

Spectrophotometric observations of the comet Swift-Tuttle (1992t)

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Abstract. Periodic comet Swift-Tuttle (1992t) period 135 years was observed with 104 cm reflector of Uttar Pradesh State Observatory, Naini Tal, using OMA (Optical Multichannel Analyser) reticon array detector in the visible region of the spectrum on four nights of December 1992. The molecular emission bands of CN ($\Delta v = 0$) at 3880 Å, CH + C₃ at 4050 Å and C₂ ($\Delta v = +1, 0, -1$) at 4690 Å, 5160 Å and 5530 Å were identified.

Key words : comet—molecular emission

1. Introduction and observations

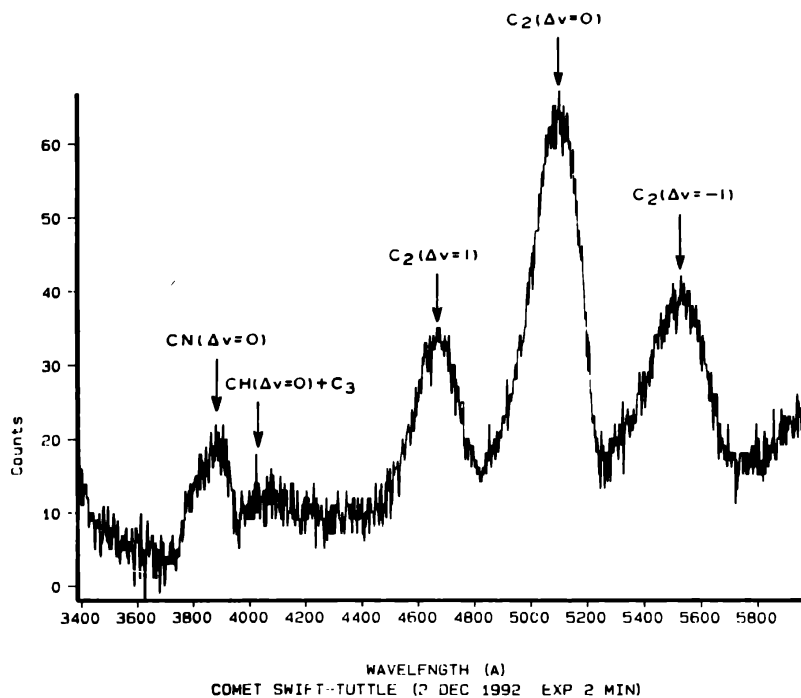
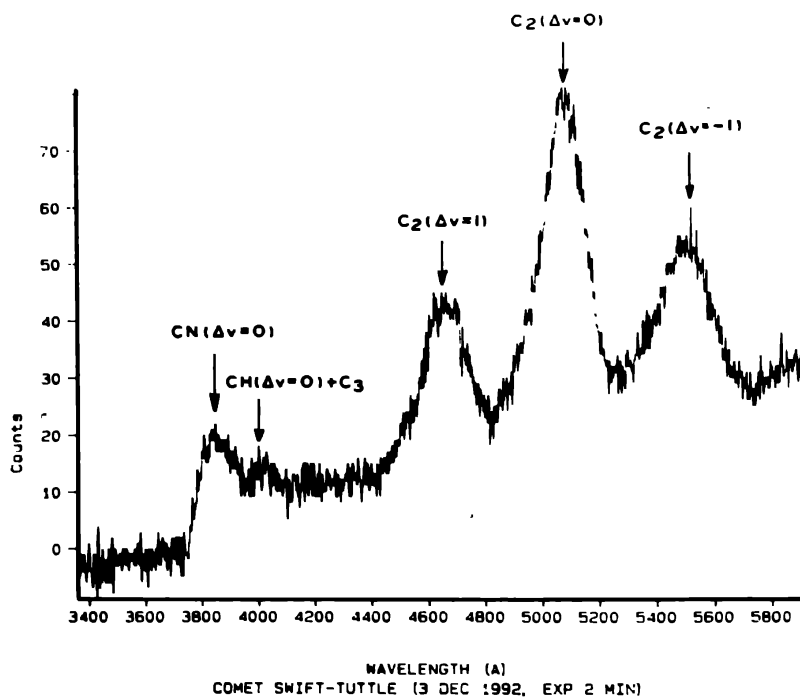
Comet Swift-Tuttle was discovered by National Astronomical Observatory (NAO) Tokyo astronomer, Tsuruhiko Kiuchi (IAU Cir. 5620) with the suggestion that it might be P/Swift-Tuttle with perihelion time in mid-December 1992. Confirmation of the discovery was done by several observers in Canada, the USA and Japan. The identification in turn confirms the suggestion (Lynn 1902, Obs., 25, 304; Marsden 1973, AJ, 78, 662, also IAU Cir. 5330 and 5586) that Kepler's 1737 observations were indeed of P/Swift-Tuttle. Future extrapolation (IAU Cir. 5636) gives the next return to perihelion as 2126 July 11, although the problem with the computation of the non gravitational forces will introduce some uncertainty, a change by +15 days could cause the comet to hit the earth on 14 August, 2126.

Keeping in view the scientific importance of observing the comets, it is prudent to attempt to follow the comets for as long as possible. Thus we undertook spectrophotometric observations of this comet for four nights of December (2, 3, 7 and 8) 1992 using spectrophotometer having the reticon array as a detector mounted at the Cassegrain focus of 104 cm telescope of the Uttar Pradesh State Observatory, Naini Tal. The spectral dispersion of the spectrograph attached with the detector is 100 Å/mm. The reticon array consists of 1024 elements of size 2 mm × 25 microns. Thus the data points are sampled at an interval of 2.5 Å. Along with the comet, the standard stars ξ^2 Ceti and α Lyr were also observed for evaluating the extinction corrections and to obtain the standard magnitudes.

