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PHOTOMETRY AND DISTANCE OF NOVA CORONA AUSTRINA 1981

Photometry of Nova CrA (I.A.U. Circular 3590) ($\alpha = 18^{\text{h}}40^{\text{m}}.6$,
 $\delta = -37^{\circ}33'$ [1981], $\ell = 358^{\circ}$, $b = -14.4^{\circ}$) was carried out on the
 S.A.A.O. 0.5m and 1.0m telescopes during a three-week period short-
 ly after discovery. UBV and V(RI)_{KC} were obtained on two photo-
 meters equipped with an EMI6256 and an EMI9659 photomultiplier
 tube, respectively. The results appear in Table I.

Table I

2444000	V	B-V	U-B	V-R	V-I
703.63	8.87	-0.33	-0.91	1.05	1.07
704.56	8.98	-0.38	-0.92	1.02	0.97
706.68	9.25	-0.38	-0.96	1.03	0.82
712.58	9.88	-0.50	-0.98	0.87	0.46
713.62	9.93	-0.52	-0.94	--	--
715.64	10.06	-0.59	-0.95	0.78	0.39
720.55	10.60	-0.70	-1.05	--	--

Formal errors are ≤ 0.01 except for the 5th and 7th U-B points
 where they are ≈ 0.015 . However, the transformation to the standard
 system is no doubt very rough because of the probable extreme
 differences between the nova spectrum and those of normal cali-
 brating stars. This is demonstrated by the consistent shift of
 $V(\text{blue tube}) - V(\text{red tube}) = 0.176$, dispersion 0.012. The tabulated
 V magnitude corresponds to an average of the two tubes,
 or to $V(\text{blue tube})$ minus one-half the average shift on two nights
 when only blue tube data were available. Mr. J. D. Laing contrib-
 uted the last epoch observation with the 1.0m; the rest are 0.5m
 by the author.

A straight-line fit of magnitude versus time is fair except for V-I. We obtain

$$\begin{aligned} V &= 8.539 + (\text{JD} - 2444700.) \times 0.1009 \\ B &= 8.284 + (\text{JD} - 2444700.) \times 0.0801 \end{aligned}$$

Kozai and Kosai (I.A.U. Circular 3950) reported the time of discovery as JD2444697.25. Gilmore (I.A.U. Circular 3951) provided evidence that eruption had not yet occurred as of 2.20 days earlier. With these limits on the time of maximum, together with the van den Bergh (1965) nova parallax

$$M_{pg}(\text{max}) = -11.9 + (3.2 \pm 0.3) \log t_2$$

the Bahcall-Soneira (1980) space reddening model (based on Sandage's (1972) modified cosec b law and an obscuring layer in the Galactic plane of z scale height 100 pc)

$$A_B(r) = 0.83(1 - \exp(-2.5r)),$$

and a distance scale of $R_0 = 9$ kpc, we obtain the distance to the nova and its Galactocentric (R, z) position given in Table II.

Table II

$t_{\text{discovery}}$	$r(\text{kpc})$	$R(\text{kpc})$	$z(\text{kpc})$
$-t_{\text{maximum}}(\text{d})$			
0.0	8.5	2.2	2.1
1.1	8.2	2.3	2.0
2.2	7.9	2.4	2.0

The parallax-based uncertainty on the distance is typically ± 1.6 kpc, that on z , ± 0.4 kpc. The nova apparently is located in the proximity of the central Galactic bulge.

One caution on this analysis is in order, however. The announcing circular provisionally gave two V magnitudes of 7.0 (2444697.25) and 7.4 (2444701.27), which fit the slope but are 1.25 magnitudes brighter than the S.A.A.O. extrapolated line. If these two data points were confirmed, then the above analysis would yield $r = 4.8-4.4$ kpc, $R = 4.5-4.8$ kpc, and $z = 1.2-1.1$ kpc

in place of Table II.

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