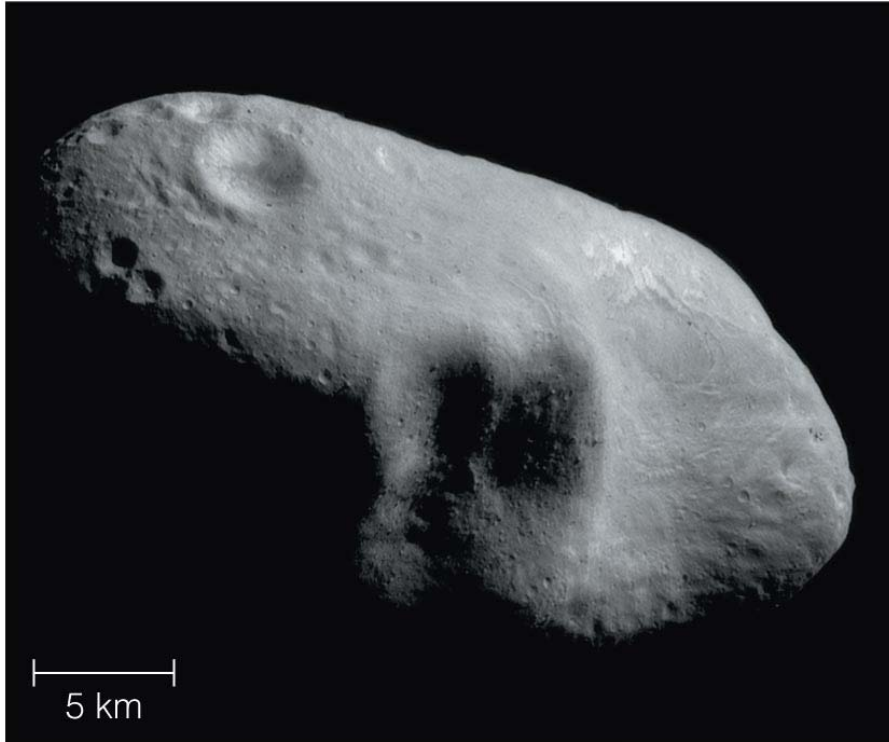


8.4 The Aftermath of Planet Formation

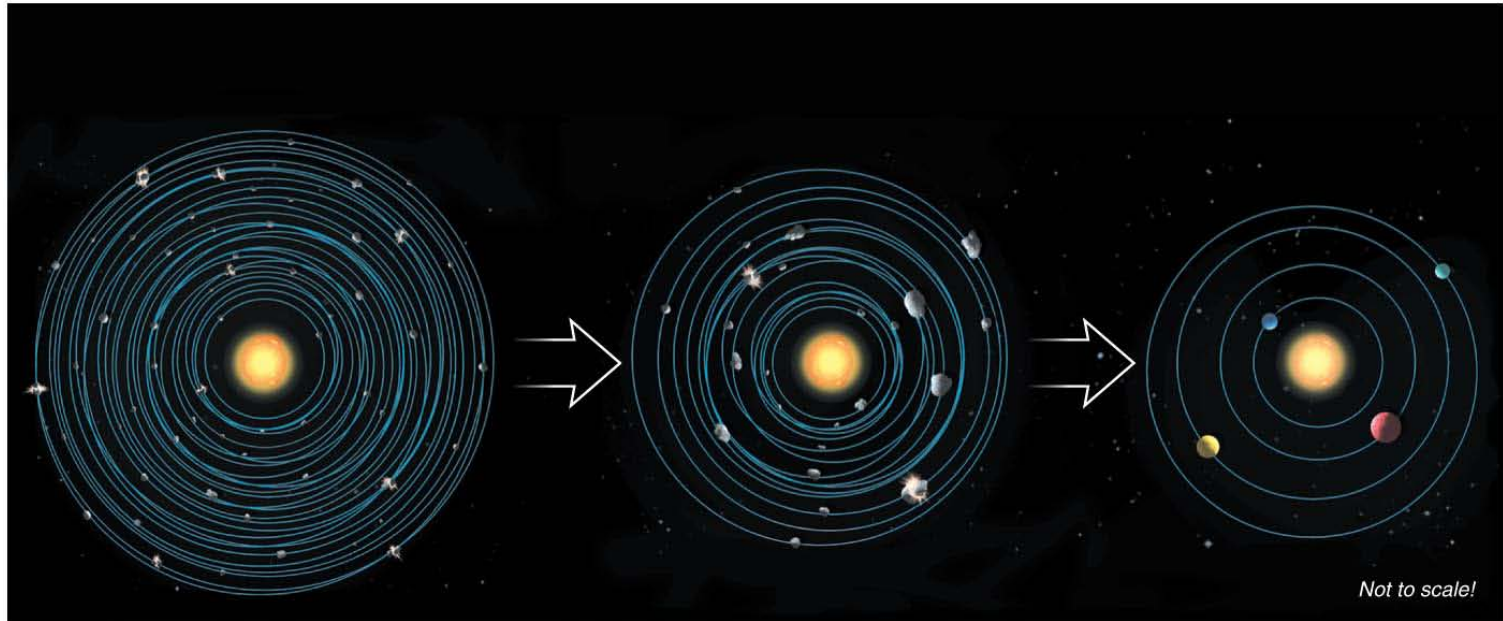
Our goals for learning:

