



Astro 301/ Spring 2005 (46690)



Introduction to Astronomy

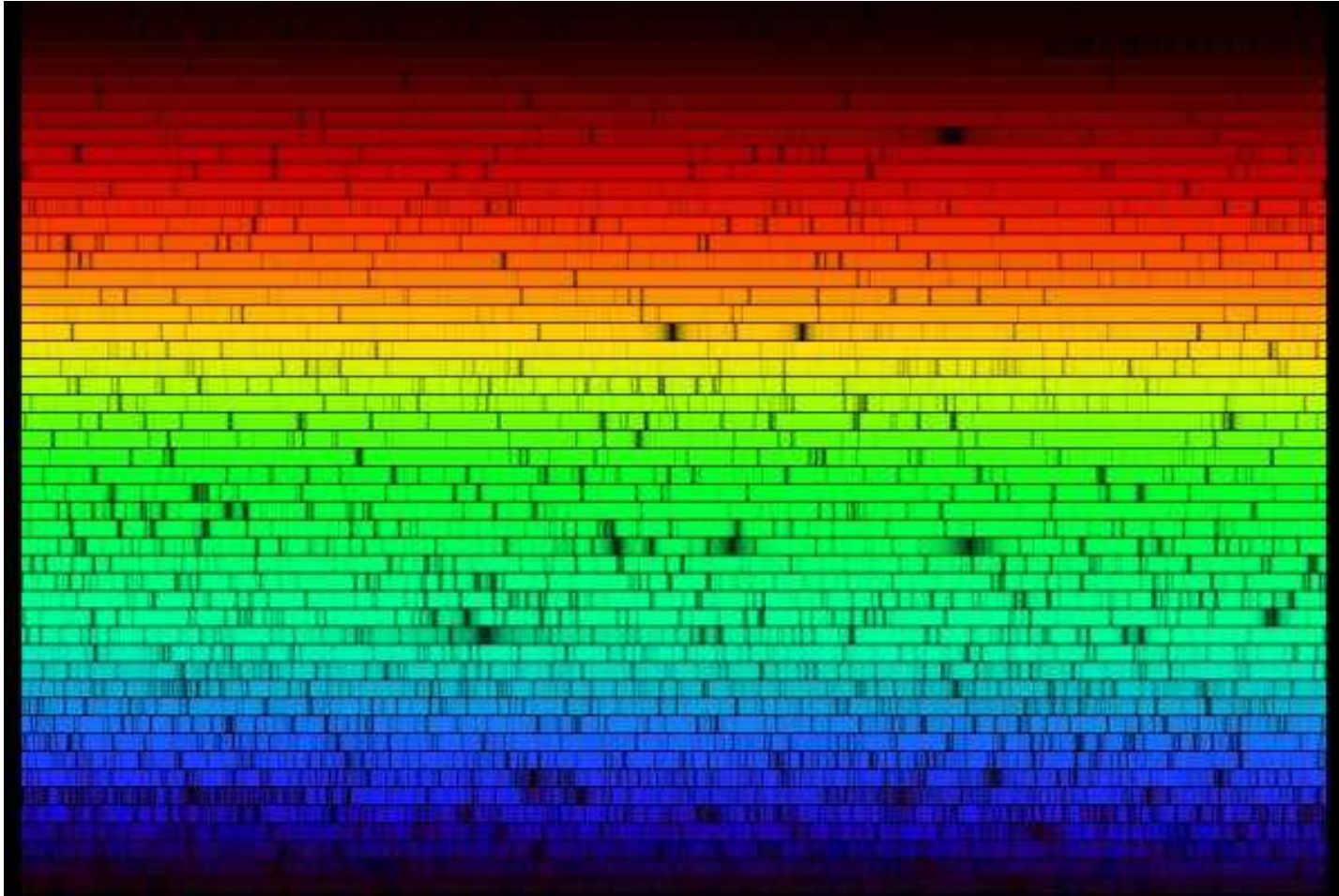
Instructor: Professor Shardha Jogee

TAs: Nick Sterling & Nairn Baliber

MWF 12-1 Welch 3.502

Lecture 17+18+19; MWF Feb 28, Mar 1,4

Lecture 17 :Astronomy Picture of the Day



Spectrum of the Sun produced by passing the Sun's light through a prism device
Thermal spectrum for $T=5800$ K from photosphere.

