	27140	.01	27148		
7.1	179	.01	27098	.01	27108	.01	27118	.01	27126		
8.0	202	.01	27075	.01	27085	.01	27095	.01	27103		

H_{32} 6.42×10^{-4}

27320

 H_{33} 5.84×10^{-4}

27327

 H_{34} 5.34×10^{-4}

27333

 H_{35} 4.8×10^{-4}

27338

55	.03	27463	.03	27470	.02	27476	.02	27481
33	.06	27440	.05	27447	.05	27453	.04	27458
112	.07	27419	.06	27426	.06	27422	.05	27437
392	.09	27397	.08	27404	.07	27410	.06	27415
369	.09	27376	.08	27383	.07	27389	.07	27394
348	.09	27354	.08	27361	.08	27367	.07	27372
26	.10	27334	.09	27341	.08	27347	.07	27352
05	.10	27313	.09	27320	.08	27327	.07	27322
82	.11	27290	.10	27297	.09	27303	.08	27308
62	.08	27269	.07	27276	.06	27282	.06	27287
41	.09	27248	.08	27255	.08	27261	.07	27266
220	.09	27227	.08	27234	.07	27240	.06	27245
98	.09	27205	.08	27212	.07	27218	.06	27223
174	.05	27181	.04	27188	.04	27194	.04	27200
	✓		✓		✓			

$$I_{n2} = n_n A_{n2} h\nu$$

$$= n_1 \frac{g_n}{g_1} e^{-h\nu_n/kT} A_{n2} h\nu$$

But $\frac{e^2}{8\pi\nu^2} \frac{g_n}{g_1} A_{n2} = \frac{\pi e^2}{mc} f_{n2}$

Whence $A_{n2} = \frac{\pi e^2}{mc} \frac{8\pi}{c^2} \frac{g_2}{g_n} \nu^2 f_{n2}$

Then

$$I_{n2} = n_1 \frac{g_n}{g_1} e^{-h\nu_n/kT} \frac{8\pi^2 e^2}{mc^3} \frac{g_2}{g_n} f_{n2} h\nu^3$$

$$= C n_1 \frac{g_2}{g_1} f_{n2} e^{-h\nu/kT} \nu^3$$

Beyond the series limit, we must use
for f_{n2} the definition:

$$f =$$

196

219

Here we define $I = I - I'$ (that is intensity minus background)
 Factors from p 186 ff factor = F