- Where did asteroids and comets come from?
- How do we explain “exceptions to the rules”?
- How do we explain the existence of our Moon?
- Was our solar system destined to be?

Where did asteroids and comets come from?

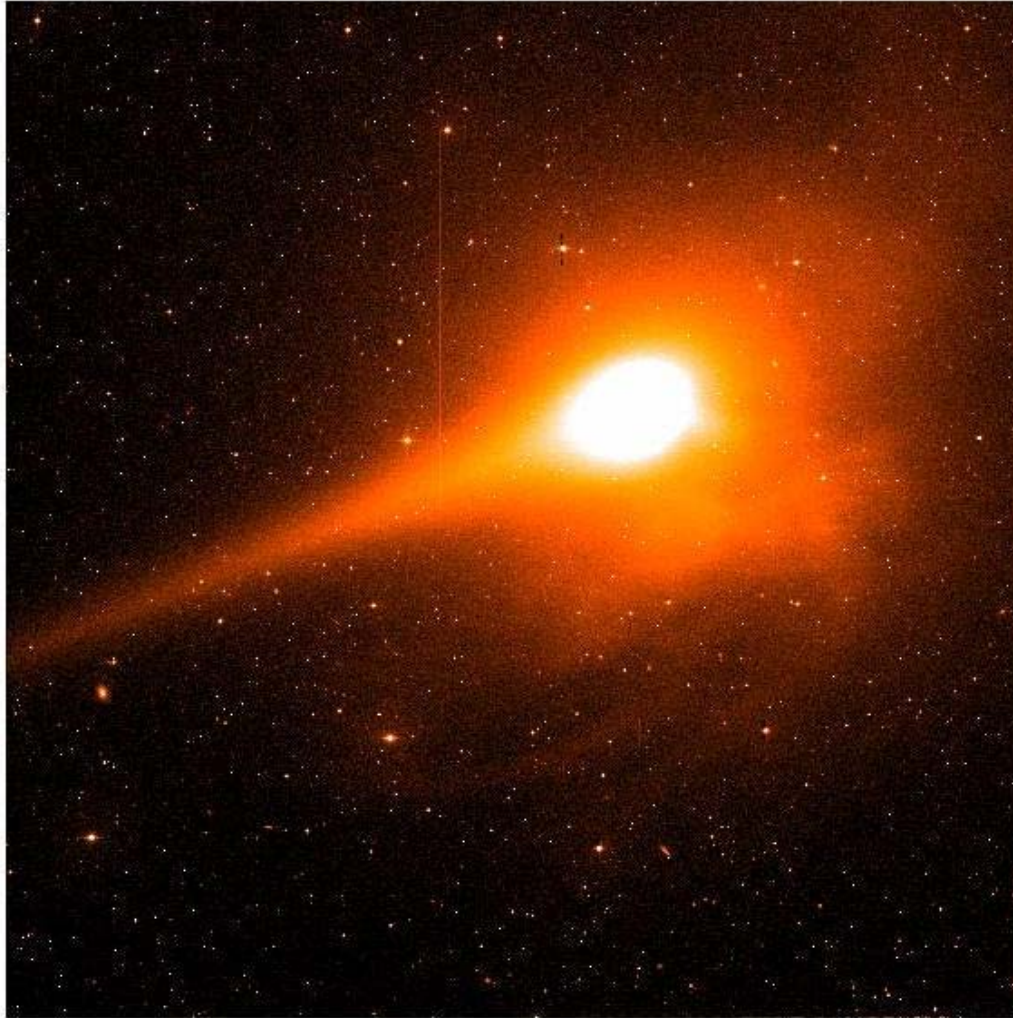


Asteroids and Comets



- Leftovers from the accretion process
- Rocky asteroids inside frost line
- Icy comets outside frost line

