

Chapter 21: **Table of contents, appendices, index, etc.**

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Table of potentially useful constants and a few common equations

gravitational constant	G	$6.674 \cdot 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$	$4\pi^2 \text{ AU}^3 \text{ M}_\odot^{-1} \text{ yr}^{-2}$
useful in		$F = GM_1 m_2 / r^2 = gm_2 ; \quad P^2 = [4\pi^2 a^3] / [G(M_1+M_2)]$	
and in		$v = [G(M_1+M_2) \cdot (2/r - 1/a)]^{1/2}$	
speed of light	c	$2.998 \cdot 10^8 \text{ m s}^{-1}$	
useful in		$c = \lambda f;$	$\lambda = \lambda_0 [1 + (v_r/c)]$
Planck constant	h	$6.626 \cdot 10^{-34} \text{ J s}$	$4.136 \cdot 10^{-15} \text{ eV s}$
useful in		$E = hf = hc / \lambda$	
Boltzmann constant	k	$1.381 \cdot 10^{-23} \text{ J K}^{-1}$	$8.617 \cdot 10^{-5} \text{ eV K}^{-1}$
useful in		$E \sim k T;$	$v \sim [2kT/m]^{1/2};$
and in		$P = (\rho kT/m);$	$H = kT / (g m)$
Stefan-Boltzmann constant	σ	$5.670 \cdot 10^{-8} \text{ J s}^{-1} \text{ m}^{-2} \text{ K}^{-4}$	$= \frac{2\pi^5 k^4}{15h^3 c^2}$
useful in		$L = 4\pi r^2 \sigma T^4$	
Wien's law		$\lambda = [2.898 \cdot 10^{-3} \text{ m K}] / [T (\text{K})]$	
converting eV to J		$1 \text{ eV} = 1.602 \cdot 10^{-19} \text{ J}$	
converting seconds to years		$1 \text{ yr} = 3.16 \cdot 10^7 \text{ s}$	
mass of an electron	m_e	$9.109 \cdot 10^{-31} \text{ kg}$	$0.511 \text{ MeV}/c$
unified atomic mass unit	m_u or u	$1.661 \cdot 10^{-27} \text{ kg}$	
mass of a hydrogen atom	m_H	$1.67 \cdot 10^{-27} \text{ kg}$	1.008 u
mass of a proton	m_p	$938.3 \text{ MeV}/c$	1.0073 u
mass of a neutron	m_n	$939.6 \text{ MeV}/c$	1.0087 u
astronomical unit	1 AU =	$1.496 \cdot 10^{11} \text{ m}$	
parsec	1 pc =	$206,265 \text{ AU}$	$3.0857 \cdot 10^{16} \text{ m} = 3.26 \text{ ly}$
light year	1 ly =	$63,241 \text{ AU}$	$9.4607 \cdot 10^{15} \text{ m} = 0.3066 \text{ pc}$

Pressure units: $1 \text{ Pa} = 1 \text{ N/m}^2 = 1 \text{ kg} / (\text{m s}^2)$
 $1 \text{ bar} = 10^5 \text{ Pa}$
 $1 \text{ atm} \sim 101 \text{ kPa} = 1 \text{ atm} \sim 760 \text{ mm Hg} \sim 14 \text{ psi}.$

Table 4.1: Summary of orbital and physical properties of selected solar system objects