H β	H γ	H δ	H ϵ	H ζ	H η	H θ
$F = 3.38 \times 10^{-2}$	2.3×10^{-2}	1.72×10^{-2}	1.3×10^{-2}	1.01×10^{-2}	0.77×10^{-2}	
219	219	219	219	219	219	219
0.88	13.8	0.03 47 26 258	0.02 32 26 515	0.01 18 26 850	0.01 14 26 963	0.01 11 27 053
3.34	90.0	0.11 3.04 26 236	0.08 2.07 26 493	0.06 1.55 26 684	0.04 1.17 26 828	0.03 0.91 26 941
39.63	131.2	1.34 4.45 26 215	0.91 3.03 26 472	0.68 2.26 26 663	0.52 1.71 26 807	0.40 1.33 26 920
81.35	126.5	2.75 4.28 26 194	1.87 2.91 26 451	1.40 2.18 26 642	1.06 1.65 26 786	0.82 1.28 26 899
101.7	104.1	3.44 3.52 26 182	2.34 2.40 26 429	1.75 1.79 26 620	1.32 1.35 26 764	1.00 1.05 26 877
126.4	104.1	4.27 3.52 26 152	2.91 2.40 26 409	2.18 1.71 26 600	1.65 1.35 26 744	1.28 1.05 26 857
133.1	90.8	4.50 3.04 26 129	3.06 2.07 26 386	2.29 1.55 26 577	1.73 1.17 26 721	1.35 0.91 26 804
138.1	87.2	4.67 2.95 26 108	3.18 2.01 26 365	2.38 1.50 26 556	1.80 1.13 26 700	1.40 0.88 26 813
146.4	70.8	4.95 2.39 26 086	3.36 1.63 26 343	2.52 1.22 26 534	1.90 0.92 26 678	1.47 0.72 26 791
146.5	92.7	4.95 3.13 26 065	3.36 2.13 26 328	2.52 1.59 26 513	1.90 1.20 26 657	1.47 0.94 26 770
159.8	84.8	5.40 2.87 26 042	3.68 1.95 26 300	2.75 1.46 26 490	2.08 1.10 26 634	1.62 0.86 26 747
111.4	101.6	3.75 3.44 26 022	2.56 2.34 26 279	1.92 1.75 26 471	1.45 1.32 26 614	1.13 1.00 26 727
138.5	119.4	4.67 4.04 26 001	3.18 2.75 26 258	2.38 2.05 26 449	1.80 1.55 26 593	1.40 1.21 26 706
129.0	153.3	4.36 5.19 25 980	2.91 3.53 26 237	2.17 2.44 26 428	1.64 1.99 26 572	1.28 1.55 26 685
127.2	91.2	4.30 3.08 25 958	2.92 2.10 26 215	2.19 1.57 26 406	1.65 1.19 26 550	1.28 0.92 26 663
70.03	10.2	2.37 3.35 25 934	1.61 2.4 26 191	1.21 1.18 26 383	0.91 1.4 26 526	0.71 1.1 26 639
5.82	1.0	2.0 0.4 25 916	1.13 0.2 26 173	0.10 0.2 26 364	0.08 0.2 26 508	0.06 0.1 26 621
1.68		0.6 25 894	0.4 26 151	0.3 26 342	0.2 26 486	0.2 26 594
						0.1 26 689

