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H α SPECTROSCOPY OF NOVA CYGNI 1992

Nova Cygni 1992 was discovered by Collins (1992). Photometric observations by many observers indicate that the maximum brightness occurred at around February 22 with a visual magnitude of about 4.3, the brightest among the novae observed in the last 10 years. The light declined slowly and t_3 found to be about 47 days (Kidger 1992). The strong neon lines in IUE and optical spectra reveal that it is a new member of the "slow" ONeMg class of novae (Austin and Starrfield, 1992) like QU Vul (Gehrz et al., 1985, Bergner et al., 1988).

In coordination with IUE observation, two CCD H α spectra of Nova Cyg 1992 were obtained by us with the 2.16-m telescope at the Xinglong station of Beijing Observatory. A fiber-fed Cassegrain spectrograph was used together with a 576 \times 384 CCD detector. The reciprocal dispersion of the spectrum is 50 $\text{\AA}/\text{mm}$, corresponding to 1.15 \AA per pixel. The two spectra were exposed on May 8.83 and 9.85 UT, respectively. The H α lines on them show nearly the same structure.

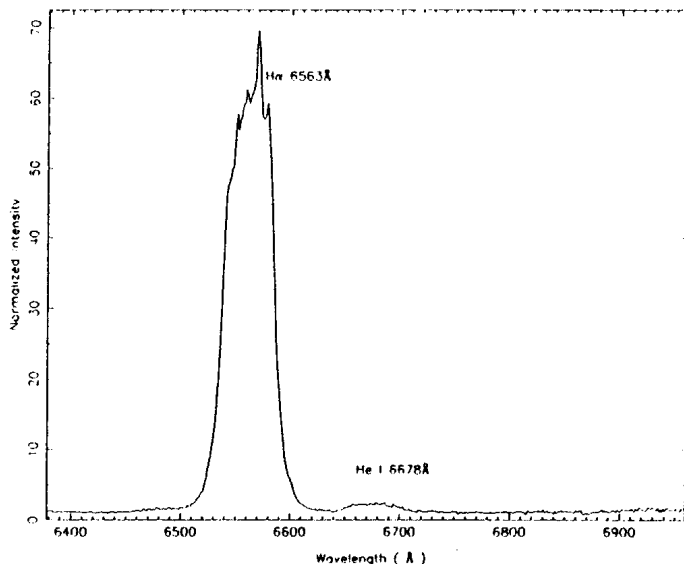


Figure 1. CCD H α spectrum of Nova Cygni 1992 on 1992 May 8.83 UT.

Figure 1 displays the spectrum on May 8.83 UT, with strong $H\alpha$ and apparently HeI 6678 \AA also in emission. The $H\alpha$ profile has a very complex structure with several peaks. Through multiple fitting six Gaussian profiles are found with five in emission profiles and one in absorption as shown in Figure 2. The line identification of the Gaussian profiles as well as their radial velocities are listed in Table 1.

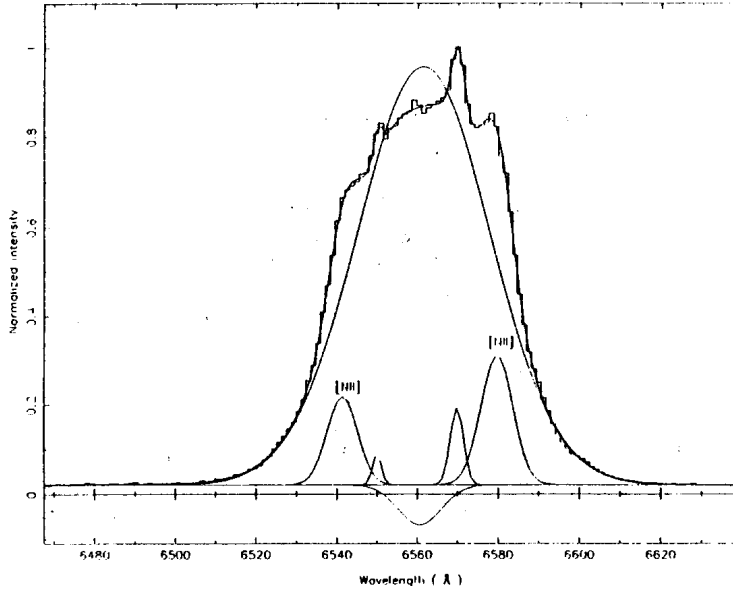


Figure 2. Multiple Gaussian fitting of the $H\alpha$ profile.

Table 1

λ (\AA)	Identification	$\Delta \lambda$ (\AA)	V_r (km/sec)
6541.3	[NII] 6548.1 \AA	-6.8	-312
6550.0	$H\alpha$ (?)	(-12.8)	(-585)
6560.7	$H\alpha$ 6562.8 \AA	-2.1	-96
6561.4	$H\alpha$ 6562.8 \AA	-1.4	-64
6569.9	$H\alpha$ (?)	(+7.1)	(+325)
6579.7	[NII] 6583.4 \AA	-3.7	-170

Two strong [NII] emission lines were observed to be blended with $H\alpha$. Their radial velocities are found to be -312 and -170 km/s, respectively.

The large difference in the radial velocities could be caused by the emissions from distinct envelopes with different expansion velocities. The appearance of the forbidden [NII] lines confirms that the nova had already entered the nebular stage as reported by Austin and Starrfield (1992), as well as Rafanelli and Rosino (1992). It is interesting to notice that the nova experienced an obvious brightening by $\Delta B \sim 0.20$ from May 2 to 9. (Hanzl et al., 1992, Dintinjana et al., 1992) and then resumed its decline in brightness but more slowly than before.

The two unidentified features at 6550.0 and 6569.9 Å could both be shifted H α lines caused by the re-emission from the inner parts of a geometrically thick but optically thin dust disc. Their high radial velocities may be somehow connected with the spin of the disc, but the huge difference between them is an open question.

The H α emission profile exhibits no obvious P Cyg structure appear but there is a weak central absorption instead, which is typical for a star with expanding gas envelope. More H α spectra were obtained after this observation. Their careful analysis will help us to understand better the nature and evolution of H α emission during the outburst of Nova Cyg 1992.

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