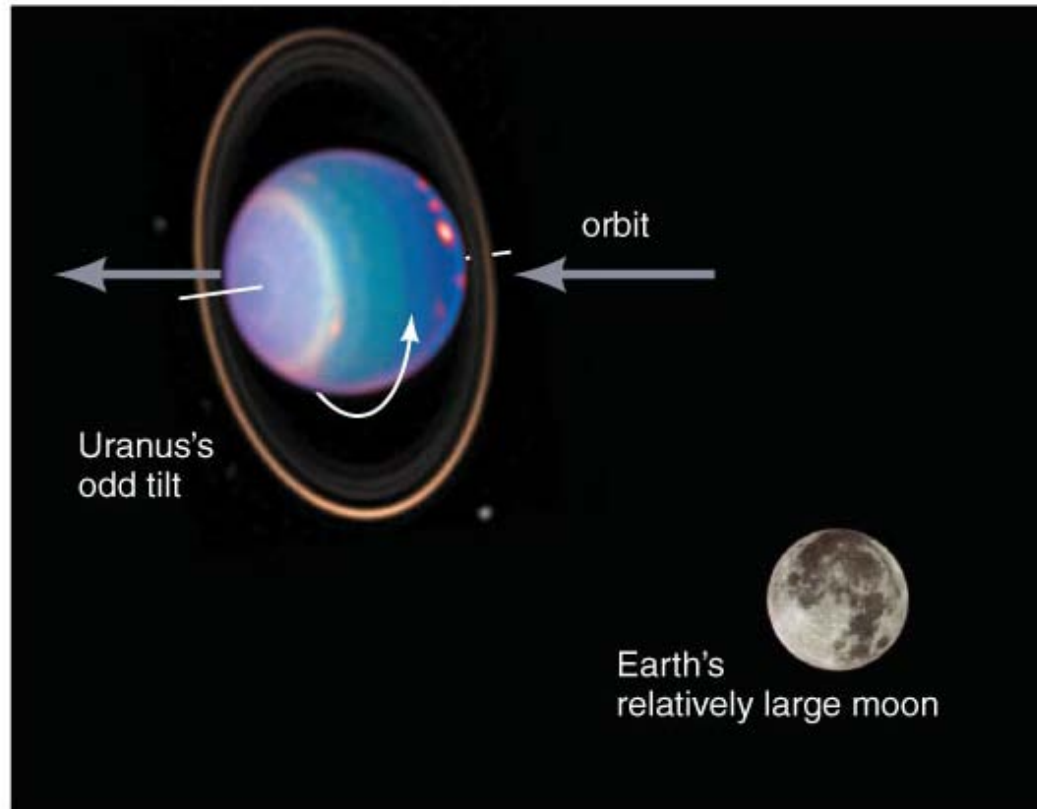
Comet Lulin – Feb 2009



Comet Lulin – Feb 2009

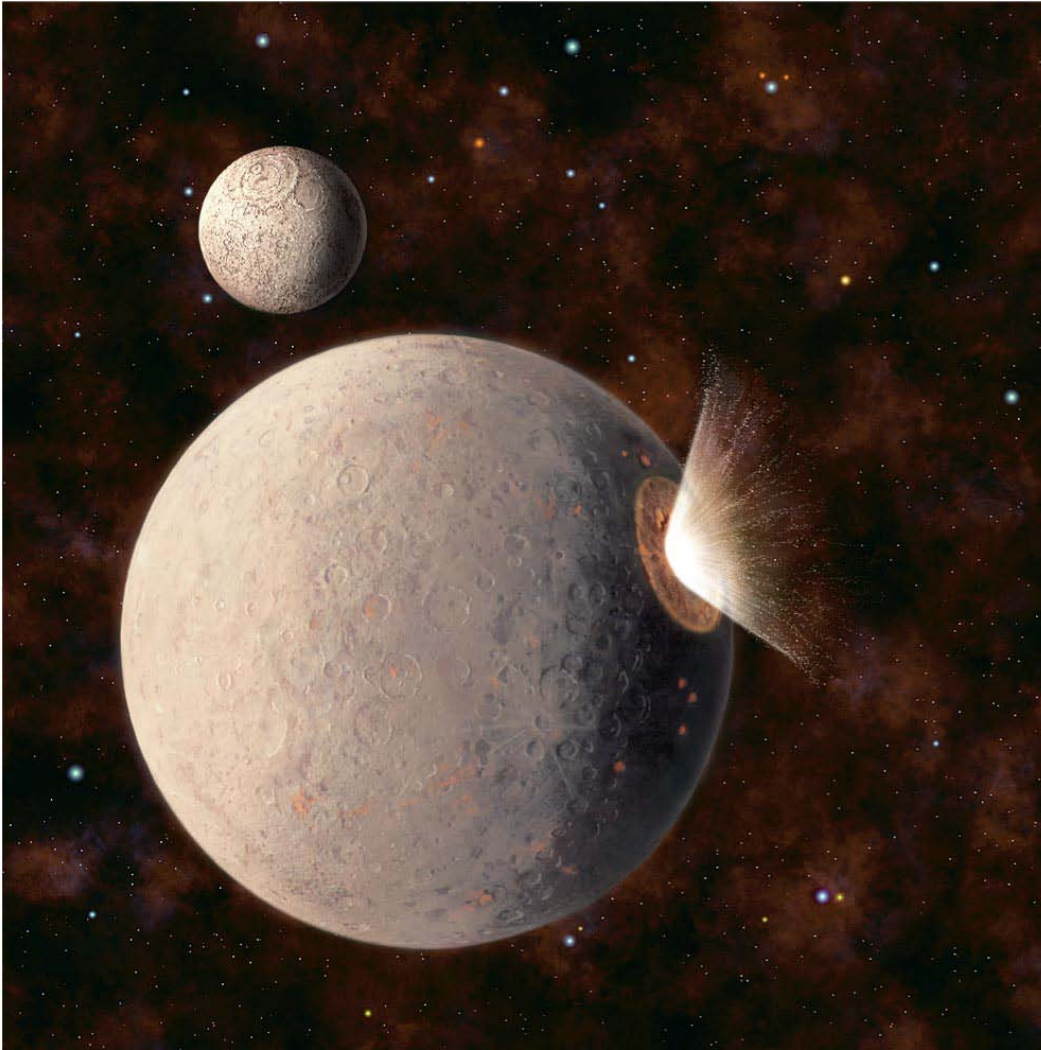


How do we explain “exceptions to the rules”?



4. Several notable exceptions to these general trends stand out, such as planets with unusual axis tilts or surprisingly large moons, and moons with unusual orbits.

