is impossible according to the more stringent version, proposed by Einstein lately[5], of the non-symmetric theory. We might strengthen this argument by saying that, to introduce as a singularity what the field equations definitely disallow where they hold, was a daring enterprise anyhow, justified only by the endeavour to investigate, at the then undeveloped stage of the theory, *all* spherically symmetric solutions.

But what about the electrically charged mass-point? The same paper[2] (§§ 8 and 9) fully discusses this case as well, though it is analytically far more intricate and has only recently found its explicit expression (see Wyman[6]). It is gratifying to find that the only reasonable solution with a radial *electric* field is not only *compatible* with Einstein's recent more stringent version, but, of necessity, complies with it (see equations 30*b* and 23, *l.c.*[2]).

To sum up: the new theory exhibits a pleasing lack of symmetry with regard to electric and magnetic quantities. Even in its most stringent form it admits of electrically charged mass-points, while isolated magnetic poles are well-nigh inadmissible in any form of the theory.

A. Papapetrou

Physical Laboratories,
University, Manchester 13.

E. Schrödinger

Dublin Institute for Advanced Studies,
64–65 Merrion Square,
Dublin.

[1] *Nature*, **167**, 648 (1951).
[2] Papapetrou, A., *Proc. Roy. Irish Acad.*, **51** (A), 163 (1947).
[3] *Sitz. Ber. d. Preuss. Akad.*, 414 (1925).
[4] Schrödinger, E., *Nature*, **153**, 572 (1944); *Proc. Roy. Irish Acad.*, **51** (A), 215 (1948).
[5] "Meaning of Relativity", Appendix II (1950).
[6] *Canad. J. Math.*, **2**, 427 (1950).

Effect of Cross-wind on a Projectile

The usual formula for drift of a projectile due to cross-wind is:

$$z = w\,(t - x/v)\ \text{(ft.)}, \qquad (1)$$

where w is velocity of cross-wind (ft./sec.), t is time of flight (sec.), x is range through air (ft.), v is muzzle velocity relative to the air (ft./sec.). At short times of flight it is not always easy to calculate $(t - x/v)$ with reasonable speed and accuracy.

By integrating the equation of motion along the trajectory

$$mx = -\rho\,(v^2 + w^2)\,v^2 f_R, \qquad (2)$$

where m is mass of projectile (lb.), x is range along the trajectory (ft.), ρ is air density (lb./ft.^{3}), r is radius of projectile (ft.), f_R is drag coefficient, and v, w are as in (1), expanding in series and substituting in (1), we obtain

$$