Dark patches= absorption lines imprinted onto spectrum as it goes through thin layers of gas at colder temperature

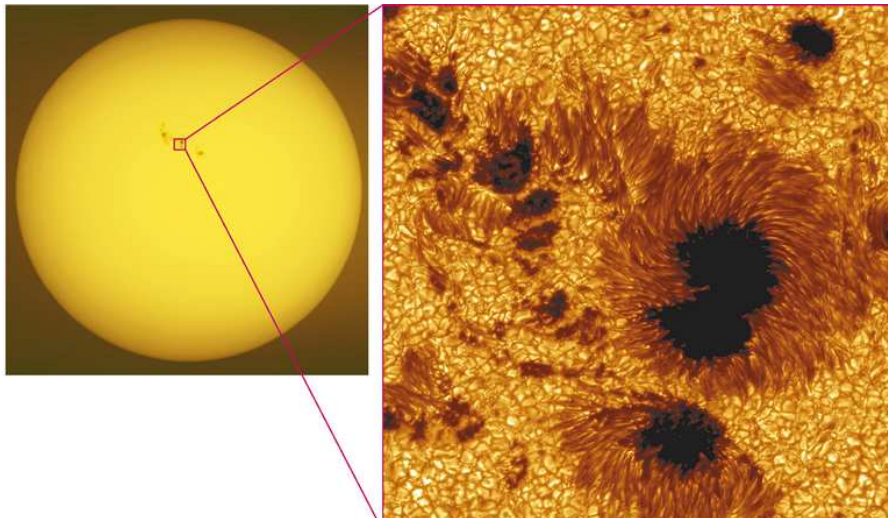
Lecture 17: Announcements

- Homework 2 due today by noon. Pick up Hwk 3 and your graded Hwk1
- Good job on Hwk1 : 25% A, 28% B, 17% C
- Exam on Wed Mar 9 : Makes up 20% of total grade . See webpage for a description of the exam format
<http://www.as.utexas.edu/~sj/a301-sp05.html>
- Review session on Wed Mar 2 from 6.30 to 8.00 pm in RLM 5.118. Bring your homeworks 1+2+3 for discussion
- Students below: please see me after class or in my office RLM 16.224
L. Speyer, K. Berastequi, G. Talbert, W. Terrell