Heavy Bombardment



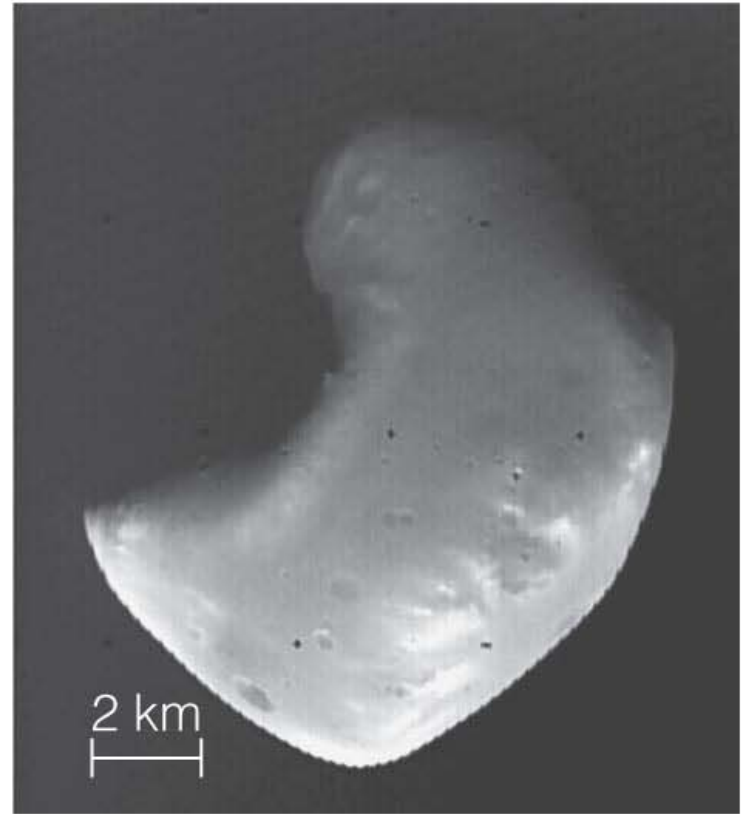
- Leftover planetesimals bombarded other objects in the late stages of solar system formation

Origin of Earth's Water



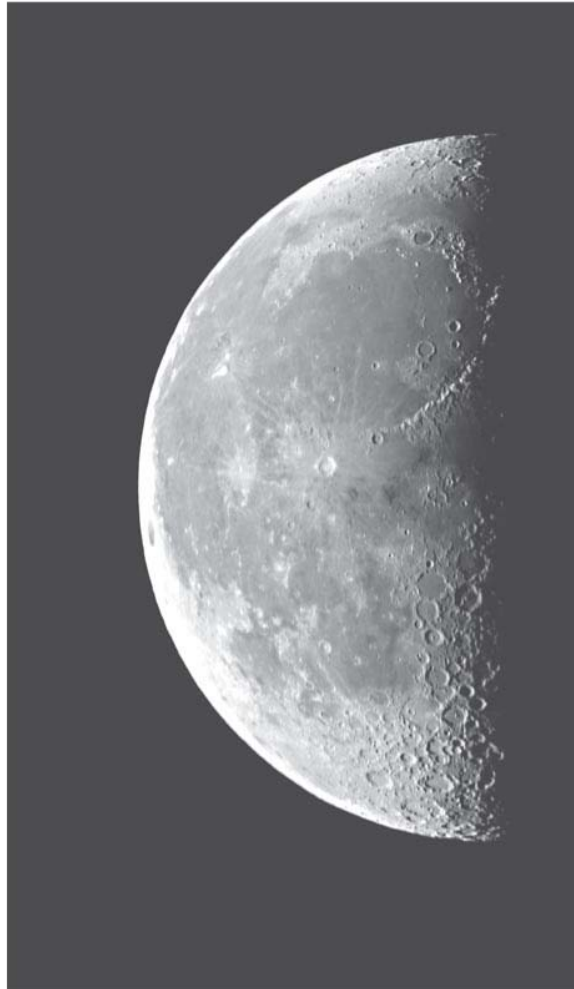
- Water may have come to Earth by way of icy planetesimals

