

Syllabus

- 1) HW
- 2) Project / PRESENTATION
- 3) class participation

OK?

NO — MIDTERM / FINAL

- 2) Goal: learn to run code
and know what is going on

① Stars usually spherically unless they rotate

Q: what are planets?

→ shine by reflected sun light

Since stars shine - radiate → lose E

→ E conservation requires

Key must evolve

→ burn nuclear fuel

• Death of stars by

• disruption

• run out of fuel

or both...

→ compact remnant

WD, NS, BH

↳ Powerful SN!

Large Scales:

• Galaxies $10^6 \dots 10^{12}$ stars

• Clusters of galaxies 10^5 galaxies

• Universe 10^{11} galaxies

→ 10^{24} stars

Q: Do galaxies mostly consist of stars?

What are stars?

- 1) Bound by self gravity
- 2) radiate E supplied by internal source

Q: what radiation (γ, ν)

Q: what sources? [... are conceivable]
[in nature] ... historical

- gravitational

contraction

gravitational settling

- chemical

burning, phase transitions

- phase transitions

- crystallization

- heat capacity / internal heat
(just cool down)

- pulsations (dissipation)

- rotational E

- magnetic E

... nuclear burning

BRIGHTNESS of stars

[We use cgs]

LUMINOSITY L : Energy / TIME = $[L]$

INTENSITY OBSERVED $I_{OBS} = \frac{L}{4\pi d^2}$

Typical stellar luminosities: $10^{-5} \dots > 10^5 L_{\odot}$

$$L_{\odot} = 3.84 \times 10^{33} \text{ erg/s}$$

SUN

$$M_{\odot} = 2 \times 10^{33} \text{ g}$$

$$R_{\odot} = 6.89 \times 10^{10} \text{ cm}$$