

EVIDENCE OF A CIRCUMSTELLAR DUST CLOUDLET ORBITING AROUND THE CENTRAL STAR OF NGC 2346

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ABSTRACT. The photometric behaviour of AGK3-0°965, the central star of the bipolar planetary nebula NGC 2346, has been monitored photometrically for several months at the Observatorio Astronómico Nacional at Tonantzintla and San Pedro Mártir, Mexico. A model is proposed in which the eclipses were caused by the passage of an elongated cool dust cloudlet of size  $\sim 2-5 \times 10^{12}$  cm and total mass  $\sim 10^{-12} M_{\odot}$ . This model can explain most of the observations. The velocity of the cloud in the direction of the major axis of the projected central binary orbit is  $v_p = 0.14 \text{ km s}^{-1}$ . Another warmer ( $T \lesssim 1000 \text{ K}$ ) circumstellar cloud is responsible for the infrared excess at wavelengths from 3 to 12  $\mu\text{m}$ . Its emission, as seen from the Earth, has not changed significantly at  $\lambda > 3 \mu\text{m}$  during the past twelve years, as shown by new infrared observations also reported. Its most relevant physical properties are still to be determined. The present results provide the first evidence of a dense circumstellar cloudlet of mass similar to that of a minor planet which is probably the result of the fragmentation of a disk or toroid around the central star of NGC 2346. Although the presence of many other similar cloudlets in its vicinity is expected, the probability of similar events occurring in the next few hundred years is very small.

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