

Stars and Planets form in Gas Clouds



- We can see stars forming in other interstellar gas clouds, lending support to the *nebular theory*
- Contraction of gas cloud by gravity







Disks around Other Stars



• Observations of disks around other stars support the nebular theory





How did terrestrial planets form?

- Small particles of rock and metal were present inside the frost line
- Planetesimals of rock and metal built up as these particles collided
- Gravity eventually assembled these planetesimals into terrestrial planets

Accretion of Planetesimals



• Many smaller objects collected into just a few large ones

How did jovian planets form?

- Ice could also form small particles outside the frost line.
- Larger planetesimals and planets were able to form.
- Gravity of these larger planets was able to draw in surrounding H and He gases.
- Interactions of jovians lead to ejection of remaining planetesimals into Kuiper Belt (see simulation)

Clear out processes

- Outflowing matter from the Sun solar wind - blew away the leftover gases (no gas accretion by terrestrial planets)
- Remaining planetesimals form rocky **asteroids** inside frost line (but not a planet because of Jupiter's gravity)
- Outer planetesimals form icy comets and Kuiper Belt Objects outside frost line



Giant Impact Formation of Moon Giant impact stripped matter from Earth's crust Stripped matter began to orbit Then accreted into Moon





When did the planets form?

- Radiometric dating tells us that oldest Moon rocks are 4.4 billion years old
- Oldest meteorites are 4.55 billion years old
- Planets probably formed 4.5 billion years ago

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

Next time:

 Chapter 9: Planetary Geology please read pages 234 – 264 in text.