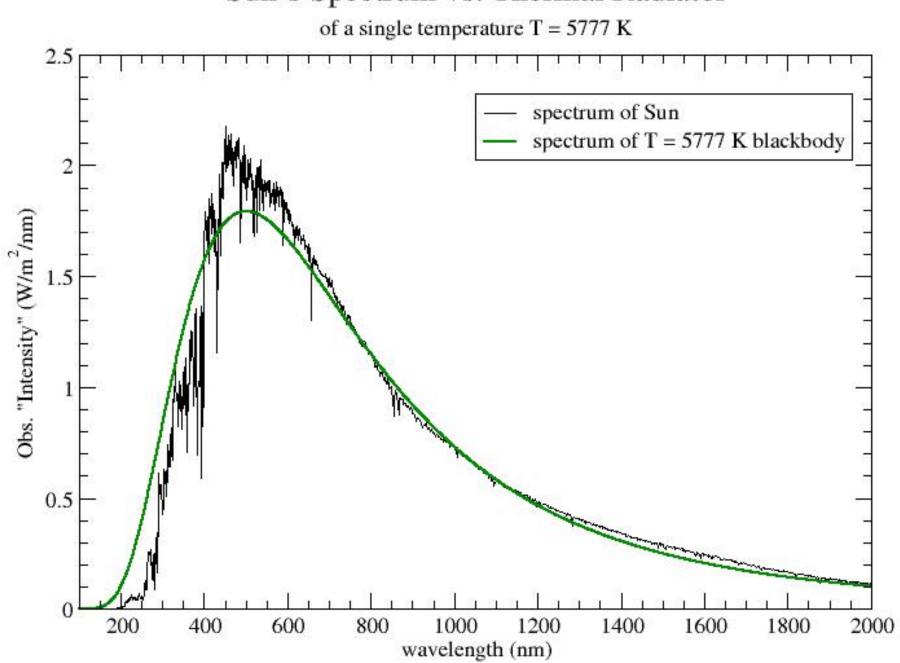
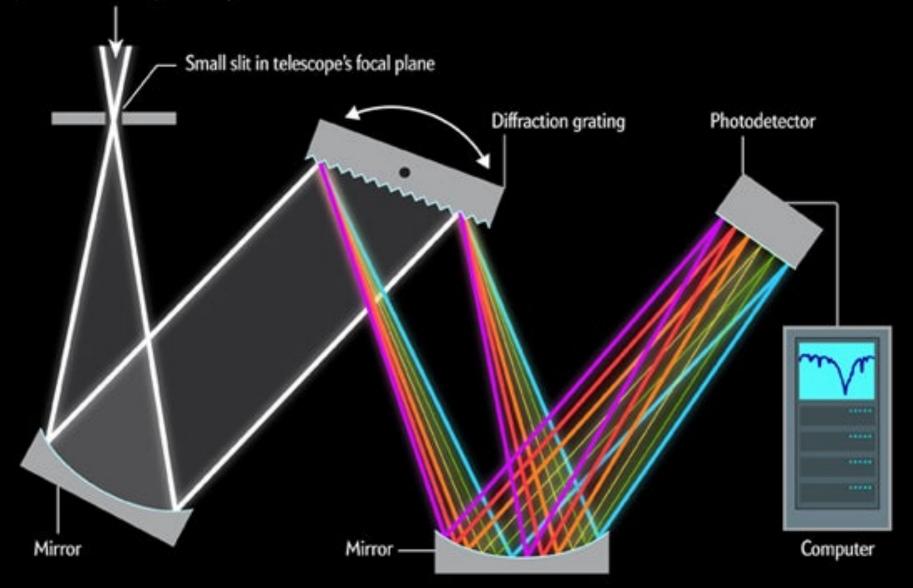
Structure and Evolution of Stars