Values of i in

red are 26.4 values

Checks on additions of 26.4

25916 .04

25934 .35

25958 3.08

人

89

219

		$H\beta$ 1.74×10^{-3}	$H\gamma$ 1.53×10^{-3}	$H\delta$ 1.35×10^{-3}	$H\epsilon$ 1.20×10^{-3}	$H\zeta$ 1.07×10^{-3}	$H\eta$ 9.61×10^{-4}	
0.0	-2.0 13.8	$\frac{27423}{.02} 27405$	$\frac{27440}{.02} 27422$	$\frac{27255}{.02} 27237$	$\frac{27440}{.02} 27422$	$\frac{27462}{.02} 27444$	$\frac{27265}{.01} 27247$	
3.34	90.0	$\checkmark .01 .16 27383$	$\checkmark .01 .14 27400$	$\checkmark .01 .12 27415$	$\checkmark .11 27428$	$\checkmark .10 27440$	$\checkmark .09 27251$	
29.63	131.2	$\checkmark .07 .23 27362$	$\checkmark .06 .20 27379$	$\checkmark .05 .18 27394$	$\checkmark .05 .16 27407$	$\checkmark .04 .14 27419$	$\checkmark .04 .13 27426$	.03
81.35	126.5	$\checkmark .14 .22 27341$	$\checkmark .12 .19 27358$	$\checkmark .11 .17 27373$	$\checkmark .10 .15 27386$	$\checkmark .09 .13 27398$	$\checkmark .08 .12 27408$	.07
101.7	104.1	$\checkmark .18 .18 27319$	$\checkmark .16 .16 27336$	$\checkmark .14 .14 27351$	$\checkmark .12 .13 27364$	$\checkmark .11 .11 27376$	$\checkmark .10 .10 27386$	.09
126.4	104.1	$\checkmark .22 .18 27299$	$\checkmark .19 .16 27316$	$\checkmark .17 .14 27331$	$\checkmark .15 .12 27344$	$\checkmark .14 .11 27356$	$\checkmark .12 .10 27366$	.11
133.1	90.0	$\checkmark .23 .16 27276$	$\checkmark .20 .14 27293$	$\checkmark .18 .12 27308$	$\checkmark .16 .11 27321$	$\checkmark .14 .10 27333$	$\checkmark .13 .09 27343$	.11
158.1	87.2	$\checkmark .24 .15 27255$	$\checkmark .21 .13 27272$	$\checkmark .19 .12 27289$	$\checkmark .17 .10 27306$	$\checkmark .15 .09 27318$	$\checkmark .13 .08 27322$	.12
146.4	70.8	$\checkmark .25 .12 27233$	$\checkmark .22 .11 27250$	$\checkmark .20 .10 27265$	$\checkmark .18 .09 27278$	$\checkmark .16 .08 27290$	$\checkmark .14 .07 27300$	.13
146.6	92.7	$\checkmark .25 .16 27212$	$\checkmark .22 .14 27229$	$\checkmark .20 .13 27244$	$\checkmark .18 .11 27257$	$\checkmark .16 .10 27269$	$\checkmark .14 .09 27279$	.13
159.8	84.8	$\checkmark .28 .15 27189$	$\checkmark .24 .13 27206$	$\checkmark .22 .11 27221$	$\checkmark .19 .10 27234$	$\checkmark .17 .09 27246$	$\checkmark .15 .08 27256$	.14
111.4	101.6	$\checkmark .19 .18 27169$	$\checkmark .17 .16 27186$	$\checkmark .15 .14 27200$	$\checkmark .13 .12 27214$	$\checkmark .12 .11 27226$	$\checkmark .11 .10 27236$	.10
138.5	119.4	$\checkmark .24 .21 27148$	$\checkmark .21 .18 27165$	$\checkmark .19 .16 27180$	$\checkmark .17 .14 27193$	$\checkmark .15 .13 27205$	$\checkmark .13 .11 27215$	.12
129.0	152.2	$\checkmark .22 .27 27127$	$\checkmark .19 .23 27144$	$\checkmark .17 .21 27160$	$\checkmark .15 .18 27172$	$\checkmark .14 .16 27184$	$\checkmark .12 .15 27194$	.11
127.2	91.6	$\checkmark .22 .16 27105$	$\checkmark .19 .14 27122$	$\checkmark .17 .12 27137$	$\checkmark .15 .11 27150$	$\checkmark .14 .10 27162$	$\checkmark .12 .09 27172$	.11
70.03	10.2	$\checkmark .12 27081$	$\checkmark .11 27098$	$\checkmark .09 27113$	$\checkmark .08 27126$	$\checkmark .07 27138$	$\checkmark .07 27148$	.01
5.82	1.0	$\checkmark .01 27063$	$\checkmark .01 27080$	$\checkmark .01 27105$	$\checkmark .01 27108$	$\checkmark .01 27120$	$\checkmark .01 27130$	.01
1.68		—	—	—	—	—	—	—

