CAAO 2026: Astrophysical Constants and Parameters

1. Universal Constants

Constant	Value
Speed of light (c)	$2.998 \times 10^8\,\mathrm{m\ s^{-1}}$
Gravitational const. (G)	$6.674 \times 10^{-11}\,\mathrm{N\ m^2 kg^{-2}}$
Stefan-Boltzmann (σ)	$5.670 \times 10^{-8}\,\mathrm{W\ m^{-2} K^{-4}}$
Planck constant (h)	$6.626 \times 10^{-34}\,\mathrm{J\ s}$
Boltzmann constant (k_B)	$1.381 \times 10^{-23}\,\mathrm{J\ K^{-1}}$
Avogadro constant (N_A)	$6.022 \times 10^{23}\,\mathrm{mol^{-1}}$
Elementary charge (e)	$1.602 \times 10^{-19}\,\mathrm{C}$
Wien's constant (b)	$2.898 \times 10^{-3}\,\mathrm{m\ K}$

2. Standard Units & Conversions

Unit	Equivalent
1 Astronomical Unit (au)	$1.496 \times 10^{11}\,\mathrm{m}$
1 Parsec (pc)	$3.086 \times 10^{16}\,\mathrm{m}$
	$206,265\,\mathrm{au}$
1 Light-year (ly)	$9.461 \times 10^{15}\,\mathrm{m}$
1 Julian Year (yr)	$365.25\,\mathrm{days}$
	$3.15576 \times 10^7\,\mathrm{s}$
1 Tropical Year	$365.242\,\mathrm{days}$
1 Sidereal Year	$365.256\,\mathrm{days}$

3. Biological & Instrumental Limits

Parameter	Value
Dark-adapted eye resolution (θ_{eye})	$\approx 100''$
Dark-adapted pupil diameter (D_{pupil})	$\approx 6\,\mathrm{mm}$
Naked-eye limiting mag. (m_{limit})	≈ 6.0
Ground atmospheric seeing (θ_{atm})	$\approx 1''$
Space telescope resolution (θ_{space})	$\approx 0.05''$
Standard optical wavelength (λ_{opt})	$550\,\mathrm{nm}$

4. Solar Data

Parameter	Value
Mass ($M_\odot$)	$1.989 \times 10^{30}\,\mathrm{kg}$
Radius ($R_\odot$)	$6.955 \times 10^8\,\mathrm{m}$
Luminosity ($L_\odot$)	$3.828 \times 10^{26}\,\mathrm{W}$
Effective Temp ($T_{\mathrm{eff},\odot}$)	$5777\,\mathrm{K}$
Apparent visual mag. ($m_{v,\odot}$)	-26.74
Absolute visual mag. ($M_{V,\odot}$)	$+4.82$
Absolute bolometric mag. ($M_{\mathrm{bol},\odot}$)	$+4.74$

5. Planetary & Lunar Data

Entity	Parameter	Value
Earth	Mass ($M_\oplus$)	$5.972 \times 10^{24}\,\mathrm{kg}$
	Radius ($R_\oplus$)	$6.378 \times 10^6\,\mathrm{m}$
	Axial tilt (ϵ)	$23°26'$
Moon	Radius (R_{Moon})	$1.737 \times 10^6\,\mathrm{m}$
	Mean distance from Earth ($d_{\mathrm{E\text{-}M}}$)	$3.844 \times 10^5\,\mathrm{km}$
	Inclination of orbit w.r.t ecliptic	$5°8'43''$
Venus	Mean semi-major axis (a_{Venus})	$0.723\,\mathrm{au}$
Mars	Mean semi-major axis (a_{Mars})	$1.524\,\mathrm{au}$
	Minimum distance to Earth (d_{opp})	$\approx 5.5 \times 10^7\,\mathrm{km}$
	Distance from Deimos to surface (d_{Deimos})	$\approx 2.0 \times 10^4\,\mathrm{km}$