

(a) Astrophysics- I

LECTURE-1: The Sun: Surface features

**Presented by,
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Solar System

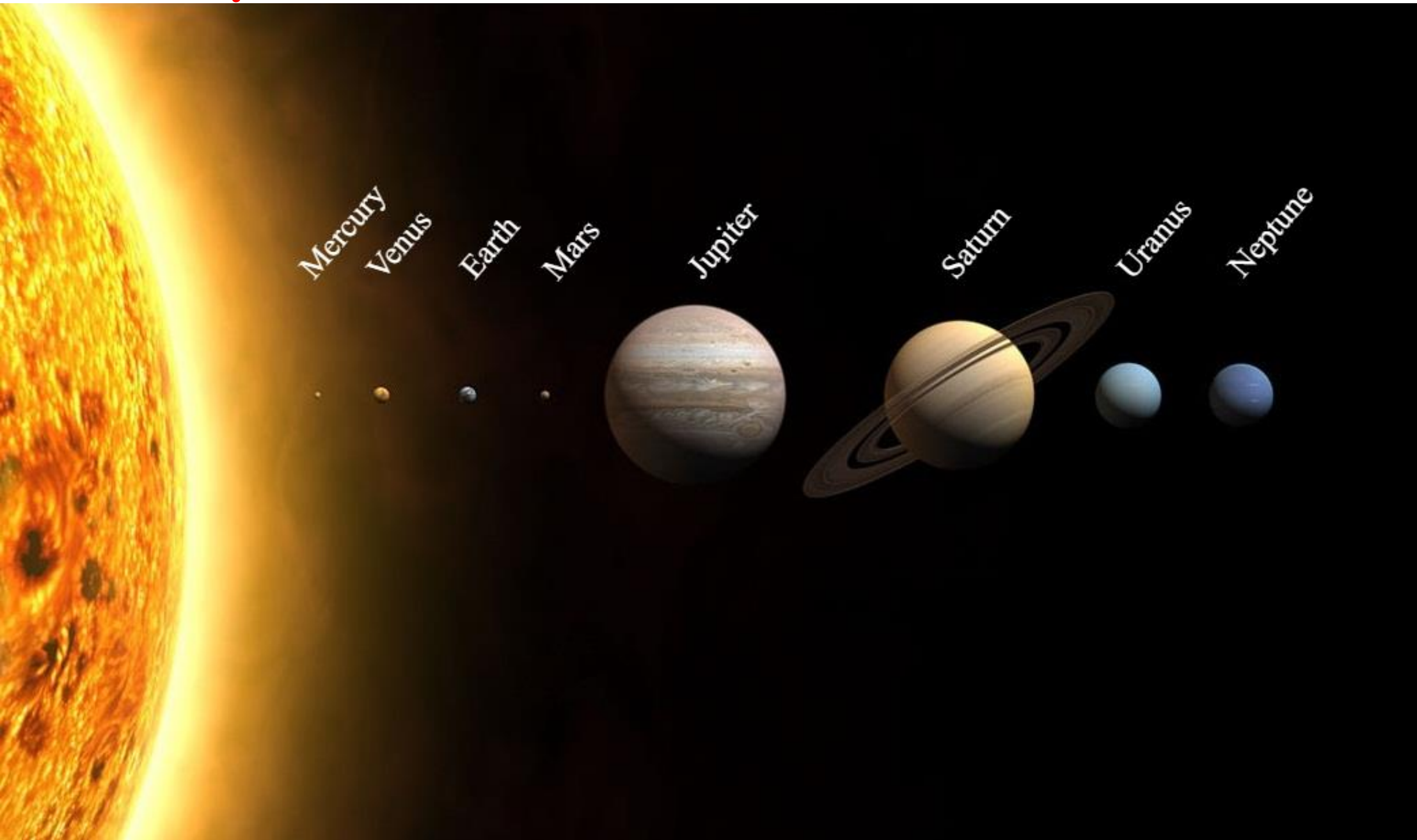


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Outline

1. Evershed effect
2. Rotation
3. Magnetic field
4. Prominences
5. Photosphere
6. Chromosphere
7. Corona
8. Solar activity
9. Radio emission from the sun

