

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 1991

Konkoly Observatory
Budapest
1981 July 14
HU ISSN 0374-0676

LIGHT VARIABILITY OF NOVA DELPHINI 1967 IN 1980

We observed Nova Delphini 1967 (= HR Del) during 7 nights in 1980 at the Hamburg Observatory in Bergedorf. The 1.2 m (f/13) Ritchey - Crétien telescope and a pulse counting photometer - polarimeter with two RCA C 31034 photomultipliers (Schröder, 1978) was used; we measured in an instrumental system close to the Johnson V-band (Schott 2 mm GG 495 + 1 mm VG 6 + 2 mm BG 38) and integrated for about 40 seconds. Comparison stars Nos. 5 and 6 of the list of Barnes, Evans (1970) were adopted as local standards and served also for determining the extinction.

The nova has been monitored for 22.2 hours, but for the detailed analysis of the light curve we used only observations made in the best atmospheric conditions (15 hours in 5 nights - Table I). The observed brightness varied slightly (Fig. 1) and could be approximated by a one-cycle sinusoid. Six extrema could be derived from the light curve of three nights (Table I) whereas only an increase in brightness was observed on Sep. 3/4 and a brightness decrease appeared on Sep. 7/8.

TABLE I Journal of observations and extrema of the light curve.

Date 1980	Period (UT)	Number of obs.	MIN JD ₀	MAX 2444400 +
Aug. 14/15	21:23 - 00:50	40	66.424	66.512
Sep. 1/2	19:43 - 00:03	50	84.441	84.349
Sep. 3/4	21:25 - 23:12	18	--	--
Sep. 7/8	19:38 - 21:09	18	--	--
Sep. 15/16	19:12 - 23:07	37	98.327	98.436

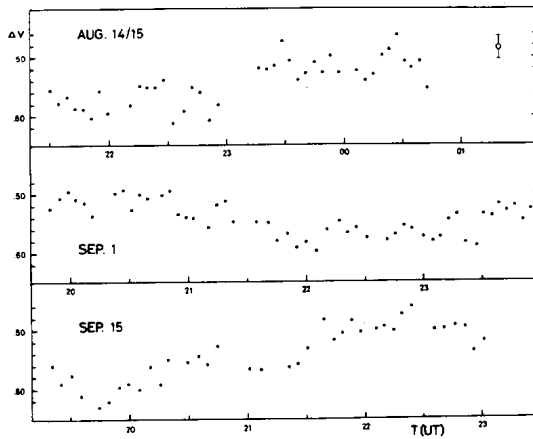


Fig. 1 The light curve of N Del 1967 in three nights in 1980;
 $v = v(\text{Nova}) - v(\text{Comp.6})$.

Assuming a periodic variation we looked for solutions in the range of $0^{\text{d}}.14 - 0^{\text{d}}.27$. Unfortunately, due to rather scarce observations, there exist numerous periods with a reasonable fit to our extrema. We eliminated most of the periods because they were not compatible with the estimated phase of the light curve on Sep. 3/4 and 7/8, respectively. The possible periods are as follows: $0^{\text{d}}.152706$, $0^{\text{d}}.165363$, $0^{\text{d}}.180308$, $0^{\text{d}}.198222$, $0^{\text{d}}.220089$.
 ± 41 ± 37 ± 33 ± 35 ± 53

Similar to the method we had used for reducing our 1977 and 1979 data (Kohoutek, Pauls, 1980) we computed a least-squares fit of our $\Delta v = v(\text{Nova}) - v(\text{Comp.6})$ measurements to a sinusoid. We selected only periods close to the possible periods given above and found the results summarized in Table II: t_0 is the time of the phase 0.0, A_v is the half-amplitude.

It is not possible to find out the true period from our photometric observations in 1980. The reduced chi-square value χ^2_r (0.025 mag was adopted as an estimated error of a single Δv measurement) excludes the period near $0^{\text{d}}.1527$ and is not in favour of $0^{\text{d}}.165339$, but the difference in χ^2_r is small between the remaining three periods given in Table II. In Fig. 2 we present the mean Δv light curve of N Del 1967 corresponding to the period $0^{\text{d}}.180289$.

TABLE II Mean light curve of N Del 1967 in August - September 1980. Sinusoidal fit using 163 Δ_V measurements.

Period	[d]	0.165339	0.180289	0.198207	0.220071
	m.e.	\pm 34	\pm 38	\pm 44	\pm 54
χ^2		1.216	1.097	1.030	1.016
t_0	[d]	66.3713	66.3619	66.3514	66.3402
($JD_0 - 2444400$)		\pm 44	\pm 44	\pm 47	\pm 53
A_V	[mag]	0.037	0.039	0.039	0.039
	m.e.	\pm 3	\pm 3	\pm 3	\pm 3

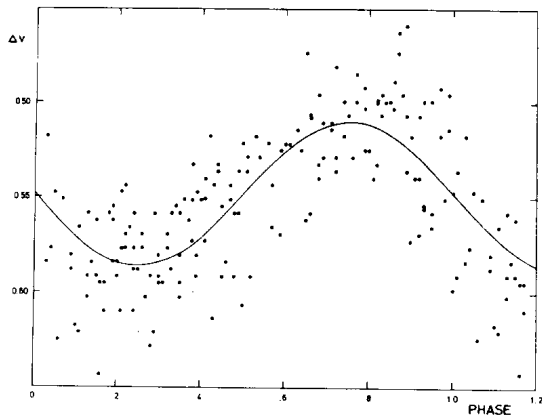


Fig. 2 Mean light curve of N Del 1967 in 1980; $P = 0^d.180289$, $n = 163$.

The best periods resulting from the 1979 observations were $0^d.1776$ and $0^d.2167$ (slightly poorer fit). In 1980 we obtain periods somewhat larger, $0^d.18029$ and $0^d.22007$ (slightly better fit), and an additional period $0^d.19821$. The period might increase by about $0^d.003$ within a year, but this vague proposition has to be proved. It should be added, that there also exists a solution $P = 0^d.17834$ ($\chi^2 = 1.142$) much closer to one of the periods found in 1979, but the predicted phase of the photometric light curve for Sep. 7/8 is inconsistent with the observed brightness decrease of the nova. The decrease of the

semi-amplitude of the light curve from 0.084 mag (1977) and 0.051 mag (1979) to 0.039 mag (1980) seems to be guaranteed. Further photometry of this nova is planned.

We wish to thank Dipl. Phys. Th. Kleine for providing us with some computer programmes.

L. KOHOUTEK
R. PAULS
H.-M. STEINBACH
Hamburger Sternwarte
D-2050 Hamburg 80
Federal Republic of Germany

References:

- Barnes, T.G., Evans, N.R., 1970, Publ.Astron.Soc.Pacific 82, 889
Kohoutek, L., Pauls, R., 1980, Astron.Astrophys. 92, 200
Schröder, R., 1978, Mitt.Astron.Ges. 43, 295