	<u>219</u>						
	H ₂₉ 8.6 × 10 ⁻⁴	H ₃₀ 7.8 × 10 ⁻⁴	H ₃₁ 7.08 × 10 ⁻⁴	H ₃₂ 6.42 × 10 ⁻⁴	H ₃₃ 5.84 × 10 ⁻⁴	H ₃₄ 5.34 × 10 ⁻⁴	H ₃₅ 4.8 × 10 ⁻⁴
65	.01 27482	.01 27490	.01 27498	.01 27506	.01 27512	.01 27519	.01 27524
51	.08 27460	.07 27468	.06 27477	.06 27485	.05 27492	.05 27498	.04 27502
	.03 .11 27439	.03 .10 27442 ⁴⁷	.03 .09 27455	.03 .08 27463	.02 .08 27470	.02 .07 27476	.02 .06 27481
8	.07 .11 27418	.06 .10 27428 ²⁵	.06 .09 27433	.05 .08 27440	.05 .07 27447	.04 .07 27453	.04 .06 27458
6	.09 .09 27396	.08 .08 27404 ⁰⁴	.07 .07 27412	.07 .07 27419	.06 .06 27421	.05 .06 27432	.05 .05 27437
6	.11 .09 27376	.10 .08 27385 ³⁸⁴	.09 .07 27392	.08 .07 27397	.07 .06 27404	.07 .06 27410	.06 .05 27415
43	.11 .08 27353	.10 .07 27361 ³⁶¹	.09 .06 27369	.09 .06 27376	.08 .05 27383	.07 .05 27389	.06 .04 27394
22	.12 .07 27332	.11 .07 27340 ³⁴⁰	.10 .06 27348	.09 .06 27354	.08 .05 27361	.07 .05 27367	.07 .04 27372
06	.13 .06 27316	.11 .06 27324 ³¹⁸	.10 .05 27332	.09 .05 27334	.09 .04 27341	.08 .04 27347	.07 .03 27352
79	.13 .08 27309	.11 .07 27317 ²⁹⁷	.10 .07 27305	.09 .06 27311	.09 .05 27310	.08 .05 27327	.07 .04 27322
56	.14 .07 27266	.12 .07 27274 ²⁷⁴	.11 .06 27282	.10 .05 27290	.09 .05 27297	.09 .05 27303	.08 .04 27308
36	.10 .09 27246	.09 .08 27254 ²⁵⁴	.08 .07 27262	.07 .07 27269	.07 .06 27276	.06 .05 27282	.05 .05 27287
215	.12 .10 27225	.11 .09 27233 ²³³	.10 .08 27241	.09 .08 27248	.08 .07 27255	.08 .06 27261	.07 .06 27266
194	.11 .13 27204	.10 .12 27212 ²¹²	.09 .11 27220	.08 .10 27227	.07 .09 27234	.07 .08 27240	.06 .07 27245
72	.11 .08 27192	.10 .07 27200 ¹⁹⁰	.09 .06 27198	.08 .06 27205	.07 .05 27212	.07 .05 27218	.06 .04 27223
148	.06 27158	.05 27166 ¹⁶⁰	.05 27174	.04 27181	.04 27188	.04 27194	.03 27200
130	.01 27140	.01 27148	—	—	—	—	—
	—	—	—	—	—	—	—

264
observed

scale	$u_{0.2770}$	$\log I$	I	λ	scale	u	I	
					124	24	1.015	10.35 26645
97	25	1.033	10.79	25940	125	27	1.069	11.72
948	36	1.236	16.98	25967	126	35	1.214	16.37
9599	56.5	1.609	40.64	25990	127	27.5	1.078	11.97
100	52.5	1.533	34.12	26020	128	28.0	1.087	12.22
101	47	1.481	26.98	26050	129	32	1.161	14.49
102	39	1.283	19.19	26075	130	29.5	1.114	13.00
103	32.5	1.168	14.72	26100	131	23	0.996	9.91
	40	1.304	20.14					
104	32.5	1.168	14.72	26130	132	25	1.033	10.79
105	32.0	1.161	14.49	26160	133	20.6	.950	8.91
106	32.5	1.168	14.72	26185	134	20	0.943	8.77
107	33	1.178	15.07	26214	135	25	1.033	10.79
108	41.5	1.330	21.38	26240	136	(24)	1.015	10.35
	44.5	1.386	24.32					
109	39.5	1.296	19.77	26275	137	20	0.943	8.77
110	29.0	1.104	12.71	26305	138	19	0.923	8.38
111	24.0	1.015	10.35	26330	139	20	.943	8.77
112	21	0.960	9.12	26352	140	18	.904	8.02
113	17.5	0.894	7.83	380	141	15	841	6.91
114	17	0.884	7.66	400	142	15	841	6.91
115	24	1.015	10.35	427	143	17	884	7.66
116	35	1.214	16.37	450	144	13.5	807	6.41
117	31.5	1.152	14.19	475	145	15	841	6.91
118	33.0	1.178	15.07	500	146	11	742	5.52
119	27.5	1.078	11.97	525	147	9	683	4.82
120	31.5	1.152	14.19	548	148	9	683	4.82
	26.5	1.059	11.46					
121	32.0	1.161	14.49	573	149	8.5	.664	4.61
122	34.4	1.203	15.96	600	150	7.5	.626	4.23
123	27	1.069	11.72	620	151	8.0	.647	4.44
					152	6.0	.62	3.65
					153	6.0	.62	3.65
					154	7.0	.606	4.04
					155	6.0	.62	3.65
					156	6.0	.510	3.24
								410

