

GENS 4001 Astronomy

Part 1: The Solar System – The Sun

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The Sun – our local star



The Sun in X-rays

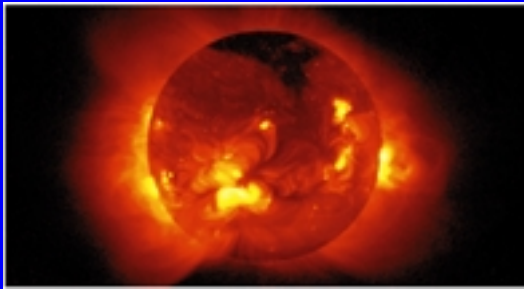
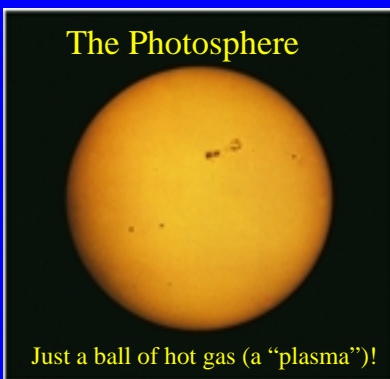


Table 18.1 Sun Data	
Distance from the Earth:	Mean: 1.496 × 10 ⁸ km Maximum: 1.521 × 10 ⁸ km Minimum: 1.471 × 10 ⁸ km
Light travel time to the Earth:	8.33 min
Mean angular diameter:	32 arcmin
Radius:	696,000 km = 109 Earth radii
Mass:	1.989 × 10 ³⁰ kg = 3.33 × 10 ⁵ Earth masses
Composition by mass:	74% hydrogen 24% helium 1% other elements
Composition by number of atoms:	92.1% hydrogen 7.8% helium 0.1% other elements
Mean density:	1.41 g cm ⁻³
Mean temperature:	Surface: 5800 K Center: 1.5 × 10 ⁷ K
Luminosity:	3.8 × 10 ²⁶ W
Distance from center of Solar:	4000 pc = 20,000 ly
Orbital period around center of Solar:	220 million years
Orbital speed around center of Solar:	220 km/s

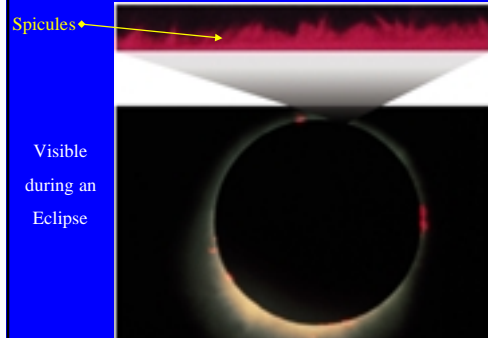
The Photosphere

- “Surface” Temperature ~6,000°C
- Opaque to light
- Sunspots



Just a ball of hot gas (a “plasma”)!

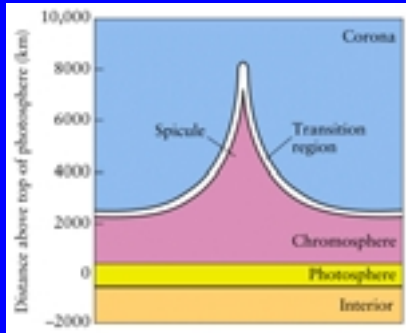
The Chromosphere: The Solar “Atmosphere”



Spicules

Visible during an Eclipse

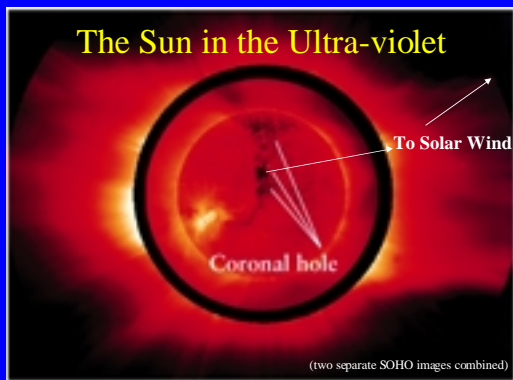
Structure of the "surface" layers



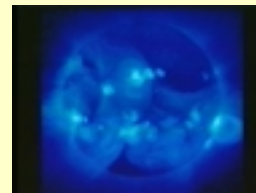
The Corona

- Temperature ~2 million °C
- Becomes the "Solar Wind"
- Extends throughout the Solar System

The Sun in the Ultra-violet

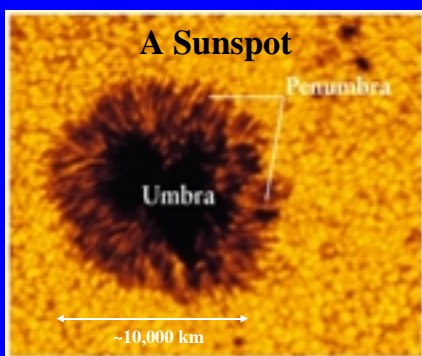


3 Weeks in the life of the Corona



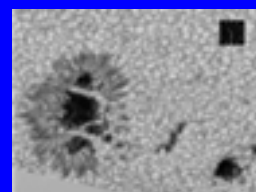
- Loops on top of sunspots
- Seen in X-rays
- Japanese Yohkoh satellite

A Sunspot



Low temperature regions of the photosphere (T ~ 4,500 °C)

3.5 Hours in the life of a Sunspot



Convection in seething granules

