

---

## General Discussion

D. McNally

*Phil. Trans. R. Soc. Lond. A* 1987 **323**, 447

doi: 10.1098/rsta.1987.0098

---

### Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right-hand corner of the article or click [here](#)

---

To subscribe to *Phil. Trans. R. Soc. Lond. A* go to: <http://rsta.royalsocietypublishing.org/subscriptions>

---

## General discussion

D. McNALLY

*University of London Observatory, Mill Hill Park, London, U.K.*

### *A possible cometary absorption line*

Twenty spectra were obtained of  $\tau'$  Ari during the 2 h period centred on closest approach ( $2'.7'$ ) to the nucleus of Halley's Comet on 19 November 1986. The star was thus occulted by the coma of Halley's Comet. Two further spectra were obtained of  $\tau'$  Ari on 22 November 1986 when star and comet were well separated. A test spectrum of HD 26571 was taken 20 minutes before the observations of  $\tau'$  Ari on 19 November. The spectra were taken at *ca.*  $17 \text{ \AA mm}^{-1}$ † with the Intermediate Dispersion Spectrograph with CCD detector of the Isaac Newton Telescope at the La Palma Observatory. The spectral range included the diffuse interstellar line at  $5780 \text{ \AA}$  and the NaD lines. (The observations were carried out as a service observation by Dr R. Terlevitch assisted by Mr I. A. Crawford.)

The object of these observations was to attempt to establish whether or not the carriers of the diffuse interstellar absorption were present in the material of the coma of Halley's Comet. It was found that no cometary contribution to the diffuse interstellar line at  $5780 \text{ \AA}$  could be detected placing an upper limit, an order of magnitude less than in interstellar space, on the abundance of such carriers if present in cometary material.

However, in all the spectra of  $\tau'$  Ari of 19 November an additional absorption line was found at  $5820.8 \pm 0.5 \text{ \AA}$  (rest wavelength if of cometary origin). This line did not appear in the spectrum of HD 26571 or in  $\tau'$  Ari of 22 November. Flat fields were used to correct for rogue pixels in the CCD detector. There is therefore a strong presumption that this absorption line must arise in the cometary coma. Nevertheless some small doubt must remain about reality because, although a similar set of observations by G. H. Herbig of the Lick Observatory found a line at the same wavelength, it had less than half the strength found by us. The line is also contaminated by stellar Si II and Ne I. Having divided the spectra on and off the comet, we found a residual equivalent width of  $45 \times 10^{-13} \text{ m}$  for the suspected cometary absorption line.

Unfortunately no identification of the line has so far been possible. The nearest match in wavelength is a line of Ni IV at  $5820.7 \text{ \AA}$ . However, Ni IV is an unlikely state of ionization in the coma of a comet. Various other possibilities have been sought but excluded on poor wavelength match, unlikely abundance or absence of other lines from the same species within the observed wavelength range. From the width of the line, an unresolved molecular band or a blend of atomic lines might be expected.

$$\dagger \text{ \AA} = 10^{-1} \text{ nm} = 10^{-10} \text{ m.}$$