$$e^{-\frac{hc}{k} \frac{\tilde{\nu}}{T}} = e^{-1.432 \times n}$$

$$e^{-\frac{ch}{kT} (\nu - 20,565)}$$

$$T = 10^3 \quad 201$$

$\tilde{\nu}$	n	$\frac{\tilde{\nu}}{1.43 \cdot n}$	e^{-x}	$\lambda \nu$	$x = 1.432 n$	e^{-x}
25900	2.59	3.85	0.0213	5,335	7.64	.000481
26000	2.6	3.86	.0211	5,435	7.78	.000418
26100	2.61	3.88	.0207	5,535	7.92	.000364
26200	2.62	3.90	.0202	5,635	8.06	.000316
26300	2.63	3.91	.0200	5,735	8.20	.000275
26400	2.64	3.92	.0198	5,835	8.35	.000237
26500	2.65	3.94	.0194	5,935	8.50	.000203
26600	2.66	3.95	.0193	6,035	8.64	.000177
26700	2.67	3.96	.0191	6,135	8.78	.000155
26800	2.68	3.98	.0187	6,235	8.93	.000132
26900	2.69	3.99	.0185	6,335	9.06	.000117
27000	2.70	4.01	.0181	6,435	9.20	.000100
27100	2.71	4.02	.0180	6,535	9.35	.000087
27200	2.72	4.04	.0176	6,635	9.50	.000075
27300	2.73	4.05	.0174	6,735	9.64	.000065
27400	2.74	4.06	.0172	6,835	9.78	.000056
27500	2.75	4.08	.0169	6,935	9.92	.000049
27600	2.76	4.10	.0166	7,035	10.07	.000042
27700	2.77	4.11	.0164	7,135	10.20	.000036

$$\frac{ch}{k} = 1.432$$

$$\frac{ch}{kT} = 1.432 \times 10^{-3}$$

$$x = 1.432 \times 10^{-3} \times (\sim 5) \times 10^3$$

$$= 1.432 \times (\sim 5) = 1.435 \times n$$

1918phae.proj.11615

202

Hβ 138

N₂

	<i>z</i>	<i>I</i>	<i>I'</i>	<i>r</i>	<i>G</i>
-28	20742	30.13	30.13	1.0	
	38	27.80	29.92	.930	
27	20734	24.04	29.72	.810	27
	30	21.23	29.72	.715	
26	20726	18.45	29.51	.625	26
	22	19.05		.647	
25	20719	20.56	29.38	.699	25
2	15	21.78	29.31	.744 ³	
24	20711	23.82		.814	24
	8	25.18		.860	
23	20704	26.42	29.24	.904	23
	2700	28.05		.961	
22	20696	28.84		.992	22
	92	29.24	29.04	1.00	
21	20688	28.84		.996	21
	84	28.77		.995	
20	20680	27.35	28.84	.949	20
	77	24.21	28.77	.843	
19	20673	21.78		.740	19
	70	19.32	28.58	.676	
18	20666	17.62	28.38	.621	18
	662	18.84	28.31	.666	
17	20658	24.04		.850	17
	654	29.24	28.25	1.035	
16	20650	34.67	28.05		16
16	646	41.80			
15	20642				