Object	semi-major axis (AU or km)	revolution period (days or years)	orbit eccentricity	& inclination to ecliptic or planet equator (°)	rotation period (hours or days)	obliquity (°)
Sun	—	—	—	—	25 – 34 d	7.25
Mercury	0.387	87.97 d	0.206	7.0	58.65 d	0.003
Venus	0.723	0.615	0.007	3.39	–243 d	177.4
Earth	1.0	1.0	0.017	7.2 to Sun eq.	23.93	23.44
Moon	384,400 km	27.32 d	0.055	5.15 to ecl.	27.32 d	6.69
Mars	1.52	1.88	0.094	1.85	1.026 d	25.19
Phobos	9,376 km	0.32 d	0.015	1.09	0.32 d	0
Deimos	23,463 km	1.26 d	~0	0.93	1.26 d	
4 Vesta	2.36	3.63	0.09	7.14	5.34	
Ceres	2.77	4.60	0.08	10.59	9.07	~3
2 Pallas	2.77	4.61	0.23	34.84	7.81	~78?
10 Hygiea	3.14	5.56	0.12	3.84	27.62	
Jupiter	5.20	11.86	0.05	1.31	9.93	3.13
Io	421,700 km	1.77 d	0.004	0.05	1.77 d	
Europa	670,900 km	3.55 d	0.009	0.47	3.55 d	0.1
Ganymede	1.070·10 ⁶ km	7.15 d	0.0013	0.20	7.15 d	
Callisto	1.883·10 ⁶ km	16.69 d	0.0074	~1	16.69 d	0
Saturn	9.58	29.46	0.056	2.49	10.55	26.73
Mimas	185,539 km	0.94 d	0.02	1.57	0.94 d	0
Enceladus	237,948 km	1.37 d	0.005	0.019	1.37 d	0
Tethys	294,619 km	1.89 d	~0	1.12	1.89 d	0
Dione	377,396 km	2.74 d	0.002	0.019	2.74 d	0
Rhea	527,108 km	4.52 d	0.001	0.345	4.52 d	0
Titan	1.222·10 ⁶ km	15.95 d	0.029	0.35	15.95 d	0
Iapetus	3.561·10 ⁶ km	79.32 d	0.029	15.47	79.32 d	0
2060 Chiron	13.71	50.76	0.38	6.93	5.92	
Uranus	19.19	84.02	0.05	0.77	–17.24	97.8
Miranda	129,390 km	1.41 d	0.0013	4.23	1.41 d	0
Ariel	191,020 km	2.52 d	0.0012	0.26	2.52 d	?
Umbriel	266,300 km	4.14 d	0.0039	0.21	4.14 d	0?
Titania	435,910 km	8.71 d	0.0011	0.34	8.71 d	?
Oberon	583,520 km	13.46 d	0.0014	0.06	13.46 d	?
5145 Pholus	20.36	91.85	0.57	24.65	9.98	?
Neptune	30.07	164.8	0.0087	1.77	16.11	28.32
Proteus	117,647 km	1.122 d	~0	0.52	1.122 d	~0
Triton	354,759 km	– 5.88 d	~0	157	5.88	0
Pluto	39.26	247.7	0.25	17.16	6.387 d	122.5
Charon	19,591 km	6.387 d	0	0	6.387 d	
Haumea	43.22	284	0.19	28.19	3.92	?
Makemake	45.72	309	0.16	29.00	7.8	?
Eris	67.78	558	0.44	44.04	25.9	?
90377 Sedna	524.4	~11,400	0.85	11.93	10.3	?

Table 4.1: Summary of orbital and physical properties of selected solar system objects, continued

