

MESSIER 27, THE DUMBBELL NEBULA

The Dumbbell Nebula (also known as Apple Core Nebula, Messier 27, M 27, or NGC 6853 and Diabola Nebula) is a planetary nebula in the constellation Vulpecula (Latin for "little fox"), at a distance of about 1,360 light-years. This object was the first planetary nebula to be discovered by **Charles Messier** in 1764. At its brightness of visual magnitude 7.5 and its diameter of about 8 arcminutes, it is easily visible in binoculars, and a popular target in amateur telescopes.

OBSERVATION DATA: J2000 EPOCH

Right ascension 19h 59m 36.340s

Declination +22° 43' 16.09"

Distance 1360+160 -212 ly

Apparent magnitude (V) 7.5

Apparent dimensions (V) 8'.0 × 5'.6

Radius 1.44+0.21 -0.16 ly

Absolute magnitude (V) -0.6+0.4 -0.3

NOTABLE FEATURES

The Dumbbell Nebula appears to be shaped like an prolate spheroid and is viewed from our perspective along the plane of its equator. In 1992,

Moreno-Corral et al. computed that its rate of expansion in the plane of the sky was no more than 2.3" per century. From this, an upper limit to the age of 14,600 years may be determined. In 1970, **Bohuski, Smith, and Weedman** found an expansion velocity of 31 km/s. Given its semi-minor axis radius of 1.01 ly, this implies that the kinematic age of the nebula is some 9,800 years.

KNOTS

Like many nearby planetary nebulae, the Dumbbell contains knots. Its central region is marked by a pattern of dark and bright cusped knots and their associated dark tails (see picture below). The knots vary in appearance from symmetric objects with tails to rather irregular tail-less objects. Similarly to the Helix Nebula and the Eskimo Nebula, the heads of the knots have bright cusps which are local photoionization fronts.

The central star, a white dwarf, is the largest known for a white dwarf, estimated to have a radius 0.055 of the Sun, larger than any other known white dwarf. Its mass was estimated in 1999 by **Napiwotzki** to be 0.56 ± 0.01 Solar Masses.



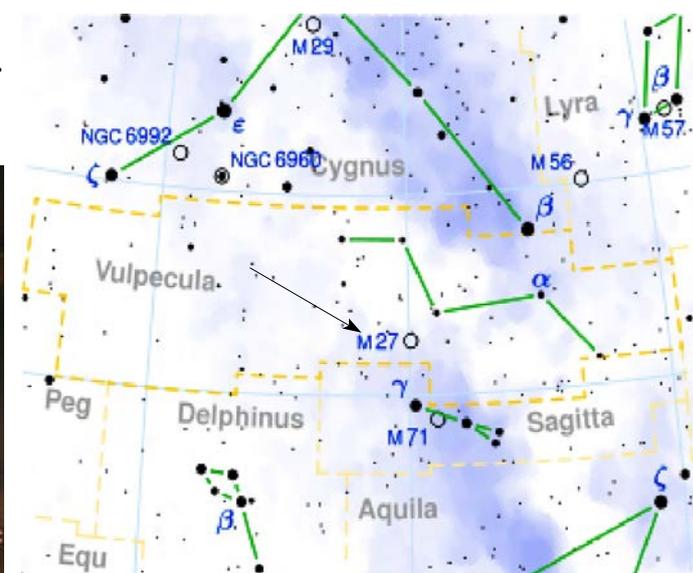
Visual light (HaRGB) image of the Dumbbell Nebula (Messier 27, M 27) by the Liverpool Telescope



ESO image showing extended structure and central star



Closeup of knots in M 27 taken by the Hubble Space Telescope



AK, with Wikipedia Notes