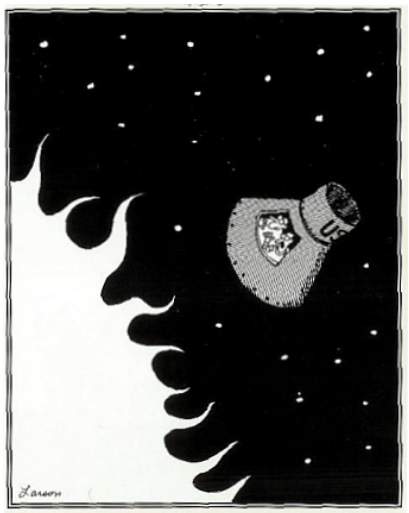
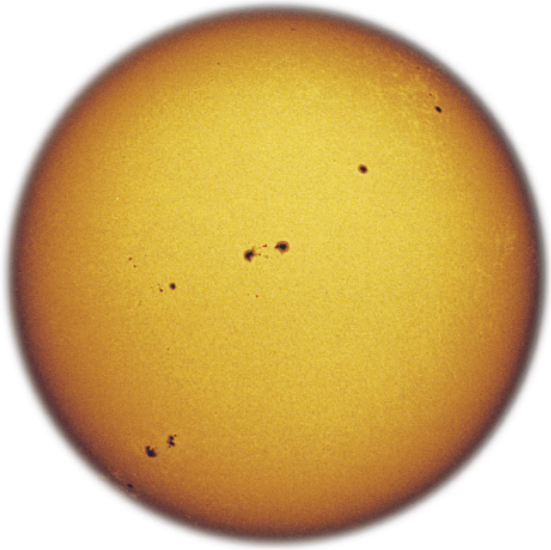


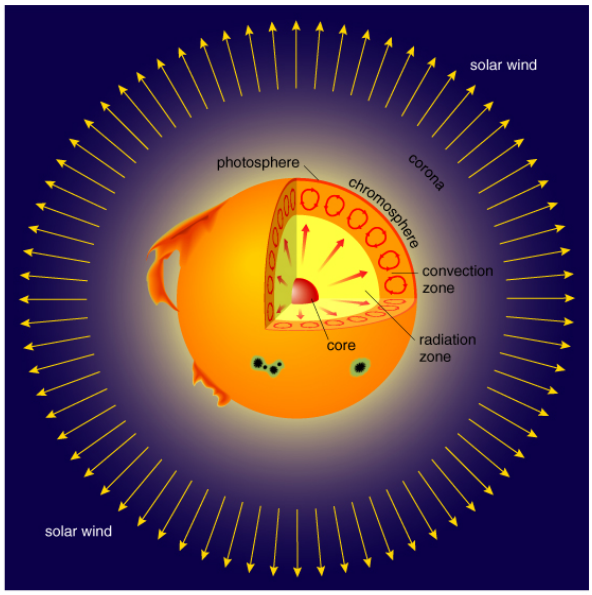
"Blast! The controls are jammed! ... We're headed straight for Mr. Sun!"

