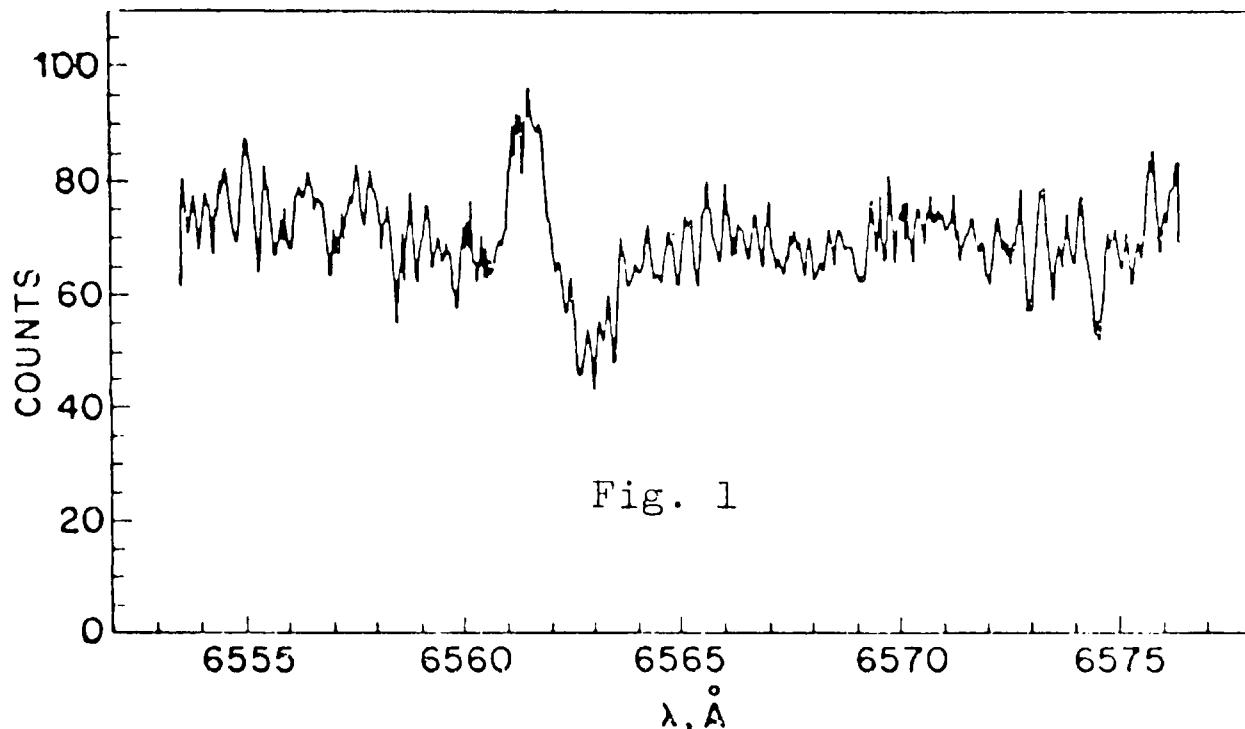


HIGH RESOLUTION SCAN OF COMET KOHOUTEK IN THE VICINITY OF 5015 Å, 5890 Å, AND 6563 Å *

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ABSTRACT

High resolution scans were made of the head of Comet Kohoutek (1973f) using the McMath solar telescope at Kitt Peak National Observatory. The data were taken on 1 and 4 January 1974 UT, just after the comet perihelion: A spectrum taken in the vicinity of 6563 Å on 4 January (Figure 1) with a 9.4 arc second round aperture shows evidence of H_{α} emission, doppler-shifted from the atmospheric solar absorption feature.



The H_{α} emission intensity in the area observed was $\sim 4.1 \times 10^{27}$ photons sec⁻¹. An H_2O^+ ion line occurs at the position of H_{α} and at ~ 6574 Å (Herzberg and Lew, 1974; Wehinger et al., 1974). At 100°K, the intensity of the H_2O^+ line at ~ 6574 Å is about one-half the intensity at 6562.8 Å. The data of Figure 1 indicate that the emission at ~ 6574 Å is

