THE UNPRECEDENTED LIGHT VARIATIONS OF NGC 2346*

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The central star of the planetary nebula NGC 2346 is now well confirmed as a single-lined spectroscopic binary, with P = 16d (Méndez and Niemela 1981, Ap. J., 250, 240). Unexpected photometric variations were recently reported by L. Kohoutek (1982, IAU Circular 3667). From additional photoelectric measurements and visual estimates we have found that these variations are periodic, with the same period as the orbital motion of the A-type primary component. From previous observations we can ascertain that such variations did not exist before, and must have started in 1981. The light minimum occurs at phase 0.75, that is to say when the A-type component is moving towards us. Radial velocities measured on spectrograms obtained during the light minimum are more positive, by about 40 km s^{-1}, than expected from the orbital motion; while the radial velocities corresponding to the light maximum agree with what is expected from the orbital motion. The spectral type of the A-type star does not change significantly as a function of brightness.

Although additional observations are clearly needed, we can advance the suggestion that these phenomena are due to the progressive occultation of the binary system by a dense dust cloud external to the system, which may or may not be associated with the planetary nebula. The proposed cloud probably has stellar dimensions and a very small mass. The full paper will be submitted to Astron. Astrophys.

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COHEN: With which star, the visible A star or the hot star seen in the ultraviolet, is this dust cloud associated?

MENDEZ: Probably with neither: if our simple assumption of a single, isolated, spherical cloud is correct - and it might well be just a small part of something more complex - then the high degree of dust concentration towards the centre implies a very low temperature. The cloud could not then be very near the binary system because the hot star would heat the dust.

POTTASCH: How well is the spectral type of the A star known? Somewhat different values are given in the literature.

MENDEZ: The spectral type, as determined from our spectrogrammes, is A5 V ± one spectral subtype. Julie Lutz has determined A2 V. All other spectral classifications in the literature were derived from photometry and cannot be given the same weight.

LUTZ: My spectral classification is less accurate than that of Mendez and collaborators because my classification is based on lower dispersion spectra.

KEYES: A technique used by Mick Plavec and his collaborators at UCLA on Algol eclipsing binaries and by myself on symbiotics may be of some use in more accurately determining the spectral type of the A star. Simultaneous ground-based optical spectrophotometric scans and IUE ultraviolet images are obtained in the eclipses and at quadrature. By subtraction of the appropriate observations, it is possible to obtain the spectrum of the cool (A) component uncontaminated by nebular continuum or hot component light.

KALER: There seems to be an interesting parallel between NGC 2346 and R Aqr, in which there may be an eclipse by a dust cloud. Furthermore, the R Aqr nebula has a vaguely similar bipolar structure.

KOHOUTEK: Our photoelectric observations of NGC 2346 in the period January - April 1982 show a light curve similar to that which has already been published (I.B.V.S. Budapest No. 2113) but with rather a high scatter. The scatter might be due to instrumental effects (subtraction of the contribution of the nebula), to the uncertain period (we used 16.2 d), or to real changes in the light curve.

BAADE: Dr. Walsh mentioned possible similarities between NGC 2346 and NGC 6302. We have used TAURUS data (imaging Fabry-Perot observations, cf. our poster, this volume) for NGC 6302 and constructed a velocity map, i.e. a two-dimensional image with the pixel values presenting radial velocities instead of intensities. The velocity map reproduces the biconical structure of direct images quite well. Any contribution of rotation to the observed radial velocities seems, therefore, to be small in NGC 6302.