Lecture 3

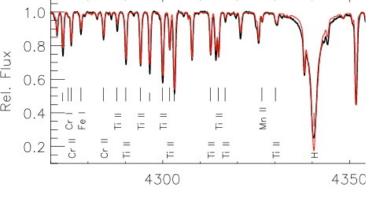


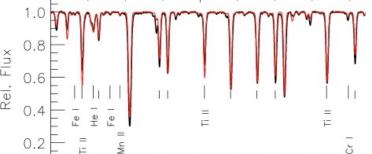
Sun's Spectrum vs. Thermal Radiator

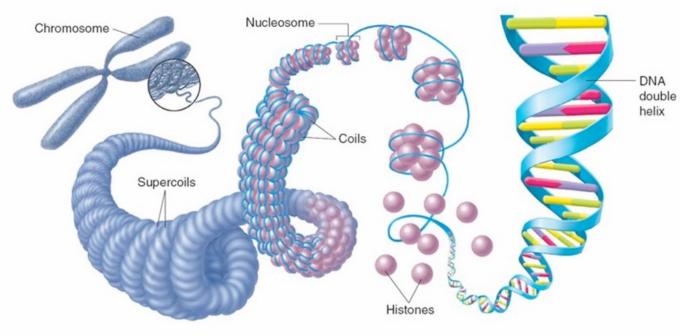
Light from star through telescope

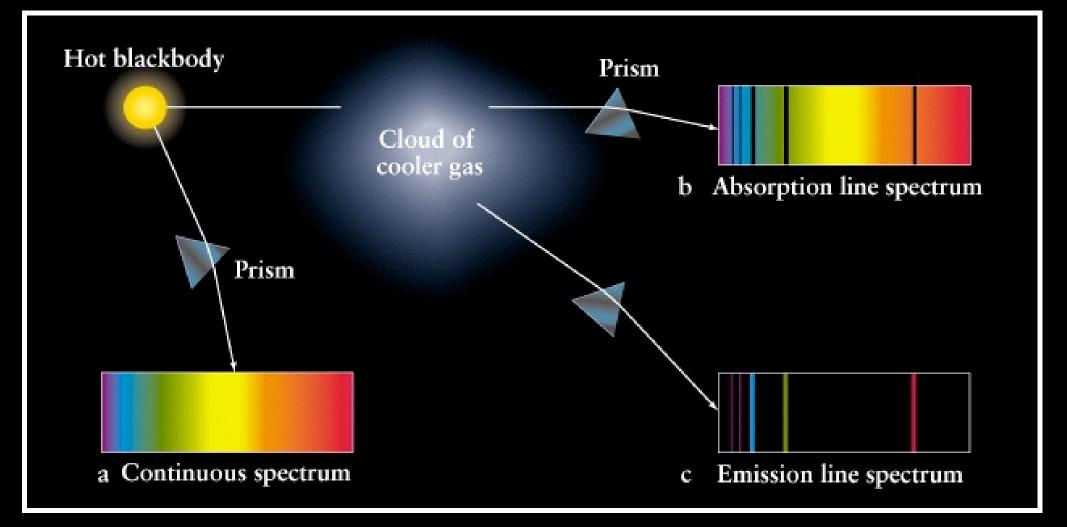


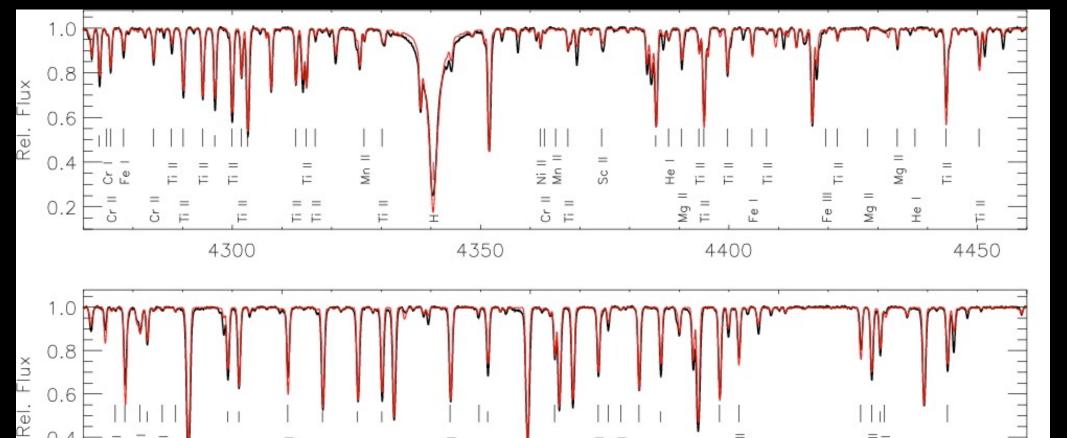












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High resolution spectrum of Vega

