Bit of Administration ....

• **Reading**
  – BSNV Chap. 12

• **Homework 9**
  – Due Friday, April 23, in box by Mathieu office door (6522) Sterling

• **Portfolios**
  – Due Wednesday, April 28
  – Can turn in each one any time for quick turnaround on grade

• **Lab 3**
  – Due Wednesday, April 28
  – Problem 5, HW 1 is a good starting point for the lab questions
  – Note typo in Question 3 - “Jupiter” => “Saturn”
Jovian Planets

• Jovian Weather

QuickTime™ and a YUV420 codec decompressor are needed to see this picture.
Jupiter emits 2x the energy it receives from the Sun!
Jovian Planets

• (Jovian) Weather Patterns

• Essential Idea -
  Atmosphere made up of high- and low-pressure systems
  High - Bulges in atmosphere
  Low - Depressions in atmosphere
Jovian Planets

• (Jovian) Weather Patterns
Jovian Planets

• (Jovian) Weather Patterns

• Essential Idea -
  
  Atmosphere made up of high- and low-pressure systems
  
  High - Bulges in atmosphere
  
  Low - Depressions in atmosphere

Atmosphere flows from high to low
Jovian Planets

• (Jovian) Weather Patterns

• Essential Idea - Coriolis Effect

QuickTime™ and a Video decompressor are needed to see this picture.
ConcepTest!

Why does the ball travel in a circle and come back to him?

A) Gravity provides a central force.
B) The merry-go-round puts a sideways spin on it.
C) The merry-go-round goes half-way around during the ball’s travel.
D) The merry-go-round is sloped, and higher in the center.
Jovian Planets

- (Jovian) Weather Patterns
- Coriolis Effect
Jovian Planets

- (Jovian) Weather Patterns
Jovian Planets

- Jovian Weather

QuickTime™ and a Microsoft Video 1 decompressor are needed to see this picture.
Jovian Planets

• Jovian Magnetic Environment
Jovian Planets

- Jovian Magnetic Environment

[Diagram showing charged particles from Io, auroral zones, solar wind, magnetic axis, and axis of rotation]
Jovian Planets

- Jovian Magnetic Environment

Radio Wave Emission
## Jovian Planets

### Jovian Magnetic Environment

<table>
<thead>
<tr>
<th></th>
<th>Size of Magnetosphere</th>
<th>Rotation Period</th>
<th>Liquid Metallic Interior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>$10^4$ km</td>
<td>58 days</td>
<td>?</td>
</tr>
<tr>
<td>Venus</td>
<td>0 km</td>
<td>243 days</td>
<td>Yes</td>
</tr>
<tr>
<td>Earth</td>
<td>$10^6$ km</td>
<td>1 day</td>
<td>Yes</td>
</tr>
<tr>
<td>Mars</td>
<td>0 km</td>
<td>1 day</td>
<td>No</td>
</tr>
<tr>
<td>Jupiter</td>
<td>$10^7$ km</td>
<td>0.4 days</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Jovian Planets

- Jovian Magnetic Environment

<table>
<thead>
<tr>
<th>pressure (bars)</th>
<th>temperature (K)</th>
<th>density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>125</td>
<td>0.0002</td>
</tr>
<tr>
<td>500,000</td>
<td>2,000</td>
<td>0.5</td>
</tr>
<tr>
<td>2,000,000</td>
<td>5,000</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Jupiter has different layers:
- gaseous hydrogen
- liquid hydrogen
- metallic hydrogen

Earth's core includes:
- atmosphere
- crust
- mantle
- core

Core of rock, metals, and hydrogen compounds
Jovian Planets

• Jovian Magnetic Environment

• Essential Idea - Dynamo Mechanism for Magnetic Field

• Electrical Current $\Rightarrow$ Magnetic Field

• Rapid rotation
• Liquid metallic core
• Convection
Would you expect the Moon to have a significant magnetic field?

A) No, because it does not have a convective core.
B) No, because it is not rapidly rotating.
C) No, because of A and B
D) Yes, because it has a convective core.
E) Yes, because it is rapidly rotating.

White) Yes, because of A and B
Jovian Rings

Saturn

Jupiter

Neptune

Uranus
Jovian Rings

- Saturn
Jovian Rings

- Saturn

70,000 km across .... 20 m thick!
Jovian Rings

• Saturn

Velocity A > Velocity B

Keplerian!

Earth

Blueshift

Redshift
Jovian Rings

• Saturn

Snowflakes (few microns) to Boulders (10 m)