Kuiper Belt Objects
The Next Frontier

History

- Pluto discovered in 1930
- Astronomers hypothesized origins of comets at outer edge of solar system
- For decades, astronomers were puzzled at the apparent emptiness of the solar system beyond Pluto
- In the 1980's, computer simulations suggest existence of belt of small objects orbiting beyond Neptune
- Advances in technologies like the CCD camera helped to search for these objects much easier and quicker
History

- In September 1992, the first object beyond Neptune since Pluto discovered at 40.9 AU called 1992 QB
- Since then, more than 1200 objects have been discovered so far
- Most of these objects became collectively known as the Kuiper Belt
- The Kuiper Belt is named after Gerald P. Kuiper who suggested its existence in 1951
General Idea

- Pluto is the largest of the KBOs, much like Ceres is the largest of the Asteroid Belt.
- The Kuiper Belt is a reservoir of objects mostly made of water ice and other volatile materials.
- The Kuiper Belt resembles a torus full of objects due to the varieties of shapes of orbits, unlike the disk-shaped Asteroid Belt.

Orbits

The belt is generally stable, having different types of orbits:

- The classical belt orbits like most objects in the solar system, having relatively low inclination and eccentricity.
- The mean-motion resonance orbits have objects orbiting in rhythm with Neptune. Pluto is trapped in a mean-resonance motion of 2:3, meaning for every two orbits Pluto travels, Neptune traveled three.
- The scattered orbit do not follow the classical orbits and do not have any resonance with Neptune.
Discoveries

- The process of discovering them is difficult
- Faintness and complications of following them for long periods of time
- Use the traditional way of looking for moving dots of light but aided with new technologies
Properties

- General properties of Kuiper Belt objects can be observed by telescopes, including its size, shape, and presence of satellites.
- One of the techniques used, photometric observations, involves measuring the variable light it reflects over time.

Properties

- Another technique, radiometric technique, can estimate the size of the object by measuring its visible brightness and infrared radiation.
- The Hubble and Spitzer Space Telescopes have helped dramatically in determining the properties of the objects.
New Horizons

- The New Horizons will be the first spacecraft to visit and study the Kuiper Belt region, mainly Pluto
- Launched in January 2006
- Scheduled to reach Pluto in summer of 2015

The Future

- There are many more objects waiting to be discovered in the Kuiper Belt region
- Formation of the Kuiper Belt is not well understood but some insights on it already reshaped our view on how the solar system formed