THE EARLY SPECTRUM OF NOVA SAGITTARII 1977

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Nova Sagittarii was discovered by Kuwano on 1977 March 27 (Kozai 1977). The nova was around ninth magnitude at the beginning of April and faded by about one magnitude by the beginning of May.

A program of spectroscopic and spectrophotometric observations of this nova is currently under way at Kavalur. The first spectrogram obtained on March 30 with a dispersion of 540Å/mm covers the entire visible region. Two more spectrograms were obtained later, on April 8 and 9 at 260Å/mm with a similar spectral range. Spectrophotometric observations were done with the photoelectric spectrum scanner on March 31, April 17, April 27 and May 19. The detectors employed were 1P21 for ultraviolet and blue, EMI 6255B for blue and green, and EMI 9558B for green to red. All the tubes were cooled with dry ice. Band passes of 10Å were used on all the days except on May 19 when the value employed was 20Å. The representative scans and microphotometric tracings are presented in figs. 1, 2 and 3.

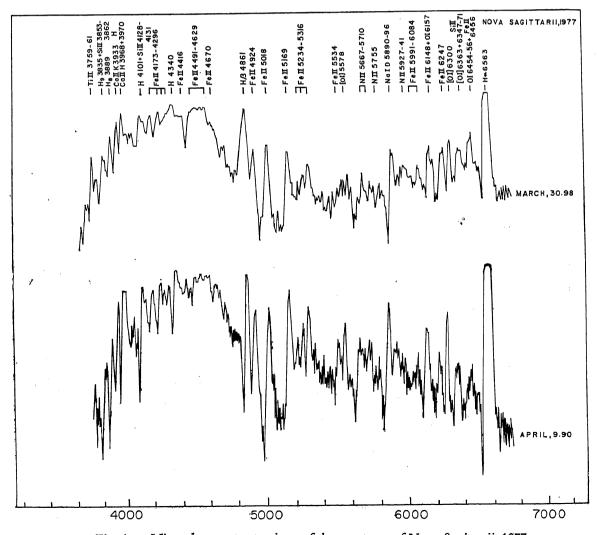


Fig. 1: Microphotometer tracings of the spectrum of Nova Sagittarii, 1977.

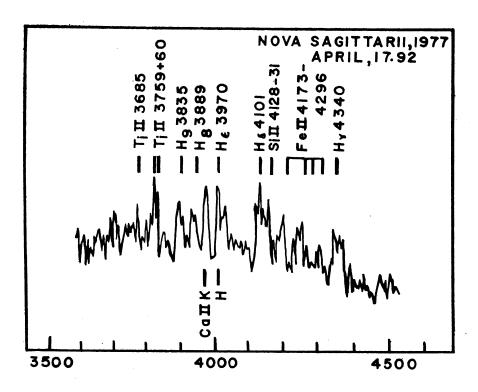


Fig.2: Scan of the spectrum of Nova Sagittarii 1977 in the ultraviolet and blue region

The spectrogram obtained on March 30 shows bright lines of hydrogen upto H_{\bullet} , Fe II ($\lambda\lambda$ 4173-4296, 4416 4491-4629, 4670, 4924, 5018, 5169, 5234-5316, 5534, 5991-6084, 6247), the H and K lines of Ca II, the D lines of Na I and Si II ($\lambda\lambda$ 3853-62, 4128-31, 6347-71). Ti II $\lambda\lambda$ 3759-61 are bright. A few other lines of Ti II could be identified while many more may be blended with the bright iron lines. [OI] λ 6300 and λ 6363 are strong while λ 5577 is just visible. The O I lines at λ 6157 and λ 6455 are strong. The Fe II lines at λ 6148 and λ 6456 may be contributing partly to the intensities of these lines, since Fe II λ 6247 of the same multiplet is fairly strong. N II lines are quite faint. The hydrogen lines, Na I $\lambda\lambda$ 5890-96 and Fe II $\lambda\lambda$ 4923, 5018 and 5169 clearly show P Cygni profiles.

All these lines brightened by April 9 which could partly be an effect of diminishing continuum intensity. The [O I] lines brightened quicker than Fe II $\lambda\lambda$ 5991, 6084 and 6247. The auroral lines [OI] λ 5577 and [N II] λ 5755 appear quite strong at this stage. The effect of increasing excitation is evident in the brightening of lines due to N II. This effect continues further and the lines of Fe II, Na I, Si II and OI begin to diminish in intensity. The auroral line [OI] λ 5577 has faded by May 19, an effect of decreasing density, while [N II] λ 5755 is persistent. There is a suggestion that [OIII] $\lambda\lambda$ 4959-5007 have appeared on May 19 since the gap between Fe II λ 4924 and λ 5018 is partially filled up.

The mean absorption velocity obtained from 9 lines on April 9 is -1600 ± 100 km/sec. This places the nova among the moderately fast galactic novae (Payne-Gaposchkin 1957).

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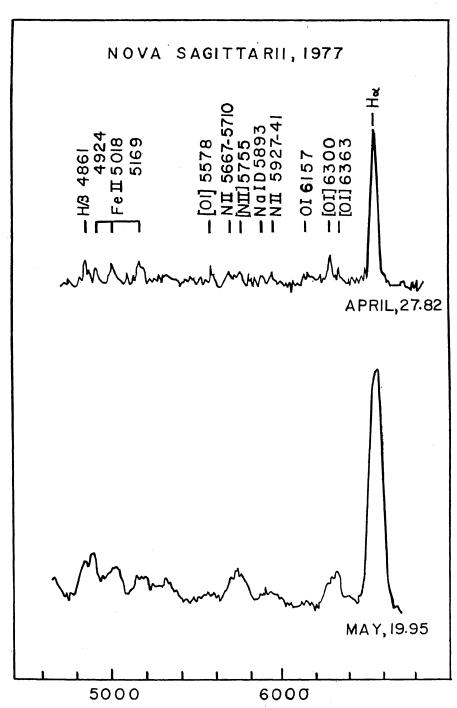


Fig.3 : Scans of the spectrum of Nova Sagittarii 1977 from H $_{\mbox{\scriptsize B}}$ to H $_{\mbox{\scriptsize C}}$

References:

Kozai, Y. 1977, I.A.U. Circular No. 3055. Payne-Gaposchkin, C. 1957, The Galactic Novae, North Holland Publishing Company, Amsterdam.