COMET WEST (1975n)

Quite frequently, one sees a bright comet with a glowing tail in the early morning or evening sky and one such was the comet West (1975n), which is shown on the front cover. This comet was discoverd by Richard M. West of European Southern Observatory, Geneva on a photographic plate taken with the 100-Cm. Schmidt telescope at La Silla on 24th September 1975. The photograph showed that the tail was about 10'' long and the head 2'' to 3'' in diameter. Initial orbit of the comet indicated that it should be observable in the favourable position for observation in the northern sky in the mid March 1976. With improved values of the position of the comet, the perihelion passage was found to be around February 22, with r = 0.232 a.u and brightness $\backsim 0^m.5$ (*I.A.U.* circular No. 2871). Also the expected brightness of the comet for the period March 3 to 18 was to lie between $1^m.6$ to $4^m.6$ However, it turned out that comet was actually brighter by about 1 to 2 magnitudes than the predicted values for the same distance and the head and the tail could easily be seen with the naked eye in the early part of March. The photograph shown on the cover page was taken on the 13th March, 1976, with one hour exposure. The photograph clearly shows a straight narrow plasma tail and a well developed dust tail. The plasma tail also shows wave pattern which is generally attributed to arise from some form of instability in tail. As the comet was relatively bright, quite a few observations of various kinds have been carried out successfully (see *I.A.U.* Circular Nos. 2910, 2924, 2926, 2928).

The fluxes at various infrared band passes have been measured and the 10μ silicate feature is present in the comet. The albedo of the particles is found to be similar to that of comet Kohoutek. There was no evidence of antitail or the material on the sunward side. Spectroscopic observations show usual emissions of C_2, CN, C_3, Na and also H_2O^+.

H_α emission has also been detected. An Aerobee rocket launched on March 5, showed that the principal emissions to be OI λ1304, CI λ1561 and λ1657. The fourth positive bands of CO has also been detected. In the radio region, the emission at 1667 Hz due to OH has been observed. The peak intensity of this line on March 12, 13 and 14 was 0.15 Jy. The unusual characteristic of this comet was the presence of a secondary nucleus in the visual observations of March 5. Further observations confirmed the multiple nature of the nuclei and infact since March 11, observers have reported as many as four discrete condensations. The configuration of the condensations appears to be aranged in a trapezoidal form.

Detailed studies of several comets have helped in understanding various aspects of cometary physics. However, the origin of the comets is still far from clear. The best way to answer many of the questions is to send a space probe to the nucleus of the comet. These are completely feasible today from both technological and scientific point of view. In fact, NASA, U.S.A. has in mind such a mission for 1980's. Space missions of comets, coupled with increased ground-based research can help us in better understanding the nature and origin of this spectacular celestial visitor.

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SOLAR PULSATIONS

Recently, two independent observational findings by Severny, Kotor and Tsap (*Nature*, **259**, 87, 1976) and Brooks, Isaak and van der Raay (*Nature*, **259**, 92, 1976) have once again refocused attention on the problem of solar oscillations and pulsations. These results are significant since they provide the first direct evidence for large-scale global pulsations of the solar sphere. Previously, solar observers have been chiefly concerned with studying the properties associated with the well known 5-minute period photospheric fluctuations, and endeavoring to discover the excitation source, and the manner in which these oscillations propagate at photospheric and chromospheric levels. Severny et al. and Brooks et al. have developed more sophisticated techniques and refined instrumental sensitivity to a level where photospheric fluctuations of 1 m sec^{-1} in amplitude are detectable. These observations independently claim to have established the existence of global oscillations of the entire Sun, with a mean period of approximately $2^h\ 40^m$, that correspond to an average radial velocity ranging from 2m sec^{-1} to 4.5 m sec^{-1}, and amplitude displacement of 10 km.

The methods employed by these groups involved different instrumental techniques. Severny et al. used a magnetograph at the magnetically insensitive photospherically formed line λ = 5123.7 A, from which a known shift in the line profile can be related to a Doppler line-of-sight velocity. The principle of the Doppler measurements involves a compensating device consisting of a plane-parallel glass plate that compensates a shift in profile against an absolute wavelength scale. By equalizing the signal output from two photomultiplier detectors centered oppositely in the wings of the spectral line, a Doppler shift of the line profile corresponds to an intensity difference that is proportional to the radial component of velocity.

Brooks et al. developed a sensitive instrument that employs either a K or Na vapour tube for calibration. The right - and left-hand circularly polarized light, after alternately exiting from an electro-optical light modulator, enters a K or Na tube, in which an artifically induced magnetic field of suitable strength splits the energy levels of K or Na atoms so that the anomalous Zeeman components coincide with the steepest portion of the wings of the solar spectral line. Thus, a small shift in the wings is detectable as an intensity difference, which in turn is proportional to the velocity.