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PHOTOELECTRIC OBSERVATIONS OF NOVA DELPHINI 1967

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SUMMARY. — UBV photoelectric observations of the Nova Delphini 1967 made at the Bologna Observatory during 1967-68 are reported in this note.

RIASSUNTO. — In questa nota vengono riportate le osservazioni fotoelettriche nel sistema UBV della Nova Delphini 1967 effettuate negli anni 1967 e 1968 all'Osservatorio di Bologna.

Nova Delphini 1967 ($\alpha_{1950} = 20^h40^m.1$; $\delta_{1950} = +\ 18°59'$) discovered by Alcock on July 8, 1967, was observed photoelectrically in the *UBV* system at the Bologna Observatory from July 10, 1967 to November 23, 1968, for 105 nights. The instrument we used was the 60 cm reflector of the Astronomical Station at Loiano, having in its prime focus a Lallemand 20 stage photomultiplier.

Almost all measures were obtained by comparing Nova Delphini with HD 197103 and, during the period of highest brightness, with HD 197461 and α Del. For the first months of observation comparisons were made also with HD 197076.

The reductions were effected in two successive phases: first we determined the differences of magnitude Δv, Δb, Δu corrected by atmospheric extinction in the instrumental system, next the conversion into *UBV* standard system through the equations

$$\Delta V = \Delta v - 0.089\,(\Delta b - \Delta v)$$
$$\Delta B = \Delta b - 0.027\,(\Delta b - \Delta v)$$
$$\Delta U = \Delta u + 0.026\,(\Delta b - \Delta v) - 0\,011\,(\Delta u - \Delta b)\,.$$

These equations were obtained by comparing the differences of magnitude of 12 stars of the IC 4665 cluster, in the two photometric systems. On applying

(*) Ricevuta il 17 Marzo 1969.

the foregoing equations to the Nova, systematic errors may arise owing to the Nova peculiar spectrum.

We obtained the *UBV* magnitudes of the comparison stars by applying the previous equations to the differences of magnitude with the standards α Del of JOHNSON (1955) and HD 207840 of GUTIERREZ-MORENO et al. (1966); the results are in Table I whereas the observations can be found in Table II.

TABLE I - Standards and comparison stars.

HD	BD	Sp	V	B-V	U.B
196867 (α Del)	+15° 4222	B9	3.77	−0.06	−0.22
207840	+19° 4797	B6	5.773	−0.104	−0.357
197103	+17° 4378	A0	6.82	−0.06	−0.21
197461	+14° 4403	A5	4.45	+0.29	+0.03
197076	+19° 4484	G5	6.45	+0.62	+0.09

The most remarkable characteristics resulting from the analysis of our data are the following:

After an exceptionally slow increase (7^m in 75^d) (SOLOMON 1967) the brightness remained almost constant, about $V = 4^m.8$ for 100 days, with only three oscillations of small amplitude.

Between JD 2439830 and 2439840 the Nova showed a sudden rise in brightness of more than one magnitude, reaching in this way its absolute maximum; at the same time we had also a maximum in the color index to which, spectroscopically, corresponded an almost complete disappearance of the emission lines as reported by BIDELMAN (1967).

After the outburst, the brightness and the color indices take values decidedly lower than those they had before the maximum; remarkable variations in the spectrum, observed at Asiago, correspond to this change in the photometric characteristics: the emission lines get stronger and broader and a new system of absorption lines appears (MAMMANO and ROSINO 1967).

After the conjunction of the Nova with the Sun, the observations taken in Bologna cannot give, by themselves, a complete description of the rapid fluctuations the Nova had in Spring 1968. The conclusions we can draw are that between JD 2439900 and 2440000 the brightness kept on rather high values and that, as it was before, rises in the color index *U-B* corresponded to rises in brightness. The descending phase began about JD 2440000, quick as far as JD 2440070, then slow ($0^m.2$ in 70^d), quick again after JD 2440150 when both color indices got positive.

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TABLE II - Observations.