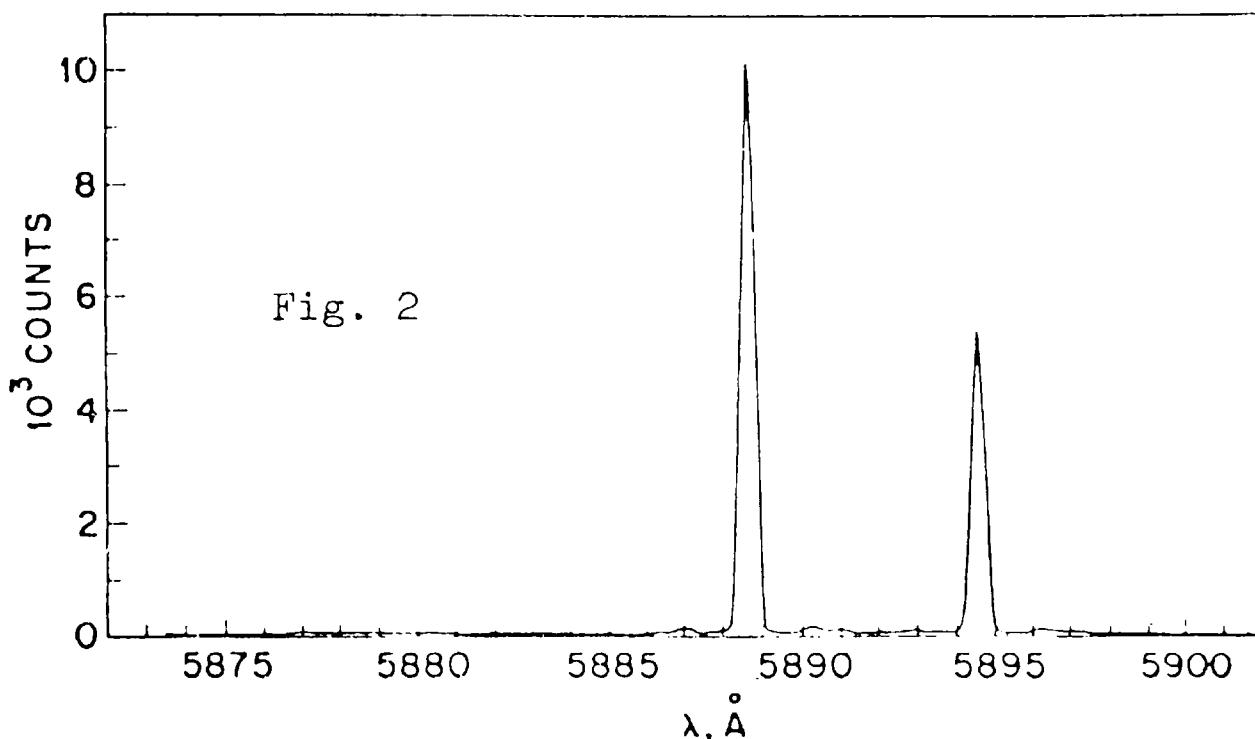
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Herzberg, G., and Lew, H. (1974). Astr. and Ap., 31, 123

Wehinger, P. A., Wyckoff, S., Herbig, G. H., Herzberg, G., and Lew, H. (1974). Ap. J., 190, L43

$\lesssim 10^{27}$ photons sec $^{-1}$. The contribution of H₂O $^+$ emission is thus probably much less than one-half of the measured H_a emission in the area of the head of the comet measured. An upper limit on the He I (5015) radiation was determined to be less than two percent of the observed H_a emission. Measurements made with a 4.7 arc sec round aperture in the vicinity of 5890 Å on both nights indicated that the D2/D1 line intensities were ~ 0.5 , indicating an optically thin emission region in the area of the head observed.

A spectrum of the NaD region taken on 1 January is shown in Figure 2. The emission intensity was $\sim 1.2 \times 10^{29}$ photons sec $^{-1}$ in the region observed (the intensity on 4 January was $\sim 7.9 \times 10^{28}$ photons sec $^{-1}$). Assuming a resonance-fluorescence emission rate for the



optically thin target, it is found that the ionized Na $^+$ production rate at Kohoutek in the region measured was $\sim 2.2 \times 10^{23}$ atoms/sec on 1 January and $\sim 1.4 \times 10^{23}$ atoms/sec on 4 January assuming a photo-ionization lifetime of $\sim 5 \times 10^4$ sec for Na at 1 a.u. These data also yield sodium number densities of $\sim 2.9 \times 10^{29}$ and $\sim 7.3 \times 10^{28}$ on 1 and 4 January, respectively.

* See *Icarus* 23, 618 (1974) for the complete text.