

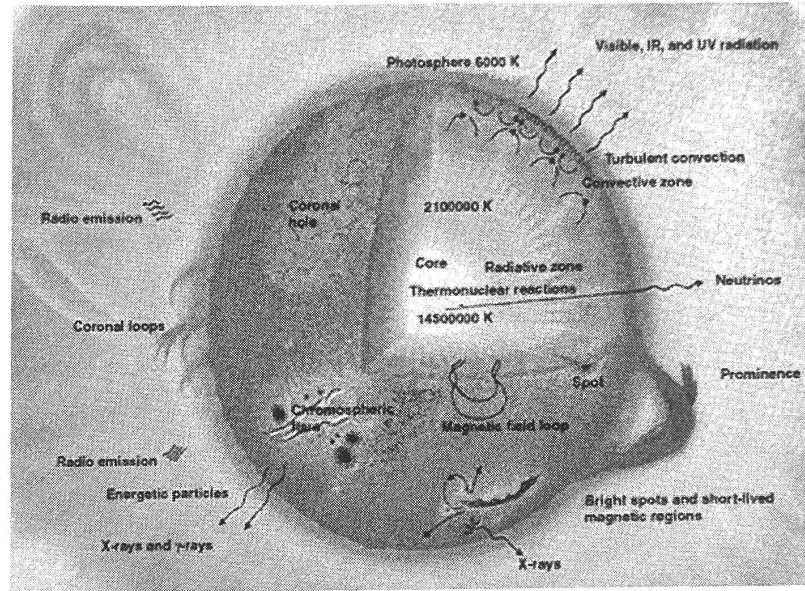
# Topic 1: Light from our Sun

## What is the Sun?

- A star: big, hot ball of mostly hydrogen gas
- At its core: under severe conditions of pressure (260 billion times the Earth's atmospheric pressure) and temperature (15 million degrees Celsius)

## How does the sun produce light?

- Conditions in the core allow nuclear reactions called fusion to take place
- $E = mc^2$ 
  - Every time hydrogen atoms fuse together to form helium, a small amount of energy is released
  - Every second of every day, the sun converts 700 million tons of hydrogen into 695 million tons of helium
    - What happened to the missing 5 million tons?



- Converted into energy (photon: particle of light)
- It takes approximately 1 – 200,000 years for the light to reach the surface of the sun and then travel through space as visible light

Picture from Physical Science, Seventh Edition, by Bill W. Tillery McGraw-Hill

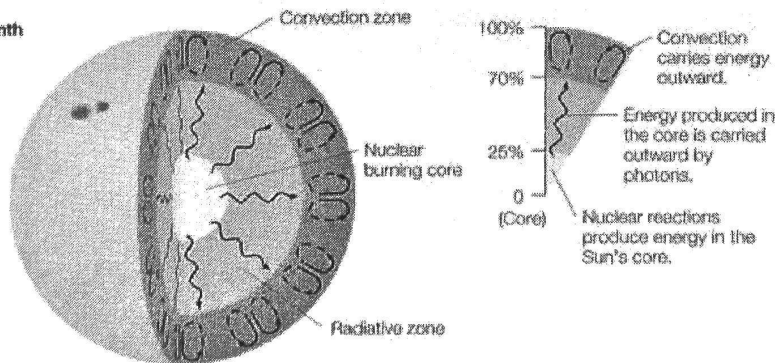


FIGURE 14.6

Energy-producing nuclear reactions occur only within the inner 25 percent of the Sun's radius. The energy produced by these reactions is carried outward by photons to 70 percent of the Sun's radius. From that distance outward, convection carries most of the Sun's energy.

- Solar flares
  - Release high energy light (gamma rays, x rays)
  - Also releases material from the sun that can hit the Earth and interact with the air near the poles, causing it to glow
    - This is what we call the aurora (aka the Northern lights)

Topic 2: Excited State

How is light produced?

- Most of the light we see comes from electrons within atoms (the building blocks of matter)
- Electron is an extremely small particle with a tiny, negative electric charge
- Light is produced by electrons that have gained energy, either by absorbing light from another source or being struck by another particle
  - An atom with such an electron is called excited
- The electron stays in the excited state briefly, and then falls back down to what is called the ground state
  - When this happens, it released energy in the form of LIGHT!

Example: An atom of Lithium