The Sun- Our Star

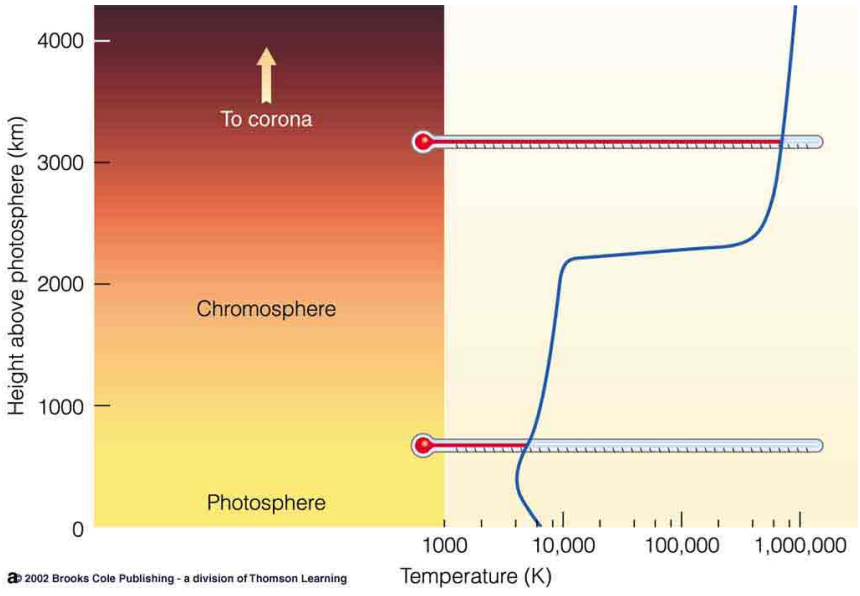


Star Parts:

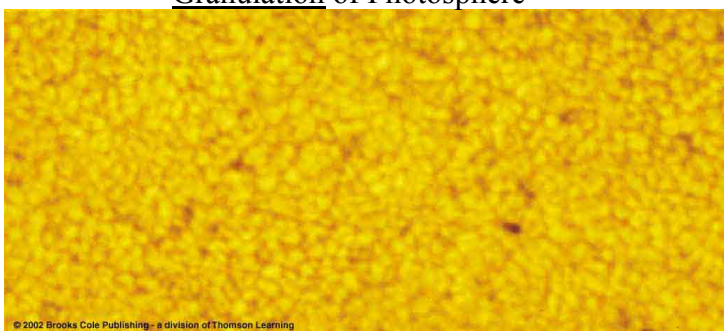
1. core
2. radiation zone
3. convection zone
4. photosphere
5. chromosphere
6. corona
7. solar wind



Temperature of the photosphere = Temperature of the Star



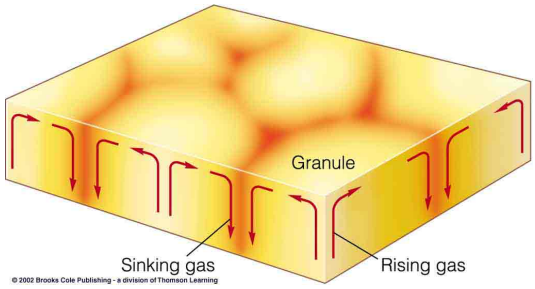
Granulation of Photosphere



Due to convection:

Bright areas = hot & rising
"Dark" areas = cool & sinking

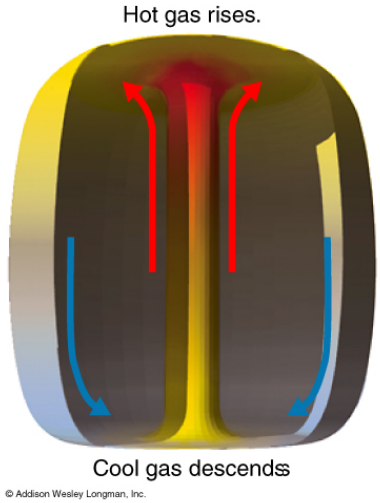
Speeds are about 1 km/s



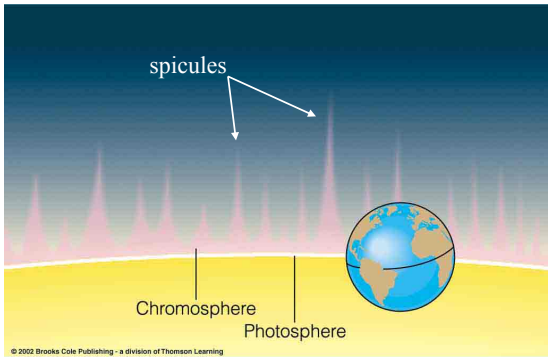
Convection

The process of hot gas rising and cool gas sinking.

Since hot material radiates more light, the rising hot parts appear bright; since cool material radiates relatively less light, the sinking cool parts appear "dark".



