

Planetary Rings

by Betty R. Robinson

Four of the eight planets in our solar system have rings: Jupiter, Saturn, Uranus, and Neptune. Interestingly, these are the four outer gas giants. The four inner, or rocky, planets do not have rings.

The rings of Saturn are the best known because they are easily visible in even small telescopes. The rings are made of water ice particles, dust, and rock of all sizes, from tiny to the size of a house. Since they contain a lot of water ice, they are highly reflective and therefore easy to see. The rings are also quite expansive: about 280,000 kilometres across.

The rings of Jupiter, Uranus, and Neptune, on the other hand, are made of dark particles. They are not as reflective as the water ice particles in Saturn's rings and are therefore more difficult to see. In fact, the rings of Jupiter, Uranus, and Neptune weren't discovered until later in the 20th century. They are much smaller and far less grand than Saturn's ring system. When viewed under infrared light, the ring systems of these three planets are more visible.

The particles that make up the ring systems could be remnants from when the planets formed. More likely many are the remnants of moons that were broken up by impacts from other objects in space or by the strong gravitational pull of the gas giants themselves. The inner rocky planets don't have the immense gravities that the gas giants have.

The *James Webb Space Telescope*, tentatively scheduled for launch on October 31, 2021, will be gathering data on the rings of these planets. The telescope is equipped with an infrared camera. It is also equipped with a spectrometer, so it will collect data on the light emitted by the particles in the rings. Such information will tell us the compositions of the various particles, which could tell us if a "family" of particles actually originated from one object, such as a moon.

See the data on the following pages for specific details on the rings of Jupiter, Saturn, Uranus, and Neptune.

Rings of Neptune



Discovered by Voyager 2 in 1989



About 125,000 km diameter; width varies from 15 km to 2000 km



Some of the rings are called arcs because they don't completely surround Neptune; however, at least six rings do.



May be composed of dust, rocks, and methane and ammonia ice (darkened by radiation from the Sun)



Dark, not highly reflective but can be seen in infrared light



Clumpy, not uniform; thought to be unstable



Faint, dusty; similar to Jupiter's rings



Thought to be young; age estimate not available