

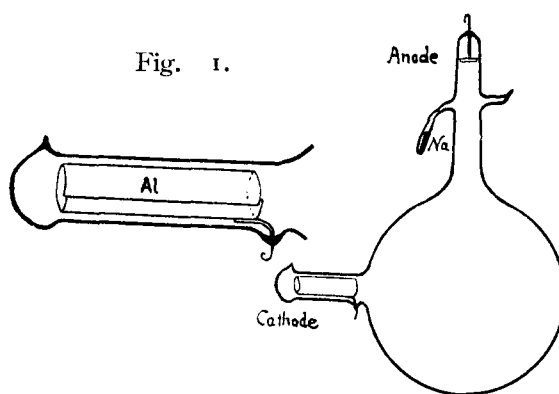
A simple Vacuum Tube demonstrating the Doppler Effect on the Balmer Lines of Hydrogen.

By

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It was shown by Stark and others that the Doppler effect was presented by canal rays. The tube used by these investigators was provided with a cathode made of a disc perforated with a number of small holes. The light emitted from the canal rays is generally feeble, and with such a tube it took generally about 5 to 6 hours' exposure to photograph the effect on the line $H\alpha$ with a prism spectrograph. The present writer found in the course of the study of the secondary spectrum of hydrogen that the Balmer lines emitted from the glow in a hollow cylindrical cathode show the Doppler effect. The tube used in this experiment was of the form shown in the accompanying Fig. 1. The cathode consisted of a hollow



cylindrical tube of aluminium. The best result was obtained with a tube having an internal diameter of about 5 mm. and a length of about 3 cm. Hydrogen was introduced into the well-evacuated tube by heating a piece of sodium contained in the side tube, and this was excited by an induction coil giving a spark of 15 cm. The glow in the cylindrical cathode was fairly strong and the visual examination of the line H_{α} through a prism spectroscope showed clearly the doubling of the line. An exposure of 10 to 15 minutes was sufficient to record the spectrum with a Hilger wave-length spectrograph, its telescope being replaced by the Hilger camera having a lens of 21" focus. The photographs given in the spectrograms of Plate I were taken with the above instrument, and showing the Doppler effect.

In conclusion, the writer wishes to express his thanks to Prof. M. Kimura for the interest he has taken in this work.

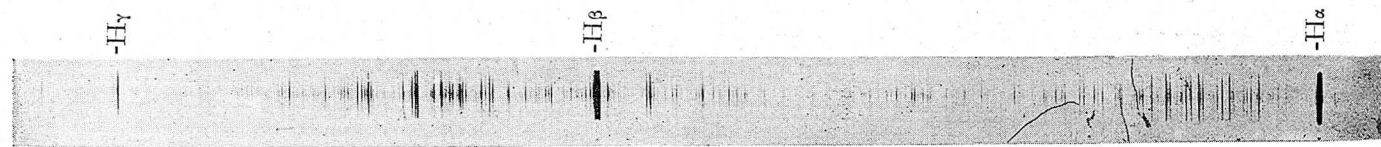


Fig. 2. Spectrum of Canal Rays through cylindrical Aluminium Cathode.
Exposure : 15m. Magnification : $\times 3$.

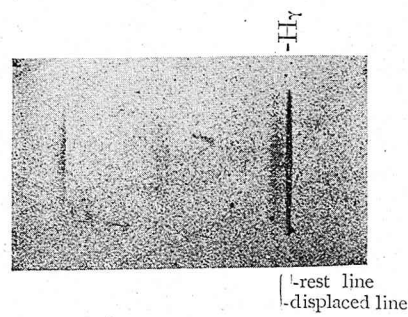


Fig. 7.
Doppler Effect for H_γ
Exposure : 15m.
Magnification : $\times 7$

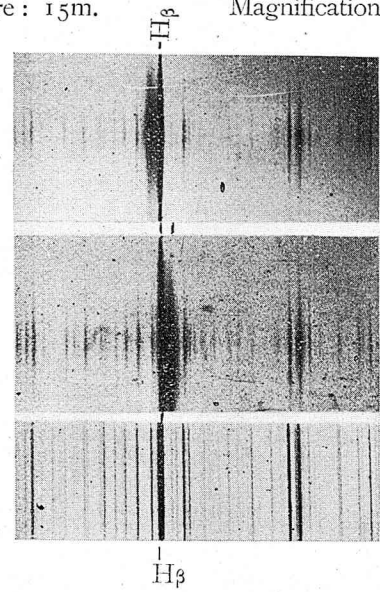


Fig. 4. Doppler Effect for H_β shifted towards the violet. Exposure : 15m. Magnification : $\times 7$
Fig. 5. Doppler Effect for H_β shifted towards the red. Exposure : 15m. Magnification : $\times 7$
Fig. 6. H_β emitted in positive column.

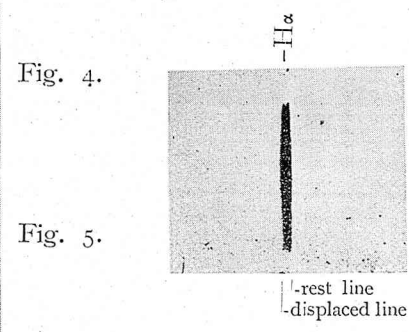


Fig. 3.
Doppler Effect for H_α
Exposure : 10 m.
Magnification : $\times 7$