Object	mass (kg)	diameter (km)	ave. density (g/cm ³)	albedo (Bond or geom.)	surface temp. (K)	atmosphere or color
Sun	$1.99 \cdot 10^{30}$	$1.39 \cdot 10^6$ (eq.)	1.41	–	5780	H, He
Mercury	$3.30 \cdot 10^{23}$	4,879	5.43	0.068 Bond	80 – 700	trace
Venus	$4.87 \cdot 10^{24}$	12,104	5.24	0.90 Bond	737	CO ₂ , N ₂ , SO ₂
Earth	$5.97 \cdot 10^{24}$	12,742	5.51	0.31 Bond	184 – 330	N ₂ , O ₂ , Ar, H ₂ O
Moon	$7.35 \cdot 10^{22}$	3,474	3.35	0.12 geom	70 – 390	trace
Mars	$6.42 \cdot 10^{23}$	6,779	3.93	0.25 Bond	130 – 308	CO ₂ , Ar, N ₂ , O ₂
Phobos	$1.07 \cdot 10^{16}$	27 x 22 x 18	1.88	0.071 geom	~233	
Deimos	$\cdot 10^{20}$	15 x 12 x 11	1.47	0.068 geom	~233	
4 Vesta	$2.59 \cdot 10^{20}$	~525	3.46	0.42 geom	85 – 270	V-type
Ceres	$9.39 \cdot 10^{20}$	938	2.17	0.09 geom	168 – 235	C-type
2 Pallas	$2.11 \cdot 10^{20}$	544	~2.8	0.16 geom	~164	B-type
10 Hygiea	$8.67 \cdot 10^{19}$	~431	2.08	0.07 geom	~164	C-type
Jupiter	$1.90 \cdot 10^{27}$	139,822	1.33	0.50 Bond	165 @ 1 bar	H ₂ , H ₂ , CH ₄ , NH ₃
Io	$8.93 \cdot 10^{22}$	3,643	3.53	0.63 geom	110	trace SO ₂
Europa	$4.80 \cdot 10^{22}$	3,122	3.01	0.67 geom	102	trace
Ganymede	$1.48 \cdot 10^{23}$	5,268	1.94	0.43 geom	110	trace O ₂
Callisto	$1.08 \cdot 10^{23}$	4,821	1.83	0.2 geom	134	trace O ₂ , CO ₂
Saturn	$5.68 \cdot 10^{26}$	116,464	0.69	0.34 Bond	134 @ 1 bar	H ₂ , He, CH ₄ , NH ₃
Mimas	$3.75 \cdot 10^{19}$	396	1.15	0.86 geom	~64	
Enceladus	$1.08 \cdot 10^{20}$	504	1.61	0.99 Bond	75 (ave)	trace H ₂ O, N ₂ , CO ₂
Tethys	$6.17 \cdot 10^{20}$	1,062	0.98	0.80 Bond	86	
Dione	$1.10 \cdot 10^{21}$	1,123	1.48	0.99 geom	87	
Rhea	$2.31 \cdot 10^{21}$	1,527	1.24	0.95 geom	53 – 99	
Titan	$1.345 \cdot 10^{23}$	5,150	1.88	0.2 geom	93.7	N ₂ , CH ₄ , H ₂
Iapetus	6.5×10^{19}	1,470	1.09	~0.6 geom	90 – 130	
2060 Chiron	?	~166 km	?	~0.15 geom	~75	
Uranus	$8.68 \cdot 10^{25}$	50,724	1.27	0.30 Bond	76 K @ 1 bar	H ₂ , He, CH ₄
Miranda	$6.59 \cdot 10^{19}$	471	1.20	0.32 geom	~60	
Ariel	$1.35 \cdot 10^{21}$	1,158	1.59	0.23 Bond	~60	
Umbriel	$1.17 \cdot 10^{21}$	1,169	1.39	0.10 Bond	~75	
Titania	$3.53 \cdot 10^{21}$	1,577	1.71	0.17 Bond	70	
Oberon	$3.01 \cdot 10^{21}$	1,523	1.63	0.14 Bond	70-80	~0 atm
5145 Pholus	?	185	?	0.046	~62	red
Neptune	$1.02 \cdot 10^{26}$	49,244	1.64	0.29 Bond	72 K @ 1 bar	H ₂ , He, CH ₄
Proteus	$4.4 \cdot 10^{19}$	~420	~1.3	0.096 geom	~51	
Triton	$2.14 \cdot 10^{22}$	2,706	2.06	0.719 geom	38	N ₂
Pluto	$1.303 \cdot 10^{22}$	2,377	1.86	0.49 – 0.66 geo	33 – 55	N ₂ , CH ₄ , CO
Charon	$1.586 \cdot 10^{21}$	1,212	1.66	0.37 geom	53	
Haumea	$4.0 \cdot 10^{21}$	~1,400	2.6	~0.8	< 50	neutral
Makemake	$< 4.4 \cdot 10^{21}$	~1,470	?	0.81	~38	reddish
Eris	$1.66 \cdot 10^{22}$	2326	2.52	0.96	~42-55	reddish
Sedna	?	~1,000	?	0.32 geom	~12	red

Table 9.1: Bulk properties of giant planets

	Jupiter	Saturn	Uranus	Neptune
Mass (Earth masses)	318	95	14.5	17.1
Average radius (Earth radii)	11.0	9.1	4.0	3.9
Flattening ($1 - R_{\text{polar}}/R_{\text{equator}}$)	0.065	0.098	0.023	0.017
Moment of inertia factor	0.254	0.210	0.225	~0.25
Density (g/cm^3)	1.33	0.69	1.27	1.64
Rotation period (hours)	9.925	10.57	-17.23	16.10

