Costanti - cgs

Velocità della luce	c	$=$	3.00×10^{10} cm s^{-1}
Costante di gravitazione	G	$=$	6.67×10^{-8} g^{-1} cm^{3} s^{-2}
Costante di Planck	h	$=$	6.63×10^{-27} erg s
Carica dell'elettrone	e	$=$	4.80×10^{-10} e.s.u.
Massa dell'elettrone	m_e	$=$	9.11×10^{-28} g
Massa del protone	m_p	$=$	1.66×10^{-24} g
Costante di Boltzmann	k	$=$	1.38×10^{-16} erg K^{-1}
Costante di radiazione	a	$=$	7.56×10^{-15} erg cm^{-3} K^{-4}
Costante di Stefan-Boltzmann	σ	$=$	5.67×10^{-5} erg cm^{-2} s^{-1} K^{-4}

Unità Astronomica	AU	$=$	1.50×10^{13} cm
		$=$	4.85×10^{-6} pc
Parsec	pc	$=$	3.09×10^{18} cm
		$=$	2.06×10^{5} AU
Anno	yr	$=$	3.16×10^{7} s
Massa solare	$M_\odot$	$=$	1.99×10^{33} g
Luminosità solare	$L_\odot$	$=$	3.90×10^{33} erg s^{-1}
Raggio solare	$R_\odot$	$=$	6.96×10^{10} cm
Massa di Giove	M_J	$=$	1.90×10^{30} g
Massa della Terra	$M_\oplus$	$=$	5.97×10^{27} g
Raggio della Terra	$R_\oplus$	$=$	6.38×10^{8} cm

Radiante	1 rad	$=$	206264.8"
Arcosecondo	1"	$=$	4.848137×10^{-6} rad

1 eV = $1,60 \cdot 10^{-19}$ erg

Physical Constants and Astronomical Data

New! Try my Physical Calculator. It is a JavaScript calculator with all of the constants below programmed into it.

Physical Constants

(converted to CGS units from the NIST Constant Index)

Name	Symbol	Number	Exp	CGS Units	Relative Error (ppm)
speed of light in a vacuum	c	2.99792458	10^{10} 10	cm s^{-1}	exact
Planck constant	h	6.6260755(40)	-27	erg s	0.60
	hbar	1.05457266(63)	-27	erg s	0.60
Gravitational constant	G	6.67259(85)	-8	cm^3 g^{-1} s^{-2}	128
Electron charge	e	4.8032068(14)	-10	esu	0.30
Mass of electron	m_e	9.1093897(54)	-28	g	0.59
Mass of proton	m_p	1.6726231(10)	-24	g	0.59
Mass of neutron	m_n	1.6749286(10)	-24	g	0.59
Mass of hydrogen	m_H	1.6733	-24	g	--
Atomic mass unit	amu	1.6605402(10)	-24	g	0.59
Avagadro's number	N_A	6.0221367(36)	23		0.59
Boltzmann constant	k	1.380658(12)	-16	erg k^{-1}	8.5
Electron volt	eV	1.6021772(50)	-12	erg	~0.60
Radiation density constant	a	7.5646	-15	erg cm^{-3} K^{-4}	--
Stefan-Boltzmann constant	\sigma	5.67051(19)	-5	erg cm^{-2} K^{-4} s^{-1}	34
Fine structure constant	\alpha	7.29735308(33)	-3		0.045
Rydberg constant	$R_{\backslash\mathrm{inf}}$	2.1798741(13)	-11	erg	0.60

Note: a "--" in the error column means that I have not found a good source for that constant, so the value quoted is just an approximation

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Astronomical Units/Data

NAME	SYMBOL	NUMBER	EXP	CGS UNITS
Astronomical unit	AU	1.496	13	cm
Parsec	pc	3.086	18	cm
Light year	ly	9.463	17	cm
Solar mass	M_o	1.99	33	g

the vernal equinox measured along the equator. This angle is the *right ascension* α (or R.A.) of the object, measured counterclockwise from ♈.

Since declination and right ascension are independent of the position of the observer and the motions of the Earth, they can be used in star maps and catalogues. As will be explained later, in many telescopes one of the axes (the hour axis) is parallel to the rotation axis of the Earth. The other axis (declination axis) is perpendicular to the hour axis. Declinations can be read immediately on the declination dial of the telescope. But the zero point of the right ascension seems to move in the sky, due to the diurnal rotation of the Earth. So we cannot use the right ascension to find an object unless we know the direction of the vernal equinox.

Since the south meridian is a well-defined line in the sky, we use it to establish a local coordinate corresponding to the right ascension. The *hour angle* is measured clockwise from the meridian. The hour angle of an object is not a constant, but grows at a steady rate, due to the Earth's rotation. The hour angle of the vernal equinox is called the *sidereal time* Θ. Figure 2.11 shows that for any object,

$$\Theta = h + \alpha \,, \tag{2.11}$$

where h is the object's hour angle and α its right ascension.

Since hour angle and sidereal time change with time at a constant rate, it is practical to express them in units of time. Also the closely related right ascension is customarily given in time units. Thus 24 hours equals 360 degrees, 1 hour = 15 degrees, 1 minute of time = 15 minutes of arc, and so on. All these quantities are in the range [0 h, 24 h).