The geocentric distance (Δ), the heliocentric distance (r) and the predicted total magnitude (m) of the comet on different observing nights are given in table 1 (British Astron. Association Circular No. 722).

Table 1. Geocentric distance, heliocentric distance and the predicted total magnitude of the comet

Date	Δ (AU)	r (AU)	m
Dec 2, 1992	1.396	0.975	4.6
Dec 3, 1992	1.412	0.972	4.6
Dec 7, 1992	1.479	0.963	4.7
Dec 8, 1992	1.496	0.961	4.7

**Figure 1.****Figure 2.**

2. Emission features

The spectral scans of the comet Swift-Tuttle taken on various nights are shown in figures 1 to 4. Wavelengths are plotted on X-axis in angstroms and on Y axis intensity in counts.

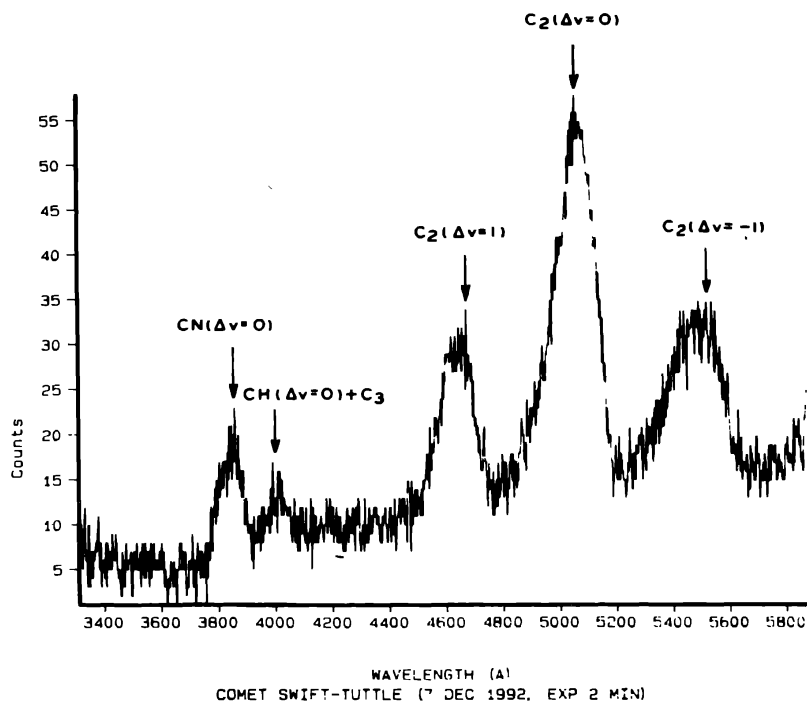


Figure 3.

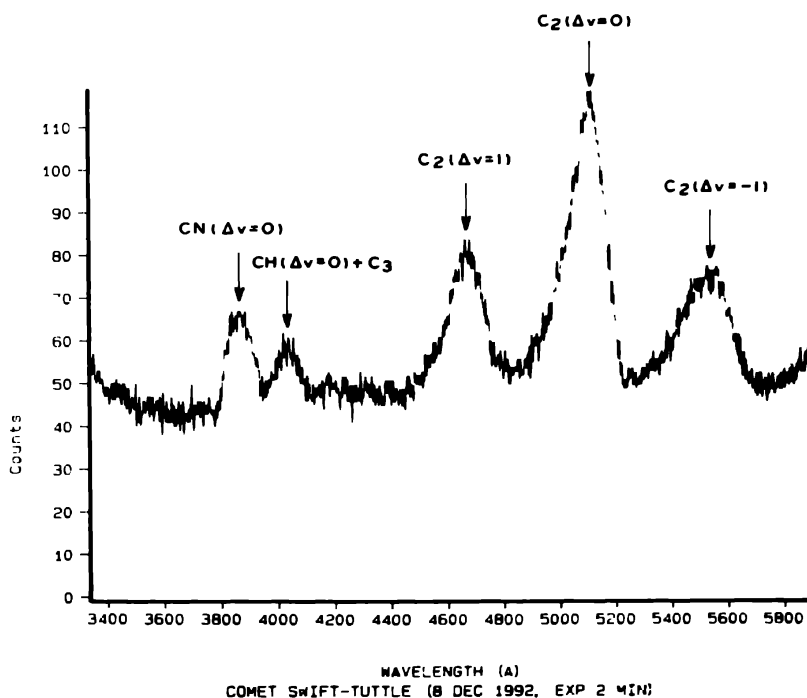


Figure 4.

The emission features of CN ($\Delta\nu = 0$) at 3880 Å, CH ($\Delta\nu = 0$) + C₃ at 4050 Å, C₂ ($\Delta\nu = 1$) at 4690 Å, C₂ ($\Delta\nu = 0$) at 5160 Å and C₂ ($\Delta\nu = -1$) at 5530 Å are marked in the same figures. A visual inspection of these spectra shows that the CN molecule at 3880 Å and CH + C₃ at 4050 Å become more sharp and prominent on 7th and 8th December, 1992 when the heliocentric distance of the comet decreases. For other species there is no significant variations.