Captured Moons



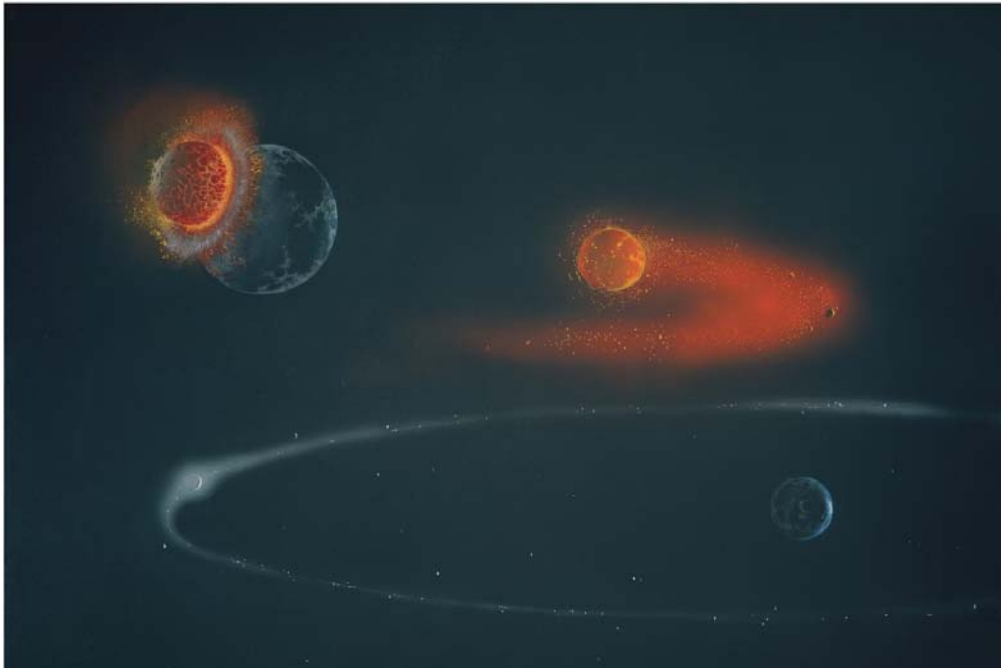
- Unusual moons of some planets may be captured planetesimals

How do we explain the existence of our Moon?



Giant Impact

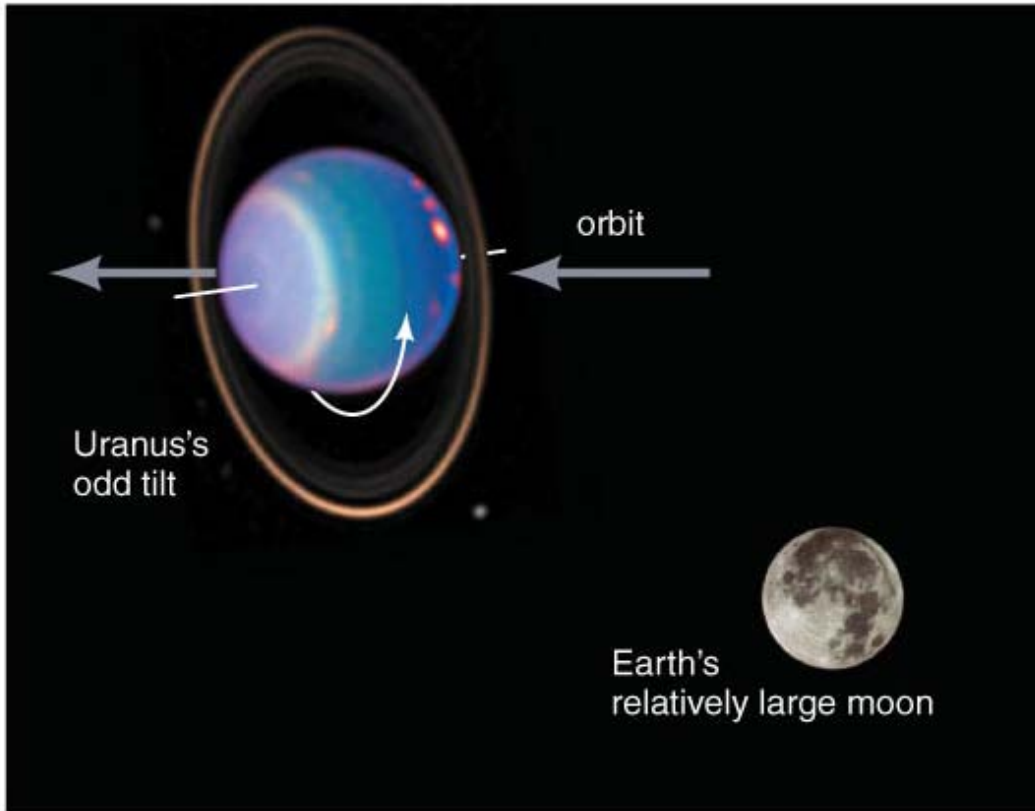
Giant impact stripped matter from Earth's crust.



Stripped matter began to orbit...

...then accreted into Moon.