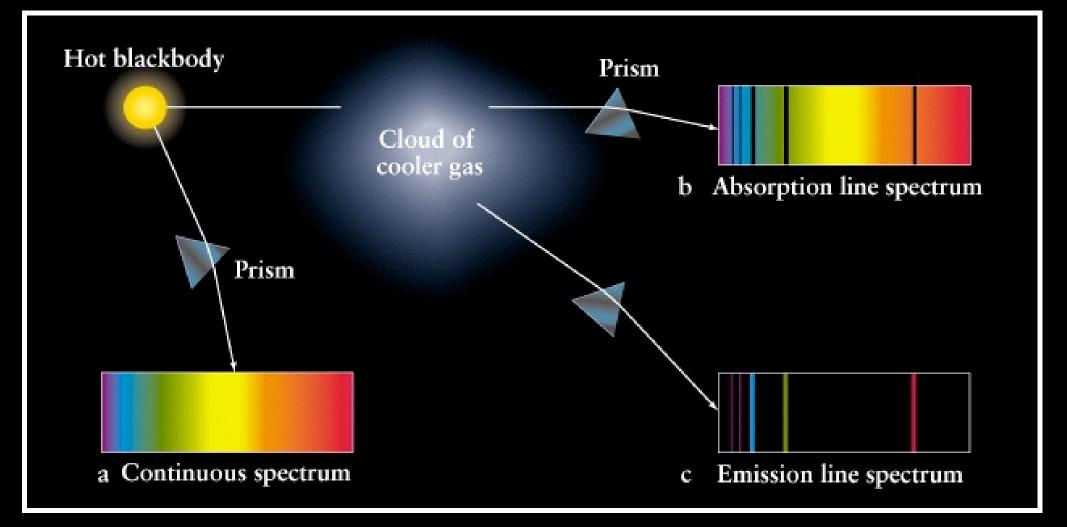
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 $\lambda(\text{\AA})$