Table 18-1

Sun Data

Distance from the Earth:	Mean: 1 AU = 149,598,000 km Maximum: 152,000,000 km Minimum: 147,000,000 km
Light travel time to the Earth:	8.32 min
Mean angular diameter:	32 arcmin
Radius:	696,000 km = 109 Earth radii
Mass:	1.9891×10^{30} kg = 3.33×10^5 Earth masses
Composition (by mass):	74% hydrogen 25% helium 1% other elements
Composition (by number of atoms):	92.1% hydrogen 7.8% helium 0.1% other elements
Mean density:	1410 kg/m ³
Mean temperatures:	Surface: 5800 K Center: 1.55×10^7 K
Luminosity:	3.86×10^{26} W
Distance from center of Galaxy:	8000 pc = 26,000 ly
Orbital period around center of Galaxy:	220 million years
Orbital speed around center of Galaxy:	220 km/s



You may have all these Questions in your mind ?

The sun is as big as the earth as you are as big as.....?

How do we Compare the mass of sun to all of other solar planet

What is the Average density of sun

What is the Chemical composition of sun

Wow do we know that the sun is not a solid object

What are Magnetic field of earth and magnetic field of sun

What is the Surface temperature of sun?

If the sun is in the vacuum of space, how does it burn?

Will the sun ever stop burning? (And if so, when? And what will happen to Earth and its inhabitants?)

What keeps all that gas from leaking into space?

Why does the sun send out solar flares?

Our Sun

Our Sun is a star, and a fairly average star at that, but with one unique feature: it is very close to us

It is 300,000 times closer than our next nearest neighbor, Alpha Centauri.

Alpha Centauri is 4.3 light years from us

the Sun is only 8 light minutes away from us.

Radius of Sun

$$R_{\odot} = 696000 \text{ km}$$

695,700 kilometres (432,300 miles) is approximately 10 times the average radius of Jupiter, about 109 times the radius of the Earth, and 1/215th of an astronomical unit, the distance of the Earth from the Sun.