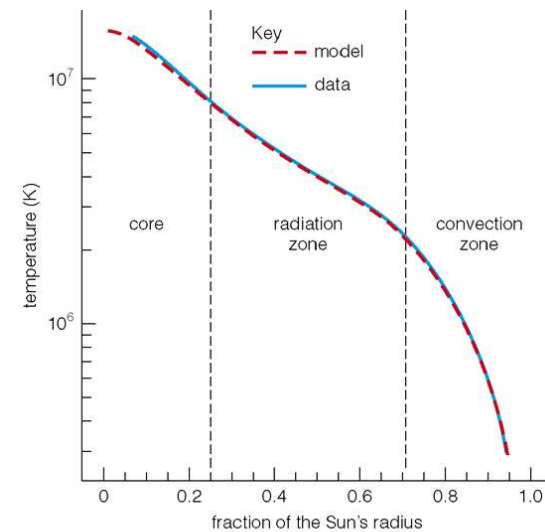
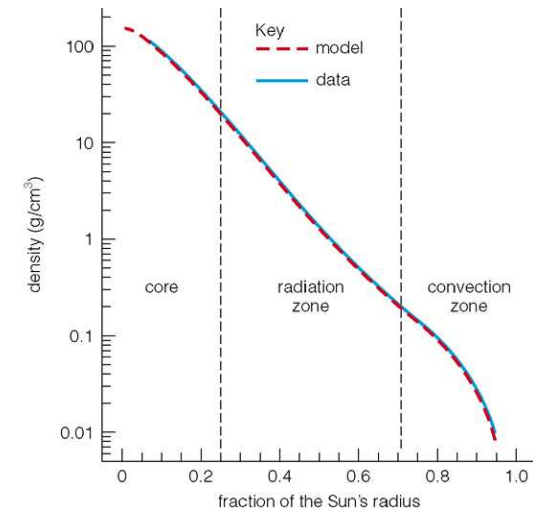
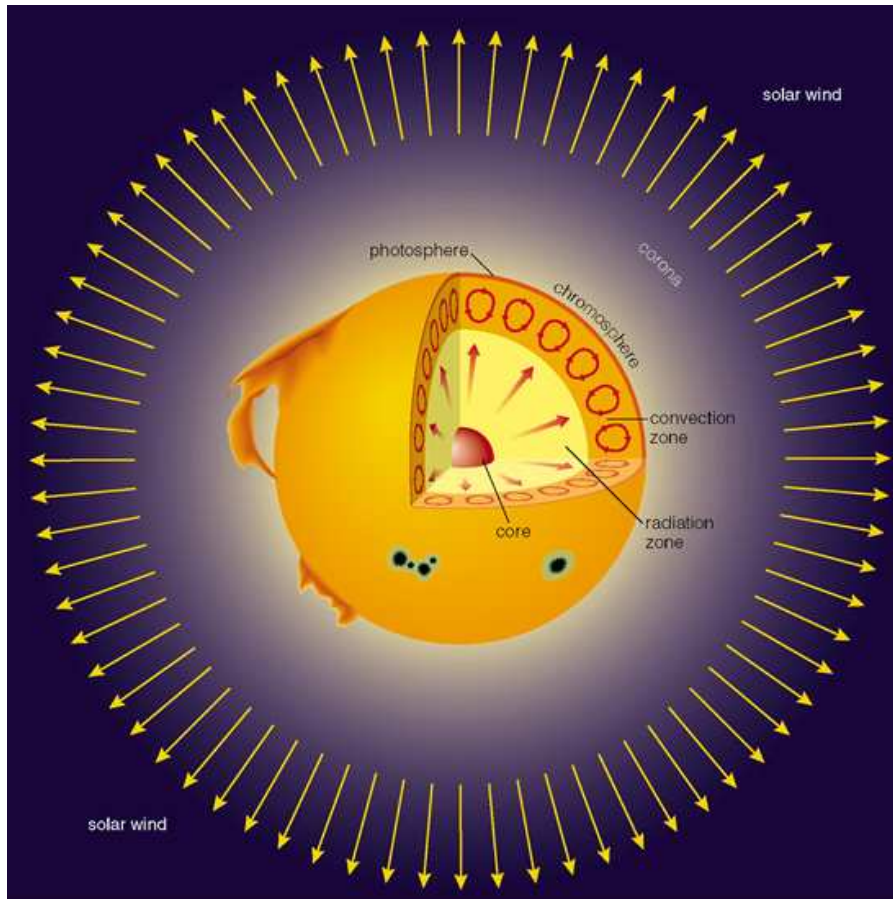
Properties of the Sun and Other Stars

Topics to be covered in class

- Nature of the Sun
- Mass, Temperature, Radius, Luminosity, Composition
- Structure of the Sun.
- Why is the photosphere considered the surface?