DJ	V	B-V	U-B	n_V	n_B	n_U
2439682.45	5.81	0.25	−0.61	6	4	3
683.44	5.73	0.29	−0.61	5	9	5
684.42	5.75	0.25	−0.62	5	6	7
685.56	5.67	0.25	−0.57	5	5	4
686.38	5.64	0.26	−0.55	4	5	3
.54	5.64	0.25	——	5	5	—
688.54	5.64	0.25	−0.60	10	14	12
689.42	5.61	0.26	−0.59	6	6	6
690.43	5.63	0.22	−0.59	5	4	4
.49	5.63	0.25	−0.59	5	5	3
691.44	5.55	0.23	−0.58	8	5	5
693.50	5.62	0.22	−0.58	10	7	11
694.45	5.54	0.27	−0.55	6	11	9
697.43	5.47	0.27	−0.52	8	5	5
698.37	5.45	—	——	4	—	—
700.46	5.49	0.26	−0.50	11	10	11
701.45	5.47	0.27	−0.47	5	5	5
702.44	5.48	0.27	−0.49	6	4	5
703.53	5.48	0.26	−0.51	6	6	6
704.43	5.46	0.26	−0.48	8	4	4
706.48	5.47	0.26	−0.48	5	4	4
711.46	5.45	0.26	——	3	3	—
712.49	5.42	0.27	——	5	5	—
713.41	5.42	0.29	−0.40	4	3	7
.52	5.41	0.27	——	5	3	—
717.43	5.28	0.26	−0.33	5	5	2
719.43	5.25	0.28	−0.30	8	5	4
720.37	5.26	—	——	4	—	—
724.42	5.21	0.27	−0.26	5	4	5
729.55	4.84	0.31	——	4	2	—
731.52	4.73	—	——	5	—	—
736.49	4.89	0.34	−0.08	4	5	5
739.46	4.90	0.32	−0.06	5	5	5
740.35	4.91	0.35	−0.03	6	5	5
742.39	4.97	0.36	——	1	5	—
757.53	4.71	0.33	−0.10	3	3	4
759.41	4.78	0.35	−0.14	5	5	5
760.33	4.80	0.34	−0.16	5	5	5
762.45	4.71	0.38	−0.10	2	5	4
764.37	4.72	0.37	−0.11	3	4	8
765.36	4.78	0.39	−0.09	4	5	5
769.45	4.97	0.34	−0.12	5	6	5
771.36	4.99	0.34	−0.13	6	5	5
791.30	4.92	0.28	−0.17	5	4	4
794.34	4.72	0.33	−0.10	4	4	6
798.30	4.70	0.33	−0.21	4	4	5
804.27	4.94	0.25	−0.32	5	5	5
817.25	4.87	0.36	——	4	1	—
828.22	4.86	0.31	−0.30	5	5	4
831.22	4.45	0.32	−0.13	4	4	4
840.27	3.88	0.37	−0.30	8	8	5
841.25	4.04	0.30	−0.44	6	6	4
843.27	4.27	0.23	−0.62	10	10	5
846.25	4.79	0.18	−0.76	4	4	2

TABLE II - (Cont.).

DJ	V	B-V	U-B	n_V	n_B	n_U
2439853.22	5.14	0.18	——	3	3	—
857.23	5.38	0.15	−0.81	3	3	5
860.22	5.33	0.15	−0.85	2	2	2
861.24	5.27	0.16	−0.86	5	5	5
864.23	5.44	0.15	−0.85	6	5	6
867.23	5.40	0.14	——	4	4	—
868.23	5.49	0.17	——	3	3	—
875.25	5.71	0.17	−0.79	5	5	3
877.24	5.27	0.17	−0.80	5	4	2
926.68	5.35	0.19	−0.80	6	4	2
939.63	5.28	0.23	−0.85	8	8	5
941.62	5.11	0.23	−0.90	10	8	10
945.65	5.02	0.26	−0.70	10	5	6
946.63	4.96	0.24	−0.71	12	6	6
966.63	4.89	0.26	−0.91	2	2	2
968.60	5.05	0.24	−0.74	9	9	6
970.61	4.87	0.22	——	4	4	—
972.62	4.47	0.26	−0.69	3	3	3
979.60	4.44	0.24	−0.61	8	7	5
2440011.54	5.81	0.23	−0.92	4	4	3
018.52	6.03	0.19	——	3	3	—
025.39	5.99	0.21	——	5	5	—
028.43	6.10	0.19	−0.90	4	4	5
029.54	6.11	0.18	−0.88	3	2	3
033.52	6.06	0.19	−0.88	5	5	4
034.53	6.06	0.18	——	5	5	—
035.49	6.19	0.19	——	3	2	—
037.59	6.15	—	——	3	—	—
039.52	6.17	0.19	−0.87	4	4	4
041.46	6.14	0.18	−0.83	4	4	4
042.47	6.18	0.19	−0.85	5	5	6
044.49	6.27	0.18	−0.89	5	5	6
046.51	6.24	0.17	−0.85	5	5	4
047.46	6.25	0.19	——	3	2	—
048.52	6.28	0.19	−0.88	4	4	5
050.60	6.32	0.19	——	4	3	—
051.60	6.33	0.18	−0.85	4	4	4
058.60	6.48	0.20	−0.88	2	2	2
064.61	6.69	0.25	——	2	3	—
083.42	6.83	0.35	−0.78	6	6	6
087.53	6.81	0.39	−0.72	6	6	7
088.57	6.82	0.38	——	6	6	—
090.59	6.85	0.36	——	3	4	—
095.49	6.84	0.40	−0.69	3	3	3
096.37	6.83	0.39	−0.70	3	3	4
103.53	6.86	0.35	——	2	2	—
104.52	6.88	0.36	−0.68	2	2	3
109.55	6.89	0.39	——	3	3	—
121.36	6.90	0.42	−0.64	7	4	4
133.46	6.97	—	——	3	—	—
135.28	6.93	0.44	−0.62	3	3	3
143.26	6.96	0.44	−0.57	2	2	4
147.25	6.99	0.42	−0.58	3	3	3
184.27	7.88	1.03	+0.75	10	8	6