Table 5.1: Densities and magnetic fields of selected terrestrial solar system objects

object	average density (g/cm^3)	surface magnetic field (μT)	field source / comments	interior liquid layer?
Mercury	5.43	0.25	dynamo?	partially molten core?
Venus	5.24	$\sim 5 \cdot 10^{-4}$	induced by solar wind	Fe-Ni core?
Earth	5.51	31	dynamo	Fe-Ni outer core
Moon	3.35	~ 0.03	localized crustal field	thin outer core
Mars	3.93	$\sim 10^{-3}$	loc. crustal field + solar wind	Fe/FeS core?
Io	3.53	~ 1.3	interacts with Jupiter's field	thin outer mantle shell
Europa	3.01	~ 0.2	interacts with Jupiter's field	ocean
Ganymede	1.94	~ 0.75	intrinsic; dynamo?	ocean; possibly two
Callisto	1.83	~ 0.04		ocean? not completely differentiated
Titan	1.88	~ 0	interacts with Saturn's field	ocean
Enceladus	1.61	~ 0	interacts with Saturn's field	ocean
Pluto	1.86	no?		ocean?

Models suggest subsurface oceans are possible on Rhea, Titania & Oberon, Triton, Orcus (a plutino), Eris, Sedna (TNO; very long eccentric orbit)

Table 9.3: Magnetic fields of giant (and comparison) planets

	Surface field strength μT	Magnetic moment $\text{T} \cdot \text{m}^3$	relative to Earth
Jupiter	428	$1.6 \cdot 10^{20}$	20,000
Saturn	22	$4.8 \cdot 10^{18}$	600
Uranus	23	$3.8 \cdot 10^{17}$	50
Neptune	14	$2.2 \cdot 10^{17}$	25
Earth	31	$7.9 \cdot 10^{15}$	1
Ganymede	0.72	$1.3 \cdot 10^{13}$	$1.7 \cdot 10^{-3}$
Mercury	0.3	$2.8 \cdot 10^{12}$	$3.5 \cdot 10^{-4}$

Table 8.1: properties substantial atmospheres of terrestrial objects

	Venus	Mars	Earth	Titan
N ₂	0.035	0.019	0.78	0.98
O ₂	< 20 ppm*	0.0015	0.21	
O ₃		0.01 ppm	10 ppm	
Ar	70 ppm	0.019	0.0093	
H ₂ O	~30 ppm	< 100 ppm	< 0.05	
CO ₂	0.96	0.96	400 ppm	
CO	~25 ppm	< 0.001	0.2 ppm	
CH ₄			1.8 ppm	0.14
SO ₂	20 – 200 ppm		trace (& trace N ₂ O)	traces H ₂ and various hydrocarbons
H ₂ S	1 – 2 ppm			
H ₂ SO ₄	4 – 10 ppm, clouds			
Ne	7 ppm	2.5 ppm	18 ppm	
He	12 ppm		5 ppm	
surface pressure	9200 kPa	0.6 kPa	101 kPa	147 kPa

*Parts per million by volume

Table 8.2: properties of tenuous atmospheres of terrestrial objects

Object	principal gases	surface pressure
Triton	N ₂ ; CO & CH ₄ ~few 10 ⁻³ N ₂ ; Ar, Ne?	~1.6 Pa
Pluto	N ₂ ; CO & CH ₄	~0.3 – 1 Pa
Io	SO ₂ ; traces of SO, NaCl, S, O	~10 ⁻⁴ Pa
Ganymede	O, O ₂ , H	~10 ⁻⁶ Pa
Europa	O ₂	~10 ⁻⁷ Pa
Rhea	O ₂ , CO ₂	~10 ⁻⁷ Pa
Dione	O ₂	~10 ⁻⁸ Pa
Mercury	Na, Mg, O ₂ , S, H ₂ S, Ca, K, H ₂ O, He, H	~10 ⁻⁹ Pa
Moon	Ar, He, Ne, Na, K	~10 ⁻⁹ Pa

Any moon with pole caps, even very small moons, will have had some molecules of ices spending some amount of time hopping from warmer subsolar latitudes to the poles.