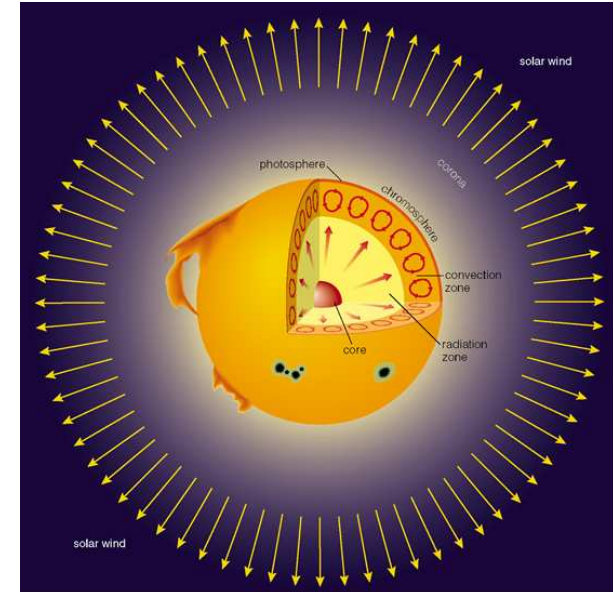
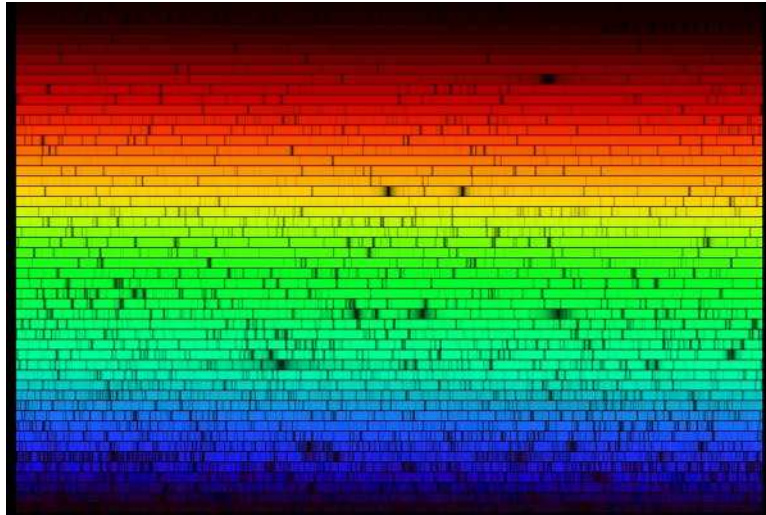


Structure of the Sun



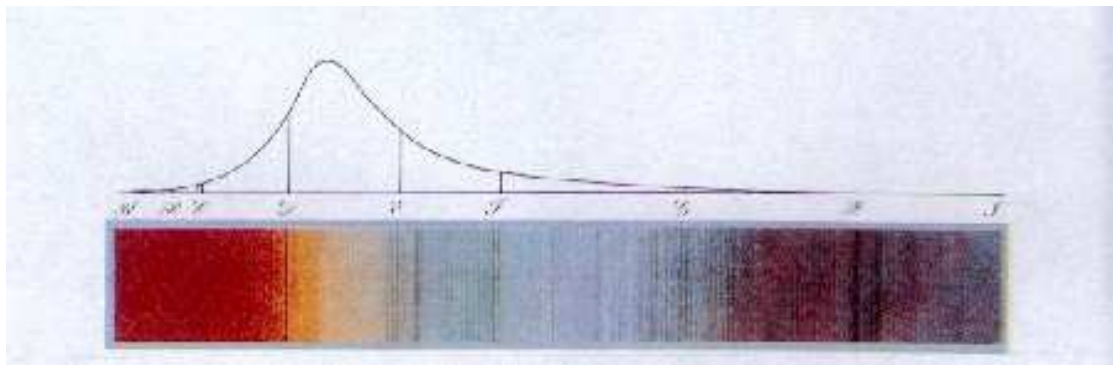
Core, radiation zone, convection zone,
photosphere = 'surface', chromosphere,
corona