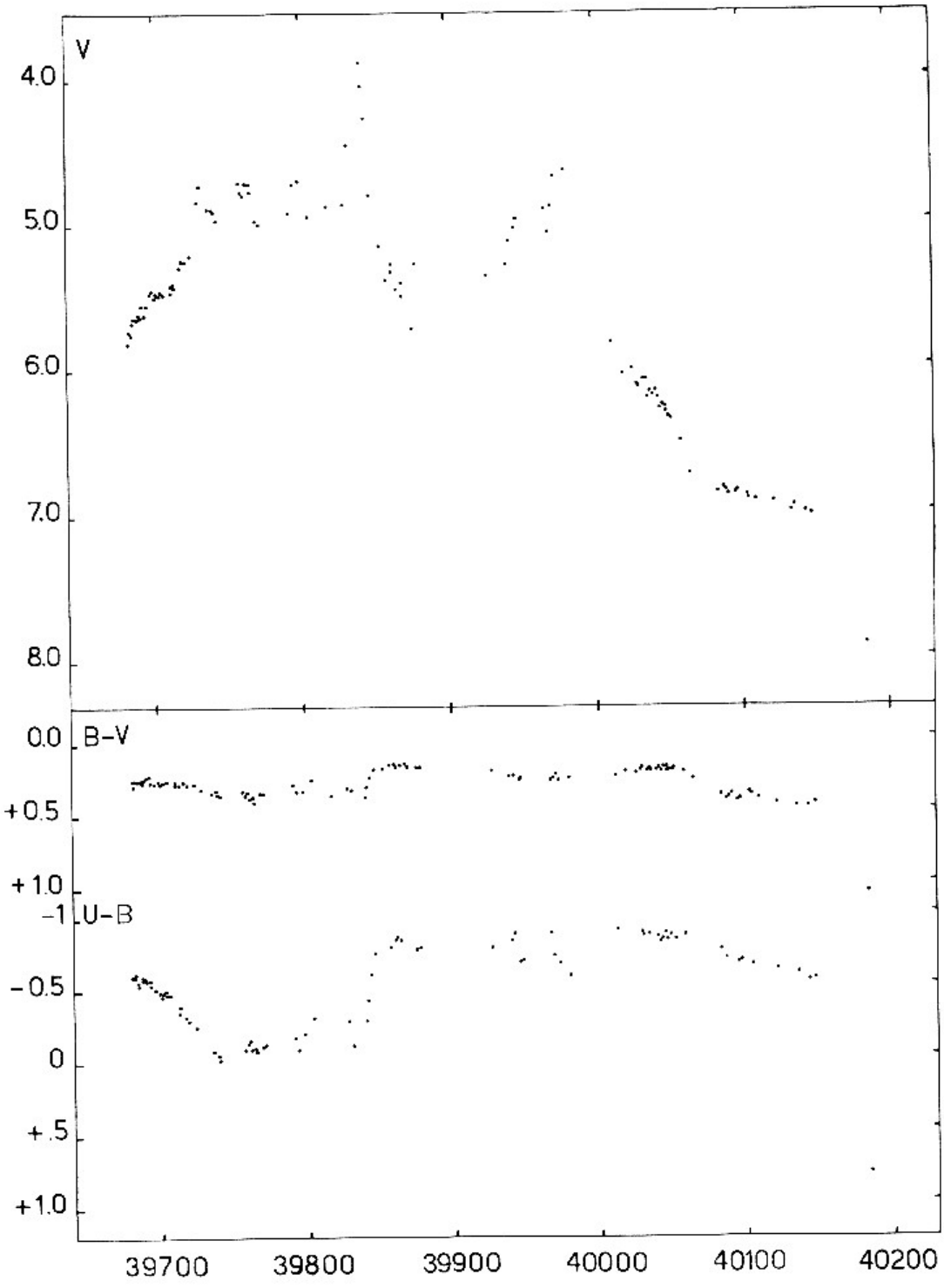

Fig. 1 - Light curves of Nova Delphini 1967.

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