cleared, but at 09h. 57m. one nucleus ($A$) was picked up at a line-shifter reading corresponding to a velocity of recession of 74 km./sec. Later, the other nuclei, $B,B'$, were picked up at a still higher velocity as a single marking much fainter in contrast. The complete set of readings in the observing book, together with the corresponding velocities, are given below :

| Time | Region | Line-shifter reading | Radial velocity (km./sec.) |
|---|---|---|---|
| 09h. 46m. (clouds) | $A,B,B'$ | — | — |
| 09h. 57m. | $A$ | + 19 | + 74 |
| 10 04 | $B,B'$ | + 42 | + 144 |
| 10 05 | $A$ | + 31 | + 109 |
| 10 06 | $B,B'$ (faint) | + 50 | + 171 |
| 10 07½ | $A$ | + 36 | + 124 |

The heliographic co-ordinates of the centre of the floccular area were found to be 6° W., 61° S. (kindly computed by Mr. E. T. Pierce from two of my measured positions). The high latitude—well outside the sunspot zone—of the phenomenon renders it of peculiar interest.

If one is correct in attributing the line-shifts to sight-line velocities, the three observations of $A$ define a linear acceleration of recession of $0\cdot81 \times 10^4$ cm./sec.$^2$, that is, about 30 per cent of solar gravity at the sun's surface. No line-shifter reading is available for the first observation, but the radial velocity could not have been far from zero at 09h. 46m., and this is quite consistent with a linear extrapolation of the velocity-time plot. Observations of the nuclei $B,B'$ cannot define the acceleration so exactly, but the value seems to lie between 45 and 80 per cent of solar gravity. These figures are of the same order of magnitude as those found by other observers for dark flocculi in regions surrounding sunspots and flares[1]. It is possible that here we are dealing with a similar phenomenon in a region entirely free from sunspots and from flare activity.

Consultation with the Cavendish Field Laboratory (results are quoted by permission of Mr. M. Ryle) reveals the interesting fact that although June 19 was marked by an absence of fade-outs, there was an increase in radio-noise on 175 Mc./sec. of some two to three times the normal 'undisturbed' mean value, and that there was special activity, including bursts up to five times the average value between 10h. 03m. and 10h. 10m. with a maximum at 10h. 08m. ($\pm$ 2 min.). It is further understood that while such bursts have not been very uncommon, only about six per month have recently been recorded of comparable intensity.

There can be little doubt that at the time of these radio disturbances this short-lived $H\alpha$ flocculus was the only noteworthy phenomenon visible in the spectrohelioscope. A bright flocculus at 31° W., 21° S. had been noted at 09h. 11m. and later of undiminished intensity, but scarcely bright enough to be classed as a weak flare. A few prominences of no great intensity were also observed at the limb.

If the two phenomena are connected, and again if the line-shifts are due to recessional velocities, it appears that we have to deal with a mass of gas moving into the sun in high latitude through a distance, in the line of sight, of some $6 \times 10^4$–$10^5$ km. before it disappeared while moving with a velocity of more than 120 km./sec. ; and secondly, that the radio-noise is to be associated with the later stages of the trajectory. It may be that the gas in question was originally ejected from the sun and that earlier observations would have revealed a velocity of approach. But such an ejection must have taken place at or before 09h. 46m., that is, 17 minutes before the radio-burst (the same time-lag holds for both phenomena). Thus the source of the noise seems to be connected in this case with an entry of matter into the sun rather than an ejection.

The connexion between the two phenomena cannot, of course, be regarded as established by this isolated case, but the solar observation suffices to emphasize ($a$) the need for spectrohelioscope observers to watch all zones of the sun, irrespective of the presence of sunspots, and ($b$) the ease with which short-lived solar phenomena may be missed if only the zero position of the line-shifter is used.

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[1] Newton, H. W., *Mon. Not. Roy. Ast. Soc.*, **102**, 2 (1942). Ellison, M. A., *Mon. Not. Roy. Ast. Soc.*, **102**, 11 (1942).

## Flow of Smoke through a Hole in a Resonant Cavity

F. W. Simpson[1] has described an experiment in which a resonant tube with a small hole in its end is excited in an outer atmosphere of smoke, and points out that smoke can be seen streaming in through the hole. This is the reverse of the effect originally noted by Prof. West[2], and was described by Lawson[3]. When West's experiment is performed with a glass tube, smoke can be observed streaming out and fresh air streaming in, apparently continuously.

With a tube closed at one end and of length three-quarters of a wave-length, Simpson has also shown that, when it is filled with smoke and has a small hole at each of the pressure antinodes and at the pressure node, smoke streams out at the antinodes but not at the node during excitation. He has also observed the reverse effect when the smoke is outside the tube. The former experiment is really a simple adaptation of the Rubens tube[4], which provides an excellent lecture experiment for demonstrating the pressure conditions in a resonating tube. In the form shown in this Department for many years, it consists of a long thin-walled brass tube about 2½ in. in diameter, closed at one end and excited at the other by an attached loud-speaker element, operated by an acoustic oscillator of variable frequency. The upper surface of the tube is pierced along its length by a large number of small holes, regularly spaced. When the tube is fed with coal gas at suitable pressure through a side tube and the jets are ignited, they burn uniformly to a height of, say, ½ in. in the quiescent state. On exciting the tube at any resonant frequency, the jets of flame vibrate and increase in length sinusoidally from the pressure nodes to reach their maximum length at the pressure antinodes. The jets are bluer than ordinary gas jets of comparable size, which suggests a local admixture of air with the burning coal gas, as might be expected to occur during the rarefactional phases of the vibration[3].

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[1] *Nature*, **160**, 93 (1947).
[2] *Nature*, **158**, 755 (1946).
[3] *Nature*, **159**, 168 (1947).
[4] Grimsehl's "Lehrbuch der Physik", **1**, 721–2, 6th edit. (Teubner, 1923).