Table 9.2: Atmospheric properties of giant planets

	Jupiter	Saturn	Uranus	Neptune
H ₂	0.864	0.963	0.85	0.85
He	0.136	0.033	0.13	0.13
H ₂ O	$2.3 \cdot 10^{-3}$	$\sim 1.6 \cdot 10^{-3}$	$\sim 1.4 \cdot 10^{-3}$	$\sim 1.4 \cdot 10^{-3}$
CH ₄	$1.8 \cdot 10^{-3}$	$4.3 \cdot 10^{-3}$	0.020	0.030
NH ₃	$2.3 \cdot 10^{-4}$	$4.8 \cdot 10^{-4}$	$< 1.9 \cdot 10^{-4}$	$< 1.9 \cdot 10^{-4}$
H ₂ S	$1.9 \cdot 10^{-4}$	$3.8 \cdot 10^{-4}$	$\sim 3 \cdot 10^{-4}$	$\sim 8 \cdot 10^{-4}$
Ne	$2.0 \cdot 10^{-5}$			
Ar	$1.3 \cdot 10^{-5}$			
C ₂ H ₆	$\sim 3 \cdot 10^{-6}$	$\sim 3 \cdot 10^{-6}$	$< 1 \cdot 10^{-8}$	$1.7 \cdot 10^{-6}$
Traces	<p>other hydrocarbons, CO →</p> <p>PH₃, GeH₄ → HCN →</p>			

Table 13.1: selected properties of the Sun

Mass	$1.99 \cdot 10^{30}$ kg
Radius	$6.96 \cdot 10^5$ km
Luminosity	$3.828 \cdot 10^{26}$ J/s
Average density	1.41 g/cm ³
Temperature — Core	$15.7 \cdot 10^6$ K
Temperature — Photosphere	5,778 K (T _{effective})
Temperature — Corona	range; several million K
Rotation period	~ 25 days near equator; ~ 35 days near poles
Magnetic field	$\sim 1\text{-}2 \cdot 10^{-4}$ T globally; ~ 0.3 T in sunspots
absolute magnitude	$M_V = 4.83$
color index	$B-V = 0.62$
spectral type	G2V
metallicity	$Z = 0.0122$

Table 14.1: some of the principal characteristics of the spectral types.

O	blue	$T_{\text{eff}} > 30,000$ K	He II; multiply ionized metals; some lines in emission
B	blue-white	T_{eff} : 10,000 - 30,000 K	He I, Balmers increasing
A	blue-white - white	T_{eff} : 7,500 - 10,000 K	Balmer lines; ionized metals; Ca II strengthening
F	white - yellow-white	T_{eff} : 6,000 - 7,500 K	Balmer lines ↓; Ca II ↑; neutral metals increasing
G	yellow-white - yellow	T_{eff} : 5,200 - 6,000 K	Balmers weak; Ca II max; neutral metals ↑; CH
K	yellow - orange	T_{eff} : 3,700 - 5,200 K	Balmers very weak; Ca II; neutral metals strong; TiO
M	orange - red	T_{eff} : 2,400 - 3,700 K	Ca II ↓; neutral metals strong; molecular bands
WR	Wolf-Rayet stars; no hydrogen lines; emission lines of helium and N &/or C, sometimes O		
L	mostly brown dwarfs; some very low-mass stars; some very cool supergiants		
T	infrared brown dwarfs, $T_{\text{eff}} \sim 700 - 1,300$ K; methane present in spectra		
Y	recently created classification for very cool brown dwarfs; possibly NH_3 , H_2O present in spectra		
C	Carbon stars; most are CR, CN giants similar to G/K and K/M stars but with added carbon		
S	ZrO in spectra; carbon intermediate between carbon stars and normal M stars		
wd or D	white dwarfs: degenerate remnants of solar-type stars; broad lines		

Table 14.2: approximate properties of Population I main sequence (luminosity class V) stars

	T_{eff}	B-V	M_V	B.C.*	R / R_{\odot}	M / M_{\odot}
O2	48,000	-1.0	-6.1	-4.7	15	100
O5	42,000	-0.33	-5.7	-4.40	12	60
B0	30,000	-0.3	-4.0	-3.16	7.4	17.5
B5	15,200	-0.17	-1.2	-1.46	3.9	5.9
B8	11,400	-0.11	-0.25	-0.80	3.0	3.8
A0	9,790	-0.02	0.65	-0.30	2.4	2.9
A5	8,180	0.15	2.0	-0.15	1.7	2.0
F0	7,300	0.30	2.7	-0.09	1.5	1.6
F5	6,650	0.44	3.5	-0.14	1.3	1.4
G0	5,940	0.58	4.4	-0.18	1.1	1.05
G5	5,560	0.68	5.1	-0.21	0.92	0.92
K0	5,150	0.81	5.9	-0.31	0.85	0.79
K5	4,410	1.15	7.4	-0.72	0.72	0.67