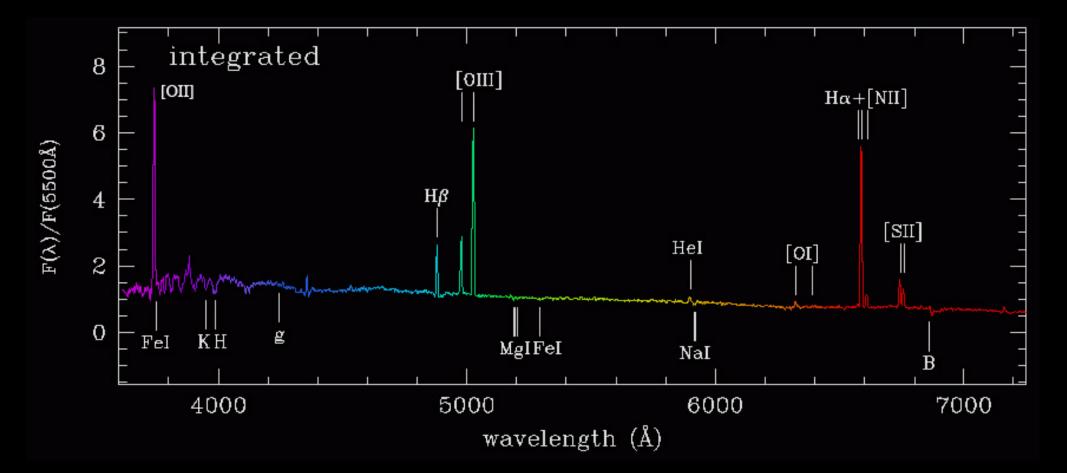
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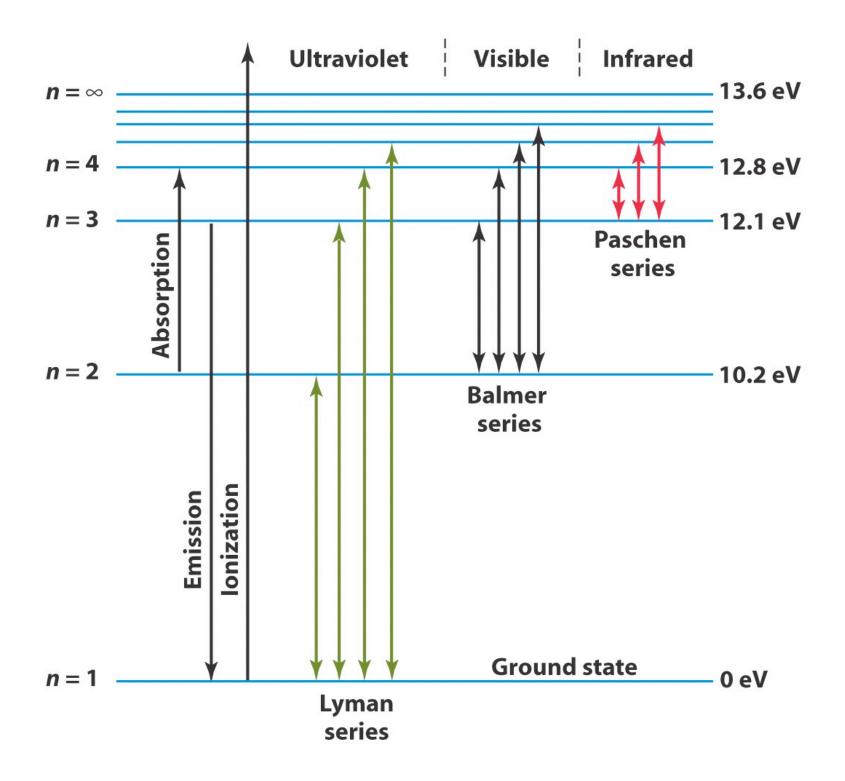
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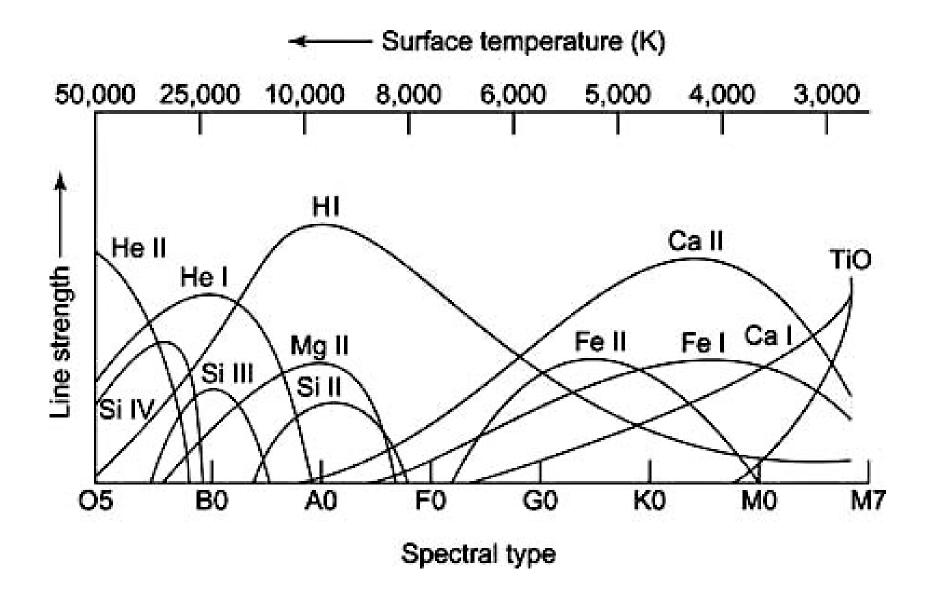


