Structure Of the Universe

#### The Solar System

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| My | Very | Elegant | Mother | Just | Sat | Upon | Nine | Porcupines |
| Mercury | Venus | Earth | Mars | Jupiter | Saturn | Uranus | Neptune | Pluto |

The Kuiper Belt, and Oort Cloud

# Galaxies

Elliptical Spiral Barred Spiral Irregular/Peculiar

**The Milky Way:**

100,000 LY in diameter, 16,000-3,000 LY thick

Contains a hundred billion stars (1011)

Total star mass about 3 x 1041 kg or 1.5 x 1011 Msun

The Sun is about 28,000 LY from the galactic center

Not very big as galaxies go.

There are about 1011 galaxies in the visible Universe

The closest is about 2 x 106 LY from us

The Sun orbits once every 200 million years

Our speed of orbit is about 250 km/s

## Globular Clusters

Created all at once

Much Smaller than Galaxies

# Nebulae

Clouds of gas and dust

Birthplace of solar systems and stars

# Types of Nebulae

Emission Nebulae Reflection Nebulae Planetary Nebulae Absorption Nebulae

## Large Scale Structures

|  |  |  |
| --- | --- | --- |
| Groups A few Million LY wide  3 - 6 conspicuous galaxies  A dozen or so smaller galaxies  Only a few times more massive than the Universe  Some of the smaller galaxies orbit the larger ones  Orbital speeds are 100-200 km/s | Clusters 10 - 20 Million LY wide  Hundreds to Thousands of galaxies  (10 - 20 times more dense than the Universe)  The largest gravitationally bound structures  Orbital speeds are around 1000 km/s (faster) | Super Clusters 100 Million LY wide or more  Tens of Thousands of galaxies  Modest enhancement of density |