Relative Sizes of Photosphere and Chromosphere



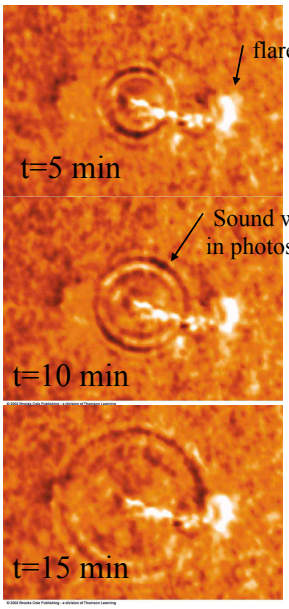
• Photosphere is dense enough to radiate light but not too dense so that photons can escape; thus it is where spectrum of star is emitted and where the absorption lines arise.

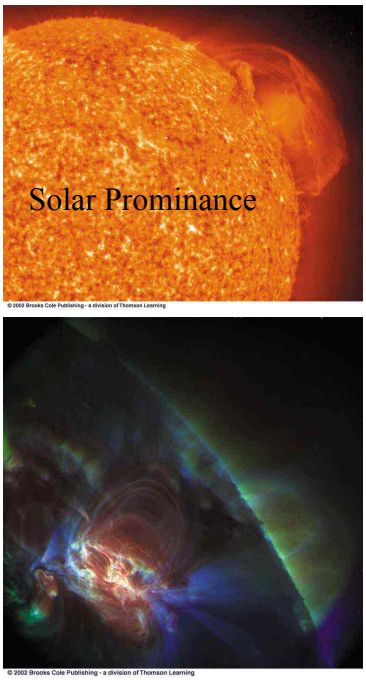
• Chromosphere is active, hotter and lower density than photosphere is where emission occurs (hot, low density gas). This is the site of spicules, flame-like jets that rise at the edges of supergranules out into the corona.

The Solar Corona (or "crown")

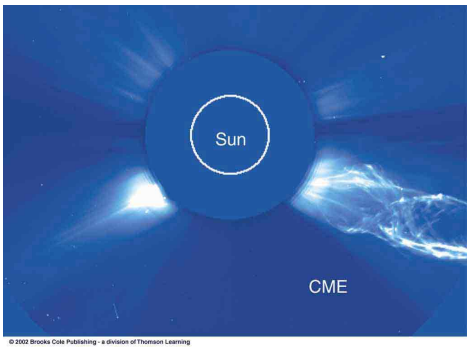
Corona is very very hot… about 1,000,000 Kelvin. It is the base of the solar wind, a "breeze" of ionized gas moving at 300-800 km/s. The Earth is bathed in this breeze of charged particles!