Spectrum of the Sun



Solar spectrum made up of 3 components

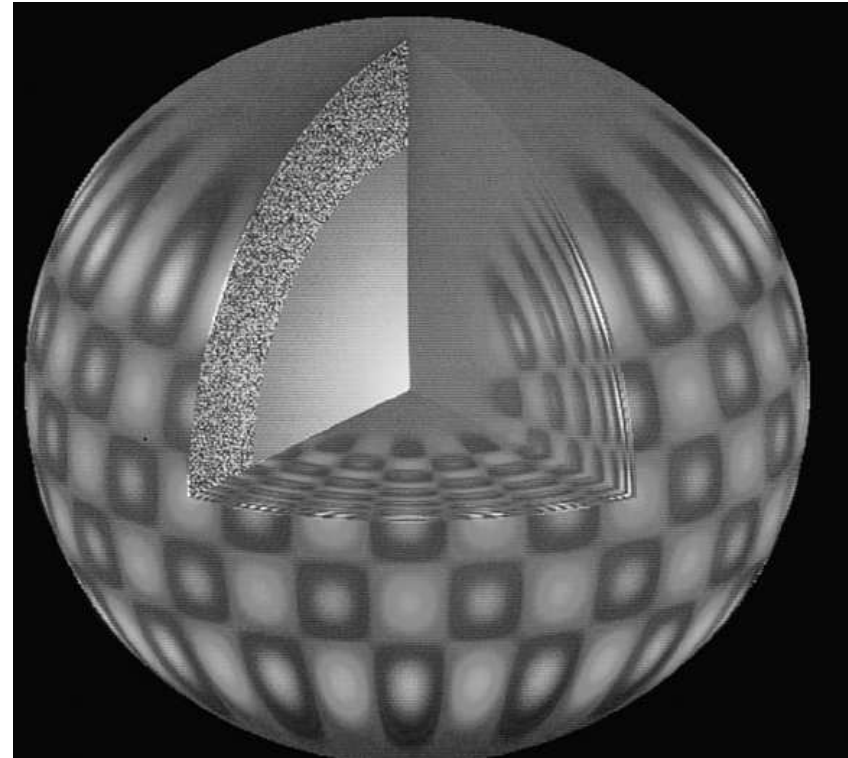
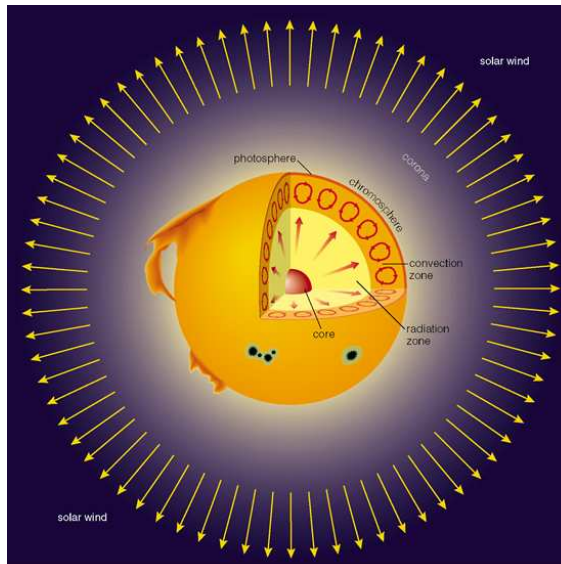
- Thermal spectrum from photosphere at 5800 K peaking at yellow λ s
- + Absorption lines (e.g., from H, He, Sodium) from which layers?
- + Emission lines from (e.g., from Calcium)from which layers?



Fraunhofer in 1814
already observed
absorption lines (from
H and Sodium) in solar
spectrum

Convection Zone of the Sun

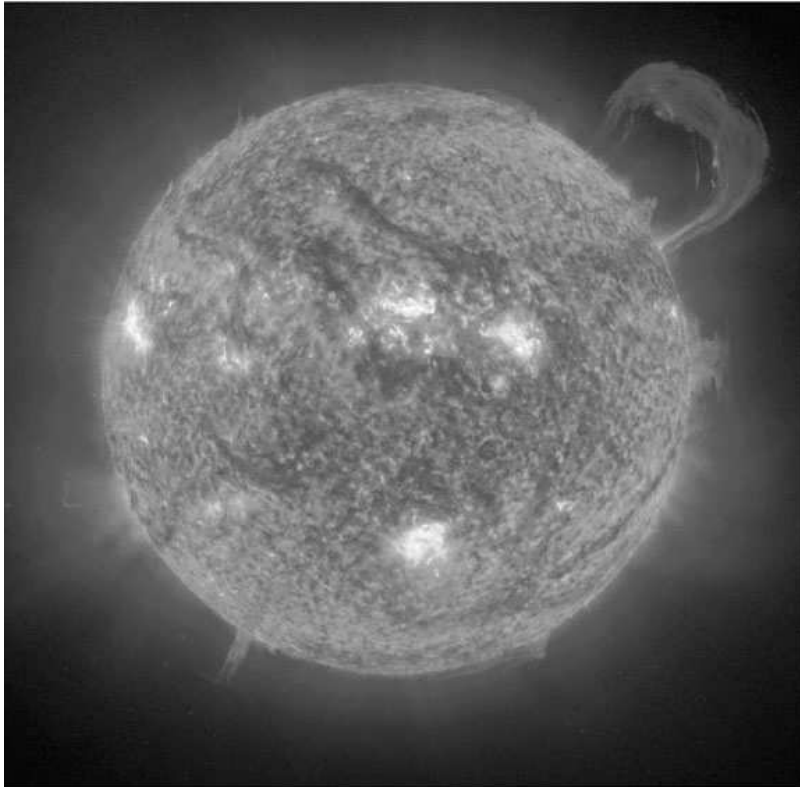
Convection zone : Energy transported by motion of hot gas outward and motion of cold gas inwards à vibrations/churning of Sun's surface appearance



