Fundamental properties of the Sun

Last time
- Described the Sun’s size (diameter), mass, chemical composition, and temperature
- Today, additional features as preparation for solar observing lab

The Sun rotates (spins on its axis)

The Sun has a sharp disk, like the Moon

The density in the solar atmosphere increases rapidly from very low values in interplanetary space to very high values, and it becomes opaque within an interval of altitude of about 200 kilometers (out of 696,000)
The temperature in the solar photosphere is hot (5800K = 9981 degrees Fahrenheit), but it is even hotter deeper in the Sun.

Next topic: the active Sun

Structure of a Sunspot

Sunspots are regions of very strong magnetic field (2000 Gauss)

Indication that magnetism is connected with sunspots...measurement of magnetic fields on the surface of the Sun via the Zeeman Effect

The magnetic Sun

White light

Magnetic field

Solar magnetic fields reach far out into space
The 11 Year Solar Cycle

The Sun has a "heartbeat"; its properties change on a period of 11 years.

Latest data on this sunspot cycle

An indication that our knowledge of the solar cycle is far from perfect

Observations and predictions as of today

Sunspots are the sites of big explosions (solar flares and coronal mass ejections)

The Sunspot Cycle has been going on for a long time

Observations show cycle persisting, but "turning off" from 1650 to 1730 (Maunder Minimum)
The Solar Wind

- A wind past the Earth at 400 km/sec
- The Sun is “melting away”
- Density 19 orders of magnitude less than atmosphere
- A medium for solar events
- May have “sandblasted” the early atmosphere of Mars

The Lesson for Other Stars

- Do they also have sunspots, sunspot cycles, etc?
- How does all this (magnetic fields, solar wind, rotation) relate to the age of a star?