Solar Flare

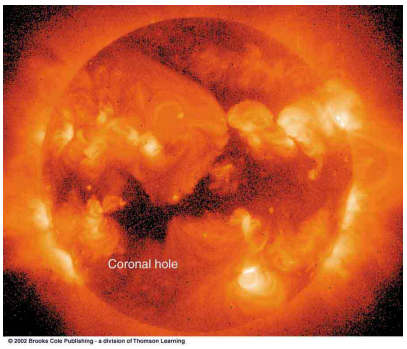




Coronal Mass Ejection

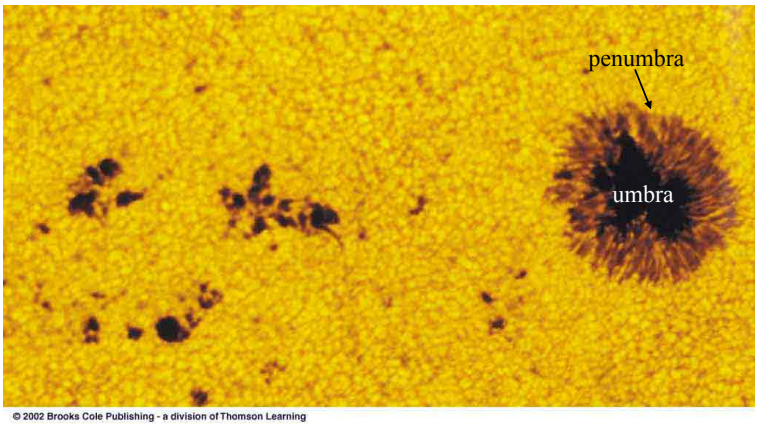


Coronal Holes



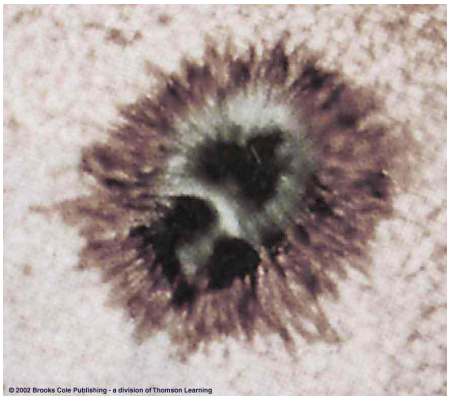
Sunspots

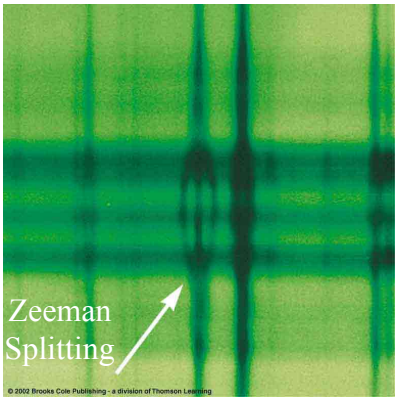
"Dark Spots" on the photosphere.
They are dark because they are cooler than surrounding gas.



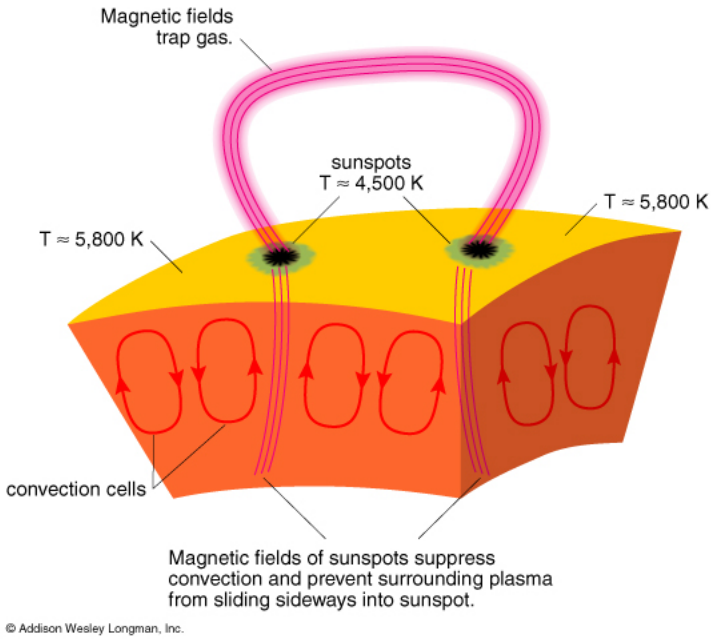
Typical sizes are about 2x Earth's diameter.
Typical temperatures of umbra is 4200 Kelvin (for the Sun).

Sunspots are due to bundled-up magnetic energy!





Sunspots occur where there is intense magnetic field energy. The strength of the magnetic energy density (or field) is measured using the Zeeman Effect, which splits absorption lines as seen above. The greater the splitting, the stronger the field.

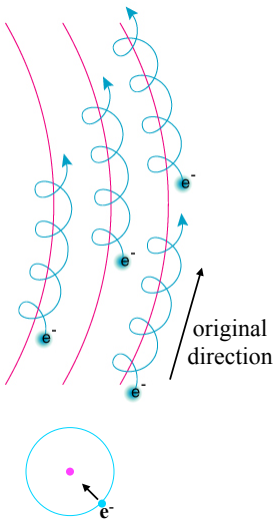


How does a magnetic field "channel" particles?

Only ions, charged particles, interact with magnetic fields…

The ions spiral around the magnetic field lines in tight circles, carried along in the direction of the original motion by inertia.

Inertia is the tendency for any object with a mass to continue in its current state of motion unless a force acts upon it.



Looking down…

A prominance is hot ionized gas caught in a magnetic loop.