M0	3,840	1.40	8.8	-1.38	0.60	0.51
M5	3,000	1.64	12.3	-2.73	0.2	0.15
M8	2,400	2.12	18.7	-4.1	0.10	0.08

*B.C. = bolometric correction

Table 14.3: roughly, approximate properties of Population I supergiants (luminosity class I)

	T_{eff}	B-V	M_V	B.C.	R / R_{\odot}
O9	32,000	-0.27	-6.5	-3.2	25
B2	17,600	-0.17	-6.4	-1.6	40
B5	13,600	-0.10	-6.2	-0.95	50
A0	9,980	-0.01	-6.3	-0.4	60
A5	8,610	0.09	-6.6	-0.1	65
F0	7,460	0.17	-6.6	-0.01	80
F5	6,370	0.32	-6.6	-0.03	100
G0	5,370	0.76	-6.4	-0.15	120
G5	4,930	1.02	-6.2	-0.3	150
K0	4,550	1.25	-6.0	-0.5	200
K5	3,990	1.60	-5.8	-1.0	400
M0	3,620	1.67	-5.6	-1.3	500
M5	2,880	1.80	-5.6	-3.5	800

Table 14.4: properties of a few interesting and/or well-known stars.

	RA (2000)			Dec (2000)		m_b	m_V	B-V	parallax	μ RA	μ Dec	V_{radial}	Spt& LC	notes
	h	m	s	°	'									
α Cen A	14	39	36.5	-60	50.0	0.72	0.01	0.71	754.81	-3679	474	-21.4	G2V	
α Cen B	14	39	35.1	-60	50.3	2.21	1.33	0.88	796.92	-3614	803	-20.7	K1V	
α Cen C	14	29	42.9	-62	40.8	12.95	11.13	1.82	769.8	-3776	766	-22.4	M5.5Ve	+ planet
Albireo (β Cyg) A	19	30	43.3	27	57.6	4.17	3.09	1.08	7.51	-7.2	-6.2	-24.07	K3II+B9.5V	
Albireo (β Cyg) B	19	30	45.4	27	57.9	5.01	5.11	-0.1	8.38	-0.99	-0.5	-18.80	B8Ve	
Aldebaran (α Tau)	4	35	55.2	16	30.6	2.4	0.86	1.54	48.94	63.5	-189	54.26	K5III	
Algol (β Per)	3	8	10.1	40	57.3	2.07	2.12	-0.05	36.27	2.99	-1.7	4.0	B8V	eclipsing binary
Altair (α Aql)	19	50	47	8	52.1	0.98	0.76	0.22	194.95	536	385	-26.6	A7Vn	
Antares (α Sco)	16	9	24.5	-26	25.9	2.75	0.91	1.84	5.89	-12	-23	-3.5	M0.5Iab+B3V	
Arcturus (α Boo)	14	15	39.7	19	10.9	1.18	-0.05	1.23	88.83	-1093	-2000	-5.19	K1.5III	
Barnard's	17	57	48.5	4	41.6	11.24	9.51	1.73	547.5	-803	10362.54	-110.51	M4V	BY Dra var