G	$\tilde{\nu}$	I	I'	r
	20738	55.98	54.95	1.002
27	34	51.29 55.48		0.934
	30	44.16		0.805
26	20726	37.93	54.90	0.691
	22	35.32		0.644
25	20719	36.90		0.673
	15	40.55	54.85	0.740
24	11	43.05		0.785
	8	45.72	54.80	0.835
23	20704	50.47	54	0.921
	700	53.21	54.75	0.973
22	696	54.70		1.00
	692	54.70		1.00
21	688	54.95	54.70	1.003
	84	54.95	60	1.006
20	80	54.20	50	0.994
	77	52.24	40	0.960
19	20673	48.08	30	0.886
	70	42.85	54.20	0.790
18	666	38.82	15	0.714
	662	36.31	53.95 10	0.678
17	658	39.72	10	0.734
	654	45.92	5	0.849
16	650	64.12	0	1.187
	646		53.95	

		I	I'	
30	20758	22.65	22.28	1.016
	54	22.80		1.024
29	20750	21.63	22.23	.974
	46	21.63		.975
28	20742	21.48	22.18	.970
	38	19.36	22.03	.878
27	34	16.33		.744
	30	13.55	21.88	.619
26	26	12.85	21.80	.589
	22	12.65		.517581
25	19	13.43	21.73	.618
	15	15.49	21.63	.715
24	11	17.38	21.58	.806
	8	19.01	21.48	.885
23	4	20.56		.959
	700	20.89	21.38	.978
22	696	20.70		.972
	92	20.89	21.18	.987
21	88	21.48	21.13	1.02
	84	21.48	21.09	1.02
20	80	20.09	20.99	.956
	77	17.30	20.89	.828
19	73	15.81	20.84	.759
	70	14.12	20.70	.682
18	66	12.94	20.56	.630
	62	13.80	20.51	.673
17	58	18.24	20.42	.894
	54	24.10	20.32	1.187
16		24.77	20.28	

142 HP

150 HP

H I 60

205

 $I_2 = 1.201$ $I_0 = 15.89$ G W I $I/I_{11.04}$ G I I/I_0 S

28 20742 11.04 1.00

36 15.89 1.00 20802

27.5 38 9.08 .822

15.42 .970 985

29 20734 8.26 .749

35 15.52 .976 20795

26.5 30 6.67 .604

15.10 .950 915

28 20726 5.75 .521

34 14.93 .940 88

25.5 21 5.85 .530

14.96 .941 84

25 20719 6.98 .632

33 15.42 .970 80

15 9.29 .841

15.17 .955 76

24 20711 10.28 .930

32 14.09 .885 72

7 12.85 1.153

12.09 823 685

23 20704

30 12.68 798 65

10.72 675 615

22

30 9.33 587 58

8.43 530 54

21

29 7.33 461 50

6.35 400 46

20

28 5.75 362 42

6.21 391 38

19

27 6.43 404 34

7.46 470 30

26 8.43 530 26

10.09 635 22.5

25 15.70 988 19

20.18 1.268 15

26 11

1018phae.proj.11655

206

150 H γ

II 71

H δ 150

$I_0 = 1325$ $I_0 = 2000$

	I	I/I ₀	$\tilde{\nu}$	G	I	I ₀	I/I ₀	$\tilde{\nu}$	G
				65	9.12	9.06	1.01	24645	33
-25	20.61	1.03	23274	64	9.46	9.08	1.05	639	
24	19.54	976	23268	63	8.75	9.11	0.971	83	32
23	19.54	976	262	62	8.51	9.13	0.945	28	
22	19.54	976	256	61	8.32	9.16	0.923	22	31
	17.46	872	249						
21	14.86	742	243	60	8.17	9.18	0.905	16	
20	13.68	684	237	59	8.17	9.21	0.905	12	30
19	13.03	651	230	58	7.73	9.24	0.856	08	
18	12.50	625	224	57	6.93	9.26	0.768	600	29
17	13.09	654	218	56	6.46	9.29	0.715	595	
16	13.68	683	212	55	6.15	9.31	.681	89	28
15	13.37	668	205	54	5.89	9.34	.652	84	
14	17.02	851	200	53	5.69	9.37	.630	78	27
13	18.71	935	194	52	6.00	9.40	.665	72	
12	20.0	1.004	23187	51	6.49	9.43	.719	67	26
11	22.13	1.105		50	5.73		.635		
				49	5.72	9.46	.579	61	
				48	6.08		.693		
				47	7.53	9.49	.834	56	25
					9.57	9.52	1.06	50	