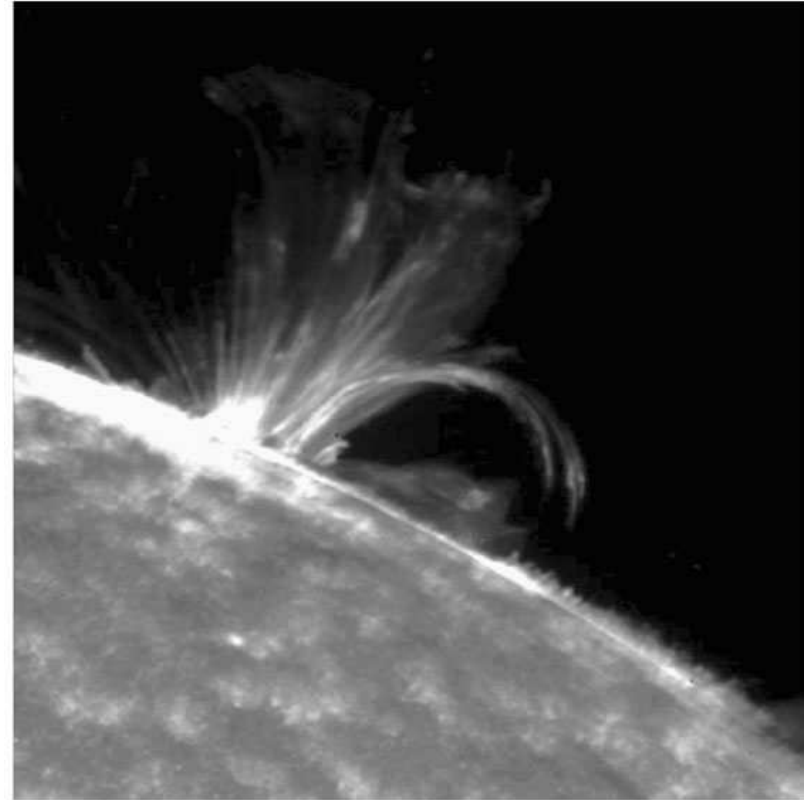
Doppler map of the Sun traces churning motions
due to convection of gas in CZ
Blueshift = due to outward moving or 'rising' hot gas
Redshift = due to inward moving or 'falling' cold gas