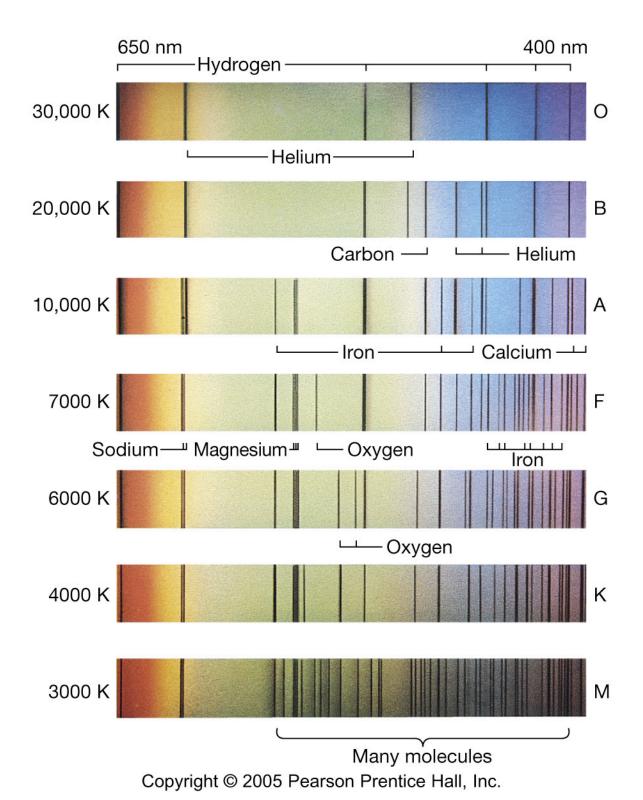


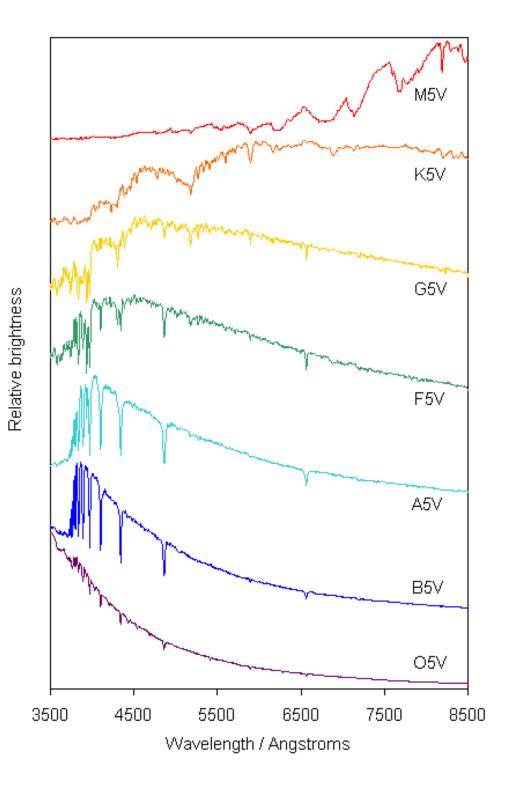
IONIZATION POTENTIALS^a

Spectrum

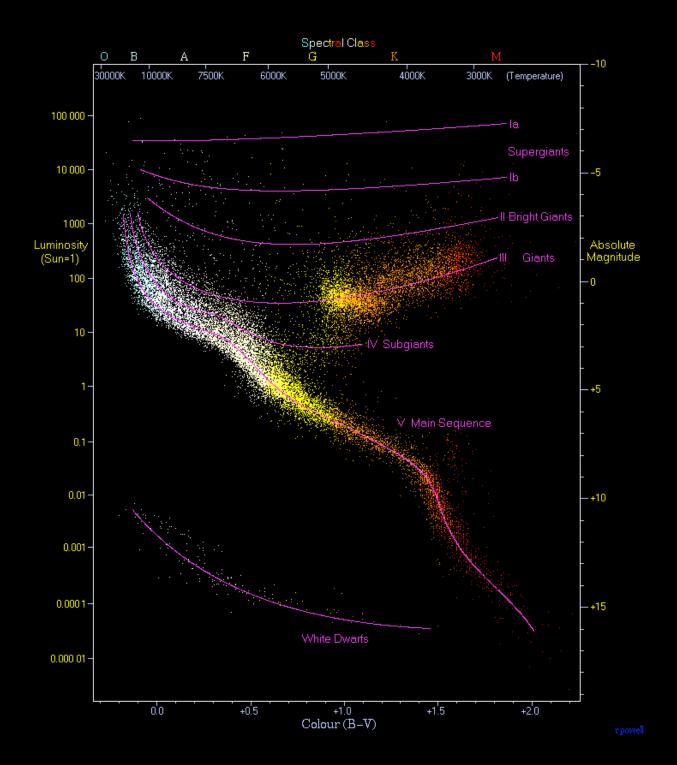
Z Element							_				Spectru	m									
	1	п	ш	IV	v	VI	VII	νш	IX	x	XI	хп	'хш	XIV	xv	XVI	хуп	хуш	XIX	xx	XXI
1 H	13.598																				
2 He	24.587	54.416																			
3 Li	5.392	75.638	122.451																		
4 Bc	9.322	18.211	153.893	217.713																	
5 B	8.298	25.154	37.930	259.368	340.217															* 1	
6 C	11.260	24.383	47.887	64.492	392.077	489.981															
7 N	14.534	29.601	47.448	77.472	97.888	552.057	667.029														
80	13.618	35.116	54.934	77.412	113.896	138.116	739.315	871.387													
9 F	17.422	34.970	62.707	87.138	114.240	157.161	185.182	953.886	1103.089												
0 Ne	21.564	40.962	63.45	97.11	126.21	157.93	207.27	239.09	1195.797	1362.164											
1 Na	5.139	47.286	71.64	98.91	138.39	172.15	208.47	264.18	299.87	1465.091	1648.659										
2 Mg	7.646	15.035	80.143	109.24	141.26	186.50	224.94	265.90	327.95	367.53	1761.802	1962.613									
3 AI	5.986	18.828	28.447	119.99	153.71	190.47	241.43	284.59	330.21	398.57	442.07	2085.983	2304.080								
4 Si	8.151	16.345	33.492	45.141	166.77	205.05	246.52	303.17	351.10	401.43	476.06	523.50	2437.676	2673.108							
5 P	10.486	19.725	30.18	51.37	65.023	230.43	263.22	309.41	371.73	424.50	479.57	560.41	611.85	2816.943	3069.762						
6 S	10.360	23.33	34.83	47.30	72.68	88.049	280.93	328.23	379.10	447.09	504.78	564.65	651.63	707.14	3223.836	3494.099					
7 CI	12.967	23.81	39.61	53.46	67.8	98.03	114.193	348.28	400.05	455.62	529.26	591.97	656.69	749.74	809.39		3946.193				
8 Ar	15.759	27.629	40.74	59.81	75.02	91.007	124.319	143.456	422.44	478.68	538.95	618.24	686.09	755.73	854.75	918	4120.778	4426.114			
9 K		31.625	45.72	60.91	82.66	100.0	117.56	154.86	175.814	503.44	564.13	629.09	714.02	787.13	861.77	968	1034		4933.931		