H β 148 I.68

H α 143 I.56

207

I = 5.75

I₀ = 61.66

G	I	I/I ₀
	84	5.62
33	20780	5.78
	76	5.41
32	72	5.51
	68	5.18
31	65	5.06
	61	5.06
30	58	4.79
	54	4.42
29	50	4.13
	46	3.71
28	42	3.13
	38	3.13
27	34	2.49
	30	2.11
26	26	2.49
	22	2.98
25	19	3.59
	15	4.49
24	11	6.43
23	04	
22		

G	I	I/I ₀
29	20750	61.66
	46	58.90
28	42	55.98
	38	52.72
27	34	41.98
	30	34.43
26	26	28.38
	22	31.84
25	19	37.33
	15	49.20
24	11	66.37
		81.10

23

22

\bar{x}	$\left(\frac{\bar{x}}{10^4}\right)^3 \cdot \sum i$	c^{-x}	$y \cdot e^{-x}$
25894	1.05	.000481 -0213	.02
916	3.48		.09
934	41.2		.88
958	74.9		1.59
980	76.9		1.64
26601	82.3	.000418 -0211	1.74
022	66.0		1.39
042	93.8		1.98
065	87.6		1.85
086	88.1		1.86
108	83.1	.000364 -0207	1.72
129	80.1		1.65
151	77.2		1.57
177	63.9		1.31
193	78.1	.000316 -0202	1.58
215	76.8		1.55
237	54.4		1.10
258	58.1		1.17
279	46.4		0.93
300	67.0	.000275 -0200	1.34
328	61.1		1.22
343	61.6		1.23
365	60.0		1.20
385	78.5		1.56
407	93.9	.000237 -0198	1.86
429	83.0		1.64
450	78.3		1.54
471	52.1		1.02

\tilde{z}	$(\frac{\tilde{z}}{100})^3 \cdot \tilde{z}$	e^{-x}	$y \cdot e^{-x}$
490	52.7	⁰⁰⁰²⁰³ .0194	1.02
513	48.7		0.94
530	63.8		1.24
553	75.0		1.45
574	73.5		1.42
597	75.3	⁰⁰⁰¹⁷⁷ .0193	1.45
618	61.3		1.17
640	78.8		1.52
660	73.0		1.40
683	61.4		1.17
706	61.9	⁰⁰⁰¹⁵⁵ .0191	1.18
726	64.6		1.23
750	81.0		1.50
26770	72.6		1.36
791	72.8	⁰⁰⁰¹⁴⁶ .0187	1.45
813	69.5		1.30
830	67.0		1.25
850	70.6		1.31
875	69.0		1.28
900	76.3	⁰⁰⁰¹¹⁷ .0185	1.41
930	71.4		1.31
950	65.7		1.20
970	70.0		1.27
995	67.0	⁰⁰⁰¹⁰¹ .0181	1.21
015	72.6		1.31
040	66.4		1.20
060	72.3		1.36
080	68.1		1.23