Chromosphere of the Sun

Chromosphere: $T=10,000$ K. Emits most of Sun's ultraviolet rays



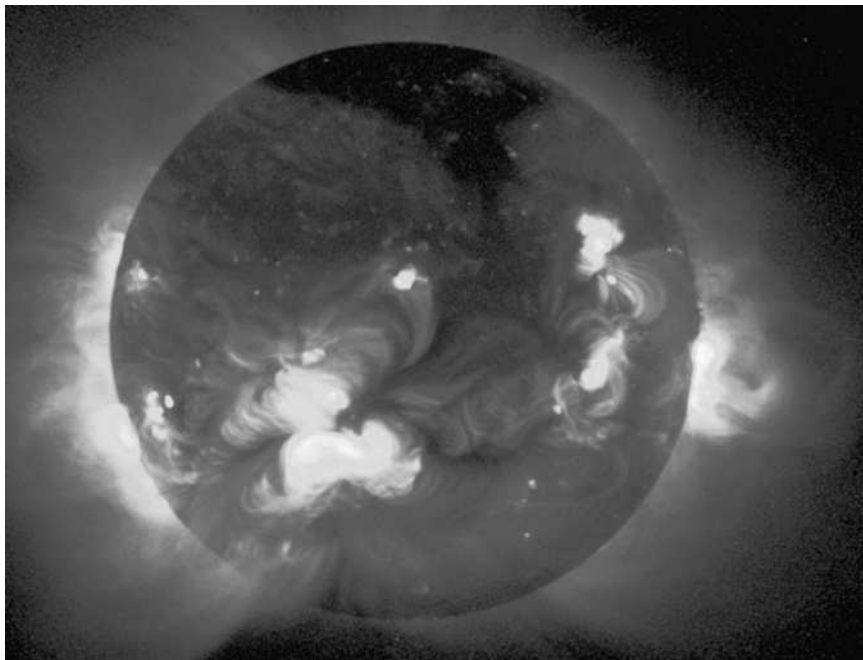
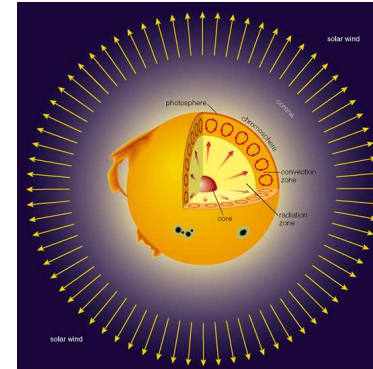
UV image (SOHO mission): giant prominence 20 times size of Earth from gas at 10^4 K.



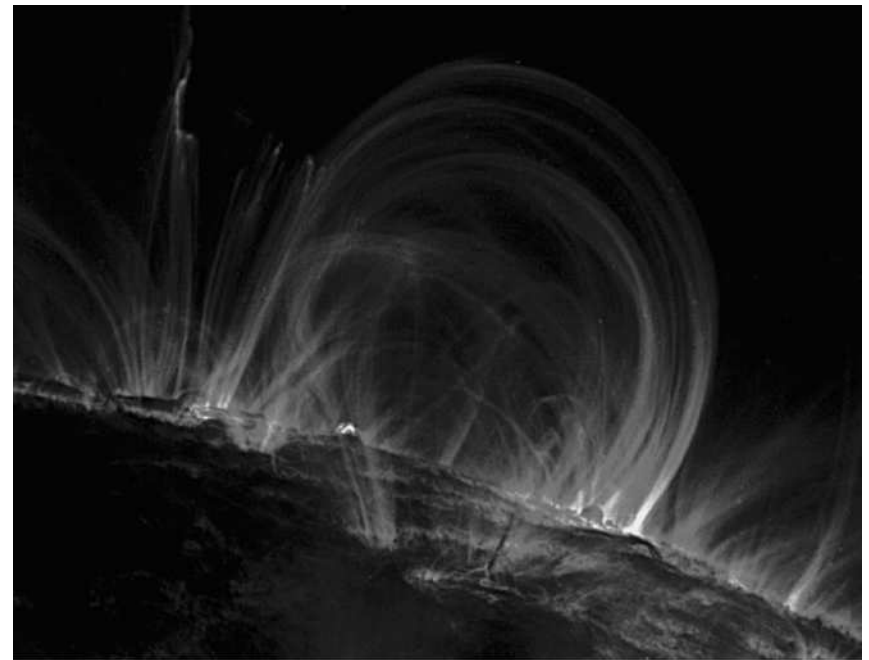
UV light emitted by hydrogen (from NASA' TRACE mission) traces solar flare

Corona of the Sun

Corona: $T=10^6$ K. Emits most of Sun's X-rays



X-ray image (Yonkoh Space Observatory)
Hot million-degree gas in Solar corona



X-ray image (NASA's TRACE mission): hot million degree gas trapped in magnetic field