0 Ca	6.113	11.871	50.908	67.10	84.41	108.78	127.7	147.24	188.54	211.270	591.25	656.39	726.03	816.61	895.12	974	1087	1157		5469.738	
1 Sc	6.54	12.80	24.76	73.47	91.66	111.1	138.0	158.7	180.02	225.32	249.832	685.89	755.47	829.79	926.00				0.0000.00000		
2 Ti	6.82	13.58	27.491	43.266	99.22	119.36	140.8	168.5	193.2	215.91	265.23	291.497	787.33	861.33	940.36						
3 V	6.74	14.65	29.310	46.707	65.23	128.12	150.17	173.7	205.8	230.5	255.04	308.25	336.267	895.58	974.02						
4 Cr	6.766	16.50	30.96	49.1	69.3	90.56	161.1	184.7	209.3	244.4	270.8	298.0	355	384.30	1010.64						
5 Mn		15.640	33.667	51.2	72.4	95	119.27	196.46	221.8	248.3	286.0	314.4	343.6	404	435.3	1136.2					
6 Fe		16.18	30.651	54.8	75.0	99	125	151.06	235.04	262.1	290.4	330.8	361.0	392.2	457	489.5	1266.1				
7 Co	7.86	17.06	33.50	51.3	79.5	102	129	157	186.13	276	305	336	379	411	444	512	546.8	1403.0			
8 Ni	7.635	18.168	35.17	54.9	75.5	108	133	162	193	224.5	321.2	352	384	430	464	499	571	607.2	1547		
9 Cu		20.292	36.83	55.2	79.9	103	139	166	199	232	266	368.8	401	435	484	520	557	633	671	1698	
O Zn		17.964	39.722	59.4	82.6	108	134	174	203	238	274	310.8	419.7	454	490	542	579	619	698	738	1856
Ga	5.999	20.51	30.71	64																	
Ge	7.899	15.934	34.22	45.71	93.5	100 4															
As	9.81	18.633	28.351	50.13	62.63	127.6															
Se SBr		21.19	30.820	42.944	68.3	81.70	155.4														
5 Kr		21.8	36	47.3	59.7	88.6	103.0	192.8													
Rb		24.359	36.95	52.5	64.7	78.5	111.0	126	230.39												
Sr		27.28	40	52.6	71.0	84.4	99.2	136	150	277.1	001/01/01										
Y	5.695 6.38	11.030	43.6 20.52	57 61.8	71.6	90.8	106	122.3	162	177	324.1										
Zr	6.84	12.24	22.99	34.34	77.0	93.0	116	129	146.52	191	206	374.0									
Nb	6.88	14.32	25.04	38.3	50.55	102.6	125														
Mo		16.15	27.16	46.4	61.2	68		162													
Te	7.28	15.26	29.54		01.2	08	126.8	153													
Ru	7.37	16.76	28.47																		
Rh	7.46	18.08	31.06																		
Pd	8.34	19.43	32.93																		
Ag	7.576	21.49	34.83																		

