Lecture 2 Reference Tables
CGS Units & Astrophysical Constants

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CGS Unit Reference

Quantity	CGS Unit	Base Units	SI Conversion
Force	dyne	g cm s^{-2}	10^{-5} N
Energy	erg	$\text{g cm}^2 \text{ s}^{-2}$	10^{-7} J
Pressure	dyne/cm^2	$\text{g cm}^{-1} \text{ s}^{-2}$	0.1 Pa
Luminosity	erg/s	$\text{g cm}^2 \text{ s}^{-3}$	10^{-7} W
Flux	$\text{erg cm}^{-2} \text{ s}^{-1}$	g s^{-3}	10^{-3} W/m^2

Fundamental Physical Constants

Constant	Symbol	CGS Value
Gravitational constant	G	$6.67 \times 10^{-8} \text{ cm}^3 \text{ g}^{-1} \text{ s}^{-2}$
Speed of light	c	$3.0 \times 10^{10} \text{ cm s}^{-1}$
Stefan-Boltzmann	σ	$5.67 \times 10^{-5} \text{ erg cm}^{-2} \text{ s}^{-1} \text{ K}^{-4}$
Boltzmann constant	k_B	$1.38 \times 10^{-16} \text{ erg K}^{-1}$
Planck constant	h	$6.63 \times 10^{-27} \text{ erg s}$
Reduced Planck	$\hbar$	$1.05 \times 10^{-27} \text{ erg s}$

Astrophysical Constants (Solar Units)

Quantity	Symbol	CGS Value
Solar mass	$M_\odot$	2.0×10^{33} g
Solar radius	$R_\odot$	7.0×10^{10} cm
Solar luminosity	$L_\odot$	3.8×10^{33} erg/s
1 Astronomical Unit	AU	1.50×10^{13} cm
1 parsec	pc	3.09×10^{18} cm
1 light-year	ly	9.46×10^{17} cm

Key Conversions to Memorize

Conversion	Factor
1 J = ? erg	10^7 erg
1 N = ? dyne	10^5 dyne
1 W = ? erg/s	10^7 erg/s
1 m = ? cm	10^2 cm
1 kg = ? g	10^3 g

Dimensional "Recipes"

Quantity	Dimensions
Velocity	$[LT^{-1}]$
Acceleration	$[LT^{-2}]$
Force	$[MLT^{-2}]$
Energy	$[ML^2T^{-2}]$
Pressure	$[ML^{-1}T^{-2}]$
Luminosity (Power)	$[ML^2T^{-3}]$
Gravitational constant G	$[M^{-1}L^3T^{-2}]$