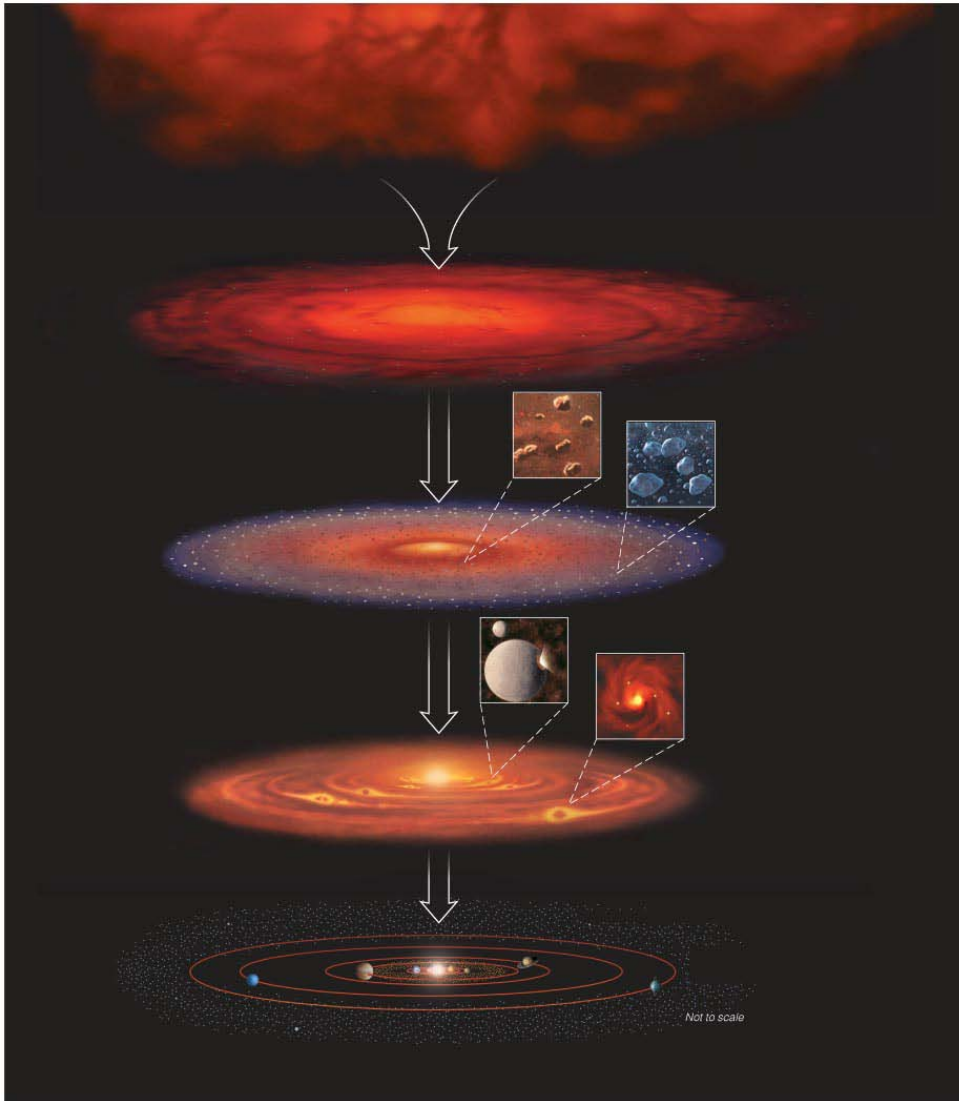
Odd Rotation



- Giant impacts might also explain the different rotation axes of some planets

4. Several notable exceptions to these general trends stand out, such as planets with unusual axis tilts or surprisingly large moons, and moons with unusual orbits.

Was our solar system destined to be?



- Formation of planets in the solar nebula seems inevitable
- But details of individual planets could have been different

What have we learned?

- Where did asteroids and comets come from?
 - They are leftover planetesimals, according to the nebular theory
- How do we explain “exceptions to the rules”?
 - Bombardment of newly formed planets by planetesimals may explain the exceptions
- How do we explain the existence of Earth’s moon?
 - Material torn from Earth’s crust by a giant impact formed the Moon
- Was our solar system destined to be?
 - Formation of planets seems inevitable.
 - Detailed characteristics could have been different.