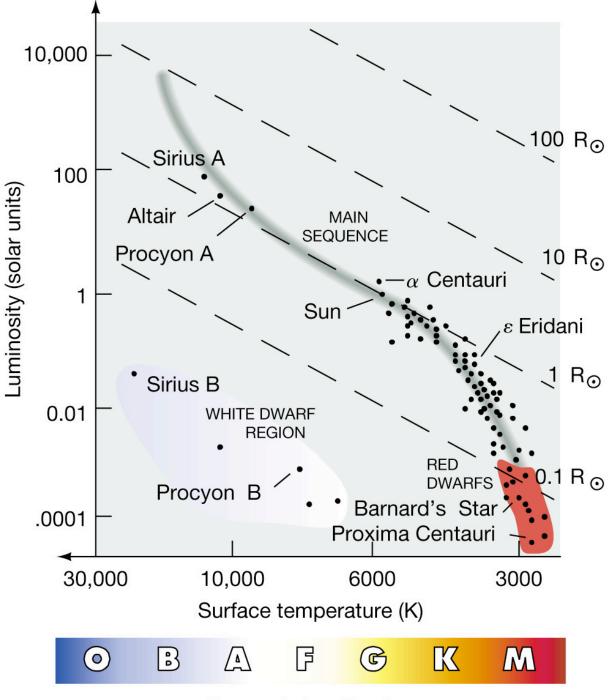






2MASS J1146+2230 An L-type dwarf in the constellation Leo The near-infrared view The optical view 2MASS Atlas JHK_s Composite Image Palomar Digitized Sky Survey 2MASS J.D. Kirkpatrick (IPAC/Caltech), I.N. Reid (Caltech), R.M. Cutri (IPAC/Caltech), C.A. Beichman (IPAC/JPL/Caltech), J. Liebert (U of A), M.F. Skrutskie (UMass) The 2MASS project is a collaboration between the University of Massachusetts and IPAC CRON ALL-SY





Spectral classification



