measure the dwarf planet's size, shape and density more accurately than ever before.

Compared with other bodies in the Solar System, Haumea rotates quickly (making one rotation in about four hours), and is strangely shaped, like an elongated egg. Ortiz *et al.* calculate that the object's longest axis is at least 2,300 km, which is larger than earlier estimates[6–8]. In turn, given known values for Haumea's mass and brightness, the dwarf planet's density and reflectivity are both lower than the unusually high values previously considered.

The authors' results suggest that Haumea might not be in hydrostatic equilibrium, and this touches on the still-sensitive topic of how planets and dwarf planets should be defined. Remarkably, the authors show that blinks in the starlight, detected at multiple observation sites both before and after a distant star was blocked by Haumea, are consistent with a 70-km-wide ring of material encircling the body, approximately 1,000 km away from Haumea's surface (Fig. 1).

Saturn's are the most studied of all rings, and yet they remain enigmatic. Data from the Cassini spacecraft revealed that gravitational interactions between the planet's rings and moons shepherd the ring material, and that one of the rings is produced entirely from matter that spews from the moon Enceladus[9,10]. However, the formation mechanisms responsible for the other rings remain uncertain — possibilities include co-formation with the planet, break-up of a captured body or satellite and collisions between the planet and other bodies.

A key factor in differentiating between these possibilities is the age of Saturn's rings, but this is difficult to determine. The timescale for creating such massive rings, and the lack of dust, suggest an age of billions of years[11]. However, the rings' brightness, which is expected to lessen over time, points to a relatively young age of 150 million years[12]. It is even possible that some parts of the rings are old but others are young.

In the case of Haumea, more work is needed to determine the brightness of its ring and, in particular, to decouple the ring's reflectivity from that of the dwarf planet's surface. Ortiz and colleagues observe differences in the system's magnitude over time, caused by the ring changing from an edge-on to a face-on orientation. However, such differences aren't particularly well matched by the authors' initial models.

Haumea, its two moons and a handful of other TNOs have surfaces of nearly pure water ice, which is a feature not seen on any other TNO. The orbits of these unusual objects have been traced back to a common location[13], which is strongly suggestive of the collisional break-up of one larger body. The age and dynamics of this collision will probably be key factors in studying the ring around Haumea.

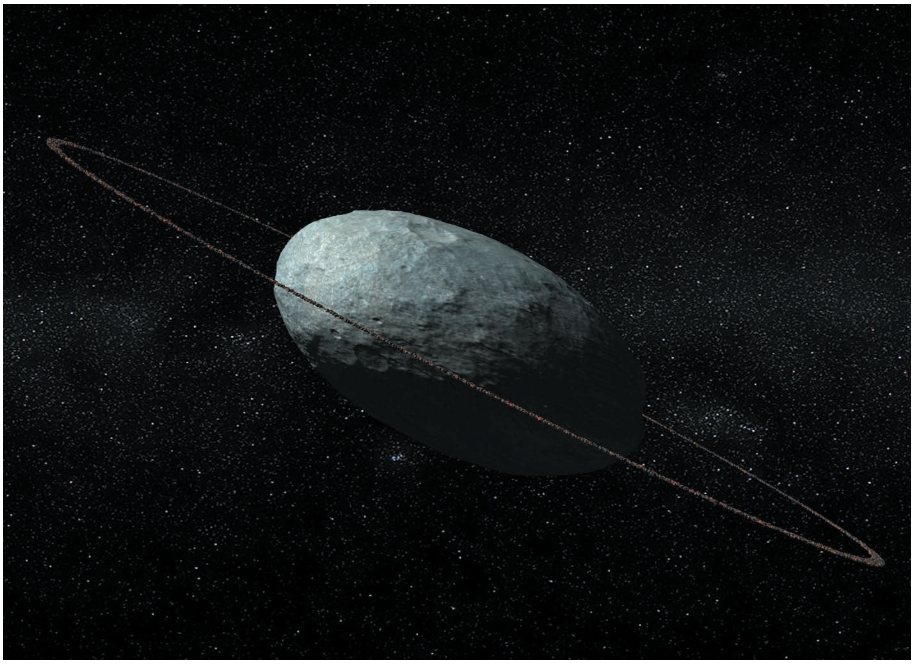

Figure 1 | Artist's impression of Haumea and its ring. Ortiz *et al.*[4] have measured the size, shape and density of the dwarf planet Haumea with unprecedented accuracy and found that it has a planetary ring. This is the first time that a ring has been discovered around a distant body in the Solar System.

Ring systems represent microcosms of larger-scale rotating structures, such as galaxies and proto-planetary disks — the disks of dense gas and dust that surround newly formed stars. Understanding the basic physics of ring systems can therefore have wider implications. With the authors' discovery of a ring around a small body in the outer Solar System, which is in a completely different environment from the rings around the giant planets, the fundamental questions of how planetary rings form and evolve have become even more intriguing.

> ***"Ring systems represent microcosms of larger-scale rotating structures, such as galaxies and proto-planetary disks."***

Scientists have just begun to try to explain the existence of two narrow, well-defined rings around two small Centaurs[1–3] (with diameters of 200–250 km). Ortiz and colleagues' results require formation mechanisms that are applicable to an object that has 250 times the volume of these Centaurs and an elongated shape, is located substantially farther out in the Solar System and boasts a single ring that is ten times wider than those of the Centaurs.

Centaurs are thought to have originally been located farther out in the Solar System, and then gradually moved inward to their current orbits. Because these orbits are intertwined with those of the giant planets, they are gravitationally unstable and last for only millions of years. Numerical simulations have counter-intuitively demonstrated that rings around a Centaur are likely to survive the transition from the outer Solar System, including close encounters with the giant planets[14]. The authors' discovery prompts speculation that ring systems in the outer Solar System are not uncommon, and that we can anticipate more discoveries in this region. ■

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CORRECTION

The News & Views 'Neuroscience: Mum's bacteria linked to baby's behaviour' by Craig M. Powell (*Nature* **549,** 466-467; 2017) omitted to mention that the author had declared competing financial interests. The News & Views has been amended online to include this.