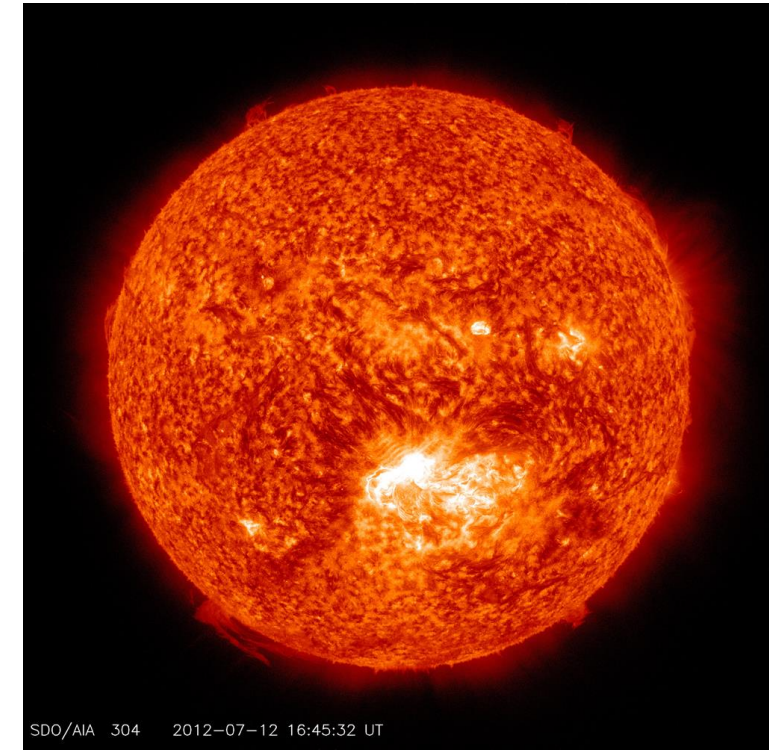


Image Credit: <https://www.space.com/>

1 R_{\odot} = Units

6.95700×10^8 = metres

695,700 = kilometres

0.00465047 = astronomical unit

432,288 = miles

7.35355×10^{-8} = light-year

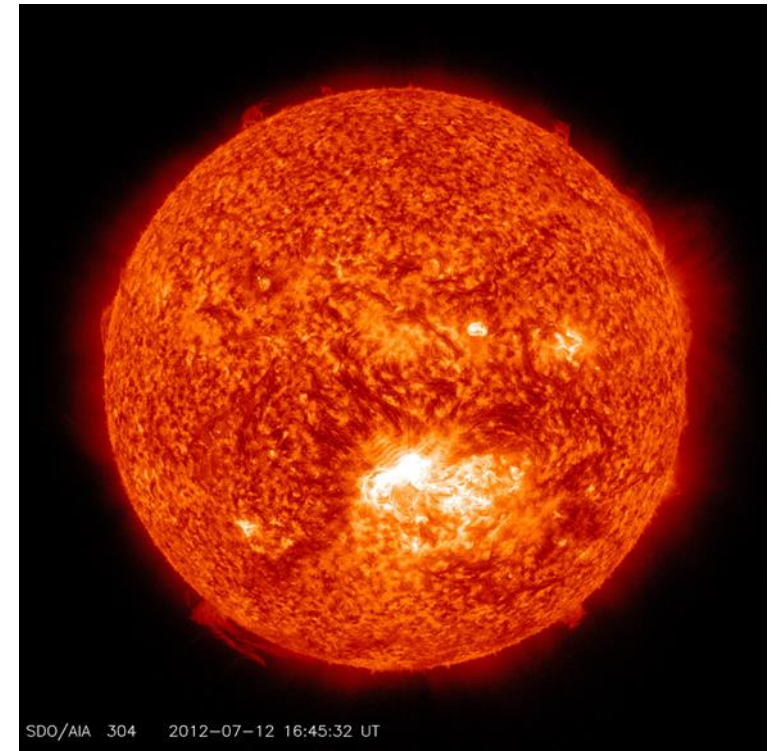
2.25461×10^{-8} = parsec

2.32061 = light-seconds

Mass of Sun

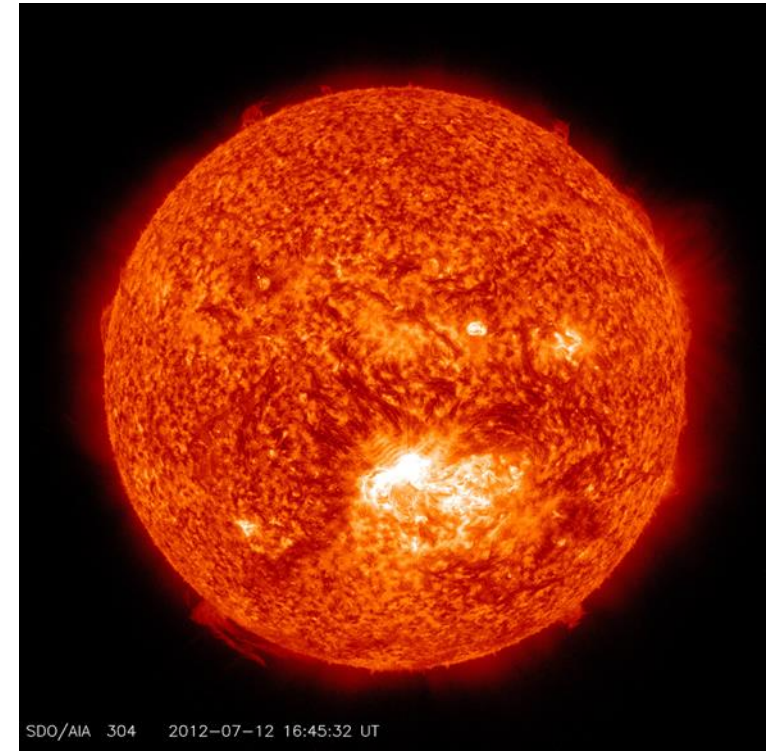
Mass of sun is approximately equal to $M_{\odot} = 1.99 \times 10^{30} kg$

Solar mass is standard mass unit . It is often used to indicate the masses of other stars, as well as stellar clusters, nebulae, galaxies and black holes



Average Density of Sun:

The average solar density is approximately 1400 kg/m^3 , and is quite similar to that of the jovian planets and about one-quarter the average density of Earth.



References:

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4. https://er.jsc.nasa.gov/seh/21_Solar_System_FC1.pdf
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