210

$\tilde{\nu}$	$(\frac{\tilde{\nu}}{10^4})^3 \cdot 2^i$	e^{-x}	$\gamma \cdot e^{-x}$
27105	67.5	⁰⁰⁰⁰⁸⁷ .0180	1.21
125	69.9		1.25
145	69.5		1.24
165	68.4		1.21
190	69.1	⁰⁰⁰⁰⁷⁵ .0176	1.22
210	69.7 69.0		1.21
230	62.7 69.0		1.21
250	57.1 69.0		1.21
275	52.1 69.0		1.20
295	45.9 69.0	⁰⁰⁰⁰⁶⁵ .0174	1.20
315	39.2 ϵ_0		1.20
340	33.5 ↓		
360	25.2		

27400	69.0	⁰⁰⁰⁰⁵⁶ .0172	1.19
27500		⁵⁴ .0169	1.17
27600		⁴² .0166	1.15
27700		³⁶ .0164	1.13

DAO	Date	GMT	C	HO	Belting	H	Y	H Y
			Curve	Finished & Plotted				
138	June 10	19 ^h 18 ^m	d	I 90 II 38				on ?
139	10	19 48	d	I 196 II 40	B, 2, 132			?
140	10	20 24	d					
141	10	20 48	B	I 138 II 50	B, 2, 132			2, 56
142	11	19 39	d	I 56 II 30	2, 54			2, 58
143	11	19 51	d	I 28 II 44	2, 54			2, 65
144	11	20 04	d	I 26	2, 54			2, 72
145	11	20 10	d	II 34				
148	13	19 23	d	I 64 II 20	2, 54			1, 132
150	13	19 54	d	I 60	2, 54			2, 78
156	14	21 29	d	I 98	2, 77			2, 83
157	14	21 56	d	I 104	2, 77			2, 88
159	15	20 00	Y					
160	15	20 26	B	I 106	2, 93			2, 91
161	15	20 40	B	I 110	2, 93			2, 96
166	17	20 38	B	I 114				2, 100
167	17	20 49	B					
180	18	20 20	B	I 118				2, 108
181	18	20 33	B	2, 119				
182	18	20 48						
No Comp Sp	201	19 21 03	B					
	202	19 21 16	B					
No Comp Sp	203	19 21 35						
	210	20 20 40	B	2, 116	2, 115			2, 132
	213	21 20 32	B	I 122 II 192				I, 174 W to R
	219	22 20 11	B	I 126				2, 137
	220	22 20 31	B	I 74				1, 68
N Sp too ft.	221	22 20 50						
	226	24 19 51	B	I 142				I, 148 changed to Red
	253	27 20 26	Y	II 36	B, 2, 32			I, 169
	264	28 20 07	Y	II 117				2, 124
	287	July 1 19 52	Y	2, 118				2, 120
	305	5 20 43	Y	I 185	1, 184			I 187

H δ	He	H δ	H γ	H δ	He	Belmont
4K ?	II 157	—	v R v R v R			
?	?					
<u>?</u>	II 158	—				stopped H γ & H
—	—	—				also stopped
2, 59	II 62	—				
2, 68	—	—				
2, 73	II 75	—				
?	?	—				
<u>—</u>	<u>—</u>	<u>—</u>				
2, 80	2, 81	—				
2, 84	II 86	???				
2, 89	II 159	—				
2, 94	2, 160	+ ?				??
2, 98	—	???				
2 102	II 104	II 106				
2, 109	???	??				good
—	—	—				
—	—	—				
—	—	—				
2, 133	II 135	II 136				
I, 177 W & R	I, 181 W & R	II 154	.155	.240		213
2, 128	II 155	II 156	.200	.280		
2, 125	II 152	II 153				
I, 154 W & R	I 160	I 164	.335	.290	.460	.440
I, 84	II 150	II 151	.60	.27	.36	.44
2, 122	II 148	II 149			.58	.64
2, 122	II 146	II 147				
1, 190	I 194	I 197				

α	γ	Δ	ρ	H β	p 10
				H γ	p 17
				H δ	p 43
				H ϵ	p 48
				H ζ	p 52

$$\alpha = 29.13$$

1918phae.proj.11658