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PHOTOGRAPHIC OBSERVATIONS OF THE PLANETARY NEBULA PK 215 +3<sup>o</sup>1

The planetary nebula PK 215 +3<sup>o</sup>1 (NGC 2346) is a butterfly bipolar nebula. The central star (AGK3 - 00965) was known as a single-line spectroscopic binary. This star had been observed frequently, and no brightness variations were noticed before 1981. In 1982 Kohoutek (1982) found that the brightness of the central star had drastic changes after November 1981, showing a light curve of an eclipsing binary with a period of  $\approx 15^{\text{d}}.957$  and an amplitude of 2-3<sup>m</sup>. Later Mendez et al. (1982) proposed that the eclipses were caused by a dark dust cloud, which circulated around the system. Some other authors have revealed fast and complex variations in the light curves.

We observed the planetary nebula NGC 2346 using the 40/200 cm double astrograph of the Peking Observatory Xing-Luing station from April 1981 to April 1986. The plates used were Kodak Eastman 103a0 and IIa0 and the selected area SA 98 was used to the magnitude calibration. The plates were measured with a microphotometer. The magnitudes in Table I contain contributions from both the central star and the nebular radiations.

From these observations (see Figure 1) the following conclusions can be made:

1. The observations in 1985 show that the central star of the planetary nebula of NGC 2346 has still obvious "eclipsing" variations with an amplitude of about 3.5 mag., the current elements being:

$$\text{Min. Hel.} = \text{J.D. } 2446153.2 + 15^{\text{d}}.957 \cdot E$$

2. From the observations of 1986 we can see that the minimum of the light curve has increased by about 2-3 mag., so that the amplitude of the variation has been reduced to  $\approx 1^m$ ; the "eclipsing" variability of the star is not obvious in 1986.

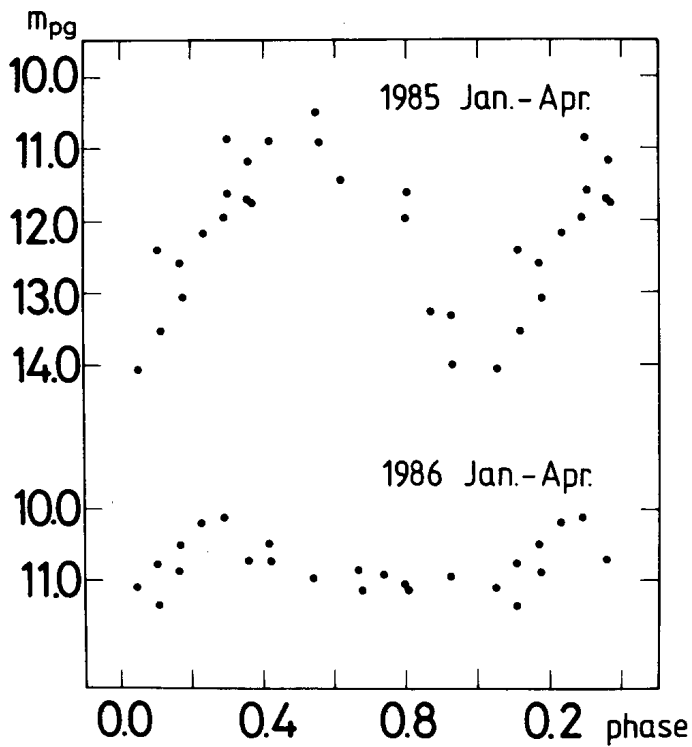


Figure 1: Light curves of AGK3 - 00965. Phases were computed using the elements given above.

The 1985 Sept. observations of Jasiewicz and Acker (1986) are in between our 1985 and 1986 observations and strengthen the conclusion about the decreasing amplitude of the star.

Table I.

No.	Plate No. DA	J.D. hel. 2440000+	m pg	No.	Plate No. DA	J.D. hel. 2440000+	m pg
1	2829	4724.054	10.91	23	4066	6170.051	14.05
2	3147	4988.024	11.22	24	4067	6171.006	13.52
3	3168	5049.021	10.94	25	4068	6172.078	13.05
4	3206	5078.029	11.33	26	4071	6174.054	11.61
5	3681	5414.054	12.60	27	4079	6178.041	10.90
6	3948	5980.354	13.22	28	4080	6179.045	11.42
7	3969	6026.360	11.36	29	4266	6443.238	10.87:
8	3994	6094.184	10.86	30	4417	6490.003	10.75
9	4005	6095.153	11.17	31	4418	6490.989	10.50
10	4012	6111.172	11.74	32	4419	6491.996	10.20
11	4038	6139.046	12.40	33	4420	6493.007	10.12
12	4041	6139.976	12.58	34	4421	6494.030	10.73
13	4044	6140.976	12.18	35	4422	6495.026	10.48
14	4046	6141.976	11.95	36	4414	6497.000	10.98
15	4049	6142.986	11.70	37	4415	6499.042	10.86:
16	4051	6143.979	10.88	38	4410	6501.044	11.03
17	4053	6146.052	10.48	39	4412	6503.036	10.95
18	4057	6150.030	11.98	40	4413	6521.037	11.09
19	4075	6152.052	13.33	41	4411	6522.008	11.36
20	4061	6166.010	11.60	42	4416	6527.001	10.72
21	4064	6167.040	13.24	43	4430	6531.033	11.14
22	4065	6168.003	14.00:	44	4428	6532.025	10.92
				45	4429	6533.055	11.12

We can say that the variations of the central star of the planetary nebula NGC 2346 will disappear gradually soon, and the brightness of the star will return to the stable phase as it was before 1981.

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