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UBV OBSERVATION OF NOVA VULPECULAE 1987

Beckmann and Collins (1987) discovered a nova at R.A. = $19^{\text{h}}02^{\text{m}}.1$ Dec. = $+21^{\circ}40'$ (equinox 1950.0) on Nov. 15.042 and Nov. 15.128 UT. UBV observations reported here were made from three days after the discovery to mid-December 1987 with a 20-cm reflector at Tamashima, Japan.

The photometer used consists of a microcomputer controlled photon counter and an uncooled Hamamatsu R 647-04 photomultiplier (bi-alkali cathode) and UBV filters (Schott GG495 (2-mm) for V, GG385 (2-mm) + BG12 (1-mm) for B, and UG1(2-mm) for U). Actual observations were made differentially with respect to HR7267 (V= 6.23, B-V = +0.40, U-B = +0.01, F3V) as a comparison star and the comparison star was also checked with HR7306 (V = 4.77, B-V = -0.05, U-B = -0.54, B4IV according to Hoffleit (1982)).

In the data reduction, the dead time corrections of the photon counter and the atmospheric extinction corrections were carried out. Not only the first order extinction for differential air mass but also the second order extinction for colors were taken into account because the observations were made at relatively large zenith distances. The transformation coefficients to the UBV system were determined from observation of standard stars.

The obtained V magnitudes and colors are given in Table I and also plotted in Figure 1. Visual observations of early time of discovery are also shown for comparison in the figure. For the check of the quality of observations on the respective nights, the differential magnitudes and colors between the comparison and the check stars are given in Table II.

It was found that the magnitude of the nova was decreasing slowly, and both B-V and U-B colors became bluer with time. It is presumed that the light maximum must have been about the day discovered (Nov. 15 UT) according to V magnitudes and colors presented here. This is supported by the study of van den Bergh and Younger (1987) ; novae with smooth light curves exhibit a sharp reddening pulse in both B-V and U-B which is centered within one day of maximum light and the half-width of these reddening pulses run up to 7 days for slow novae.

Table I

UBV photometry of Nova Vulpeculae 1987

| No. | Hel. J.D. 2447000+ | n | V | | B-V | | U-B | |
|-----|-----------------------|----|------|------|------|------|-------|------|
| | | | mean | s.d. | mean | s.d. | mean | s.d. |
| 1 | 117.9087 | 8 | 7.39 | 0.01 | 0.86 | 0.01 | 0.42 | 0.03 |
| 2 | 119.9002 | 7 | 7.17 | 0.01 | 0.73 | 0.01 | 0.03 | 0.02 |
| 3 | 123.8988 | 8 | 7.28 | 0.01 | 0.67 | 0.02 | -0.02 | 0.01 |
| 4 | 128.8902 | 9 | 7.28 | 0.01 | 0.64 | 0.01 | -0.25 | 0.02 |
| 5 | 130.8991 | 6 | 7.30 | 0.01 | 0.65 | 0.02 | -0.34 | 0.02 |
| 6 | 131.8940 | 9 | 7.07 | 0.01 | 0.66 | 0.01 | -0.22 | 0.03 |
| 7 | 132.8849 | 4 | 7.22 | 0.02 | 0.61 | 0.01 | -0.49 | 0.04 |
| 8 | 133.8790 | 10 | 7.62 | 0.01 | 0.67 | 0.02 | -0.19 | 0.02 |
| 9 | 136.8869 | 8 | 7.99 | 0.01 | 0.59 | 0.01 | -0.49 | 0.01 |
| 10 | 142.8685 | 1 | 8.13 | - | 0.57 | - | -0.56 | - |
| 11 | 143.8815 | 7 | 7.87 | 0.01 | 0.67 | 0.02 | -0.50 | 0.06 |
| 12 | 145.8806 | 4 | 8.06 | 0.01 | 0.54 | 0.00 | -0.67 | 0.02 |
| 13 | 148.8853 | 5 | 7.93 | 0.01 | 0.58 | 0.02 | -0.78 | 0.03 |

"n" in the third column denotes the number of single observations with 20-seconds integration time for each band.

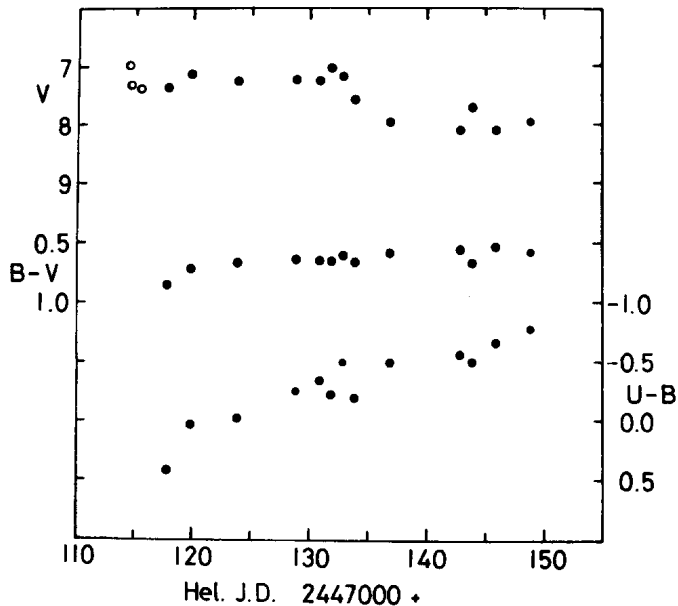


Figure 1 Light and color curves of Nova Vulpeculae 1987. Filled circles refer to photoelectric observations; open circles to visual observations by Beckmann and Collins (1987).

Table II

Observed differential magnitudes and colors between the comparison and the check stars

| No. | J.D. 2447000+ | n | ΔV | $\Delta(B-V)$ | $\Delta(U-B)$ |
|---------------|------------------|---|------------|---------------|---------------|
| 1 | 117.9 | 4 | 1.45 | 0.46 | 0.54 |
| 2 | 119.9 | 1 | 1.44 | 0.48 | 0.51 |
| 3 | 123.9 | 1 | 1.45 | 0.45 | 0.54 |
| 4 | 128.9 | 1 | 1.44 | 0.47 | 0.56 |
| 5 | 130.9 | 2 | 1.45 | 0.47 | 0.53 |
| 6 | 131.9 | 2 | 1.44 | 0.45 | 0.57 |
| 7 | 132.9 | 1 | 1.46 | 0.45 | 0.56 |
| 8 | 133.9 | 2 | 1.47 | 0.46 | 0.53 |
| 9 | 136.9 | 2 | 1.47 | 0.44 | 0.55 |
| 10 | 142.9 | 1 | 1.44 | 0.50 | 0.52 |
| 11 | 143.9 | 1 | 1.47 | 0.42 | 0.57 |
| 12 | 145.9 | 2 | 1.46 | 0.45 | 0.53 |
| 13 | 148.9 | 2 | 1.48 | 0.42 | 0.57 |
| mean | | | 1.46 | 0.46 | 0.54 |
| B.S.Catalogue | | | 1.46 | 0.45 | 0.55 |

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