Betelgeuse (α Ori)	5	55	10.3	7	24.4	2.27	0.42	1.85	6.55	27.5	11	21.91	M1-2Ia-lab	
Canopus (α Car)	6	23	57.1	-52	41.7	-0.59	-0.74	0.15	10.55	19.9	23.2	20.3	A9II	
Capella (α Aur)	5	16	41.4	45	59.9	0.88	0.08	0.8	76.2	75.3	-427	29.19	K0+G1III	spectroscopic bin
Castor (α Gem) Aab	7	34	35.9	31	53.3	1.62	1.93	-0.31	64.12	-206.3	-148	6	A1.5IV+dM1e	spectroscopic bin
Castor (α Gem) Bab	7	34	36.1	31	53.3	1.62	2.97	-1.35	64.12	-206.3	-148	-1.2	A1IV+dM1e	spectroscopic bin
Castor (α Gem) Cab	7	34	37.6	31	52.2	10.56	9.27	1.29	64.12	-207.6	-96	2.5	2(M0.5Ve)	BY Dra & bin
τ Ceti	1	44	4.1	-15	56.2	4.22	3.5	0.72	273.96	-1721	854	-16.68	G8V	multiple planets; debris disk
61 Cygni A	21	6	53.9	38	45.0	6.39	5.21	1.18	285.95	416	32	-65.74	K5V	BY Dra var
61 Cygni B	21	6	55.3	38	44.5	7.4	6.03	1.37	286.15	4106	3156	-64.07	K7V	
Deneb (α Cygni)	20	41	25.9	45	16.8	1.34	1.25	0.09	2.31	2.0	1.9	-4.9	A2Ia	
ϵ Eri	3	32	55.8	-9	27.5	4.61	3.73	0.88	310.9	-975.2	19.5	16.43	K2 V	BY Dra var; + planet
Fomalhaut (α PsA) A	22	57	39	-29	37.3	1.25	1.16	0.09	129.8	329	-165	6.5	A4V	+planet; debris disk; angular size 0.212'
Fomalhaut B (TW PsA)	22	56	24.1	-31	33.9	7.58	6.48	1.1	131.4	330	-158	7.2	K4Ve	BY Dra var
Fomalhaut C	22	48	4.5	-24	22.1	14.3	12.624	1.676	130.3	332	-184	6.5	M4.0Ve	
ϵ Indi	22	3	21.7	-56	47.2	5.75	4.69	1.06	274.8	3967	-2536	-40	K5V	
Luten 726-8 A (BL Cet)	1	39	1.5	-17	57.0		12.7		374	3296	563	29	M5.5V	flare
Luten 726-8 B (UV Cet)	1	39	1.5	-17	57.0		13.2		374	3296	563	29	M6V	flare
Mizar (ζ 1 UMa) A	13	23	55.5	54	55.5	2.29	2.23	0.06	39.4	121	-22	-5.6	A1.5V	spectroscopic bin
Mizar (ζ 2 UMa) B	13	23	56.3	54	55.3	4.05	3.88	0.17	40.5	114	-26.5	-9.3	A1+A7IV-V	spectroscopic bin
Alcor (80 UMa)	13	25	13.5	54	59.3	4.18	4.01	0.17	39.9	113	-28.6	-8.9	A5+M3-4V	binary
Polaris (α UMi) Aa	2	31	49.1	89	15.9	2.62	2.02	0.6	7.54	44.5	-11.9	-16.4	F8 Ib	Cepheid
Polaris (α UMi) Ab							9.2						F6V	
Polaris (α UMi) B	2	30	33.5	89	15.6	8.69	8.2	0.49				-8	F3V	
Pollux (β Gem)	7	45	18.95	28	1.6	2.14	1.14	1.0	94.54	-627	-45.8	3.23	K0IIIb	+ planet
Procyon (α CMi) A	7	39	18.1	5	13.5	0.79	0.37	0.4	284.6	-717	-1035	-3.2	F5 IV-V	
Procyon (α CMi) B	7	39	17.9	5	3.4	10.7	10.92	-0.2		-709	-1024		DQZ	
R136a1	5	38	42.4	-69	6.0	12.78	12.77	0.01	0.02				WN5h	LMC
Regulus (α Leo) A	10	8	22.3	11	58.0	1.24	1.4	-0.2	41.13	-249	5.6	5.9	B8IVn	
Regulus (α Leo) B/C	10	8	12.8	11	59.8	8.99	8.13	0.9	41.21	-254	8.0	6.72	K0Ve (+M4V?)	binary
Rigel (β Ori) A	5	14	32.3	-8	12.1	0.1	0.13	-0.03	3.78	1.3	0.5	17.8	B8Iae	
Rigel (β Ori) Bab	5	14	32	-8	12.2	10.4	10.4	0.00				19.1	B9+B9	spectroscopic bin
Ross 128	11	47	44.4	0	48.3	12.905	11.153	1.75	295.8	607	-1223	-31.2	M4V	flare; +planet
Sirius (α CMa) A	6	45	8.9	-16	43.0	-1.09	-1.09	0.00	379.2	-546	-1223	-5.5	A1V	spectroscopic bin
Sirius (α CMa) B	6	45	9	-16	43.1	8.41	8.44	-0.03		-547	-1207		DA1.9	
Spica (α Vir)	13	25	11.6	-11	9.7	0.74	0.97	-0.23	13.06	-42	-30.7	1	B1V	
Vega (α Lyr)	18	36	56.3	38	47.0	0.03	0.03	0.00	130.23	201	286	-20.6	A0V	
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