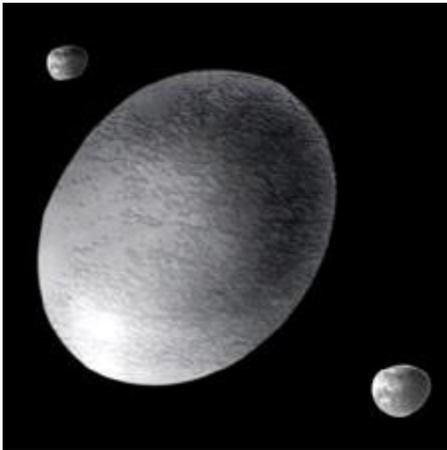


Lessons from an Odd Kuiper Belt Object

By David Tytell



The shape of 2003 EL₆₁ is at least 1,960 x 1,500 x 1,000 kilometers – making it a fast-rotating squashed football. NASA, ESA, and A. Feild (STScI)

April 20, 2006 | To date astronomers have found more than 1,000 Kuiper Belt objects (KBOs) beyond Neptune, and the strangest one of all might just be the key to understanding how the largest of these distant ice-rock bodies acquire their moons.

Last July, 2003 EL₆₁ entered the KBO lexicon just days before the "[10th planet](#)," 2003 UB₃₁₃. But follow-up observations of 2003 EL₆₁ left astronomers scratching their heads. Its spin period is just 3.9 hours, making 2003 EL₆₁ the fastest rotating known body in our solar system larger than 100 kilometers (60 miles) across.

As for its shape, picture a squashed American football. Models suggest that 2003 EL₆₁'s long dimension could exceed both Pluto's and 2003 UB₃₁₃'s diameters. The body also has two small satellites: an inner moon with a 34.7-day non-circular orbit and a brighter, outer companion with a 49.1-day circular orbit.

Observations of the primary body made by Chadwick Trujillo (Gemini Observatory) and his colleagues reveal the strong spectral signature of crystalline water ice. This is odd because crystalline ice forms at temperatures above 110 kelvins (-163°C) whereas the ambient temperature of space around 2003 EL₆₁ is less than 50 K. Moreover, crystalline water ice typically lasts only 10 million years before it's destroyed, which points to possible resurfacing, perhaps by micrometeorite impacts converting existing surface ices to crystalline form by flash-heating.

Spectra of the outer satellite obtained by Kristina Barkume, Michael Brown, and Emily Schaller (Caltech) reveal the signature of almost pure water ice. While the observations were too low in resolution to distinguish the type of water ice, it seems that nearly all of the moon is coated in frost.

Putting the pieces together, 2003 EL₆₁ strongly suggests that the moons of the largest KBOs differ in origin from those of ordinary KBOs. The satellite systems of the larger objects formed from the remains of violent impacts instead of by delicate gravitational capture. According to Brown, "[2003 EL₆₁] itself is rapidly rotating and thus elongated – a predicted consequence of a giant impact which forms a small satellite." Moreover, he adds, other astronomers have predicted that "small satellites, which form from disks, will be made almost entirely of water ice, which is precisely what we see." Impact is already a favored formation mechanism for another large KBO system – Pluto [and its three moons](#).