In practice, the sidereal time can be readily determined by pointing the telescope to an easily recognisable star and reading its hour angle on the hour angle dial of the telescope. The right ascension found in a catalogue is then added to the hour angle, giving the sidereal time at the moment of observation. For any other time, the sidereal time can be evaluated by adding the time elapsed since the observation. If we want to be accurate, we have to use a sidereal clock to measure time intervals. A sidereal clock runs 3 min 56.56 s fast a day as compared with an ordinary solar time clock:

$$\begin{aligned} &24\,\mathrm{h}\ \text{solar time}\\ &\quad = 24\,\mathrm{h}\ 3\,\mathrm{min}\ 56.56\,\mathrm{s}\ \text{sidereal time}\,. \end{aligned} \tag{2.12}$$

The reason for this is the orbital motion of the Earth: stars seem to move faster than the Sun across the sky; hence, a sidereal clock must run faster. (This is further discussed in Sect. 2.13.)

Transformations between the horizontal and equatorial frames are easily obtained from spherical

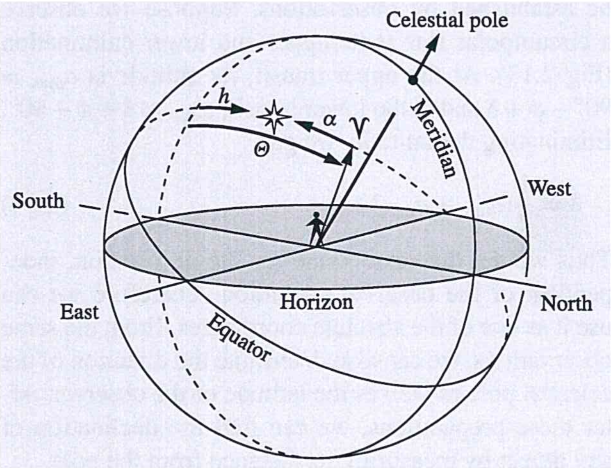

Fig. 2.11. The sidereal time Θ (the hour angle of the vernal equinox) equals the hour angle plus right ascension of any object

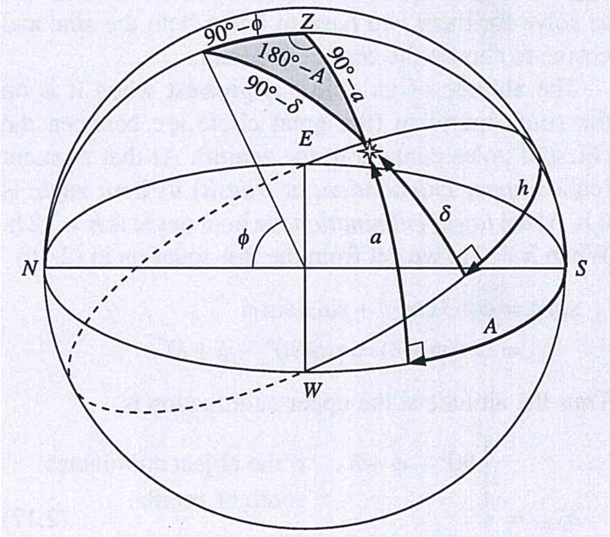

Fig. 2.12. The nautical triangle for deriving transformations between the horizontal and equatorial frames

Absolute Magnitude of the Sun in Several Bands

These calculations used the solar spectrum available at the CALSPEC database at STScI, and the STIS spectrum of Vega combined with the Model Atmosphere of Vega calculated by Kurucz, as described by Bohlin and Gilliland 2004 .

The procedure used here followed very closely Fukugita, Shimasaku and Ichikawa, 1995, PASP, 105, 945 using filter curves coming from a variety of sources, many of them referenced in that work.

The solar absolute magnitudes for U,B,V,R,I,J,H,K were calibrated against the values of Binney and Merrifield 1998, Galactic Astronomy, Table 2.1 (page 53), assuming Bessell filters, and the offsets used to calibrate the entire set of filters. Some values need checking - particularly those using UV filters (FOCA and Galex).

Filter	B&M	here	difference
U	5.61	5.55	0.06
B	5.48	5.45	0.03
V	4.83	4.80	0.03
R	4.42	4.46	-0.04
I	4.08	4.11	-0.03
J	3.64	3.67	-0.02
H	3.32	3.33	0.01
K	3.28	3.29	0.01

with a dispersion of 0.09magnitudes.

The SDSS filters shown here come from two different sources. The "primed" system is that used by the USNO 40-in Photometric Telescope. However, the 2.5 telescope (which is the Survey instrument) has slightly different bandpasses, which are represented as the unprimed system. (Further information about this can be seen at the SDSS flux calibration page. Because of the emphasis in galaxy work, the unprimed filters were further shifted to z=0.1 to compare with the Solar absolute magnitudes used by Blanton et al. 2003, ApJ, 592, 819. There is a systematic difference of about 0.1 magnitudes between Blanton et al. and here.

Filter	Blanton et al.	here	difference
u,0.1	6.80	6.77	0.03
g,0.1	5.45	5.36	0.11
r,0.1	4.76	4.67	0.09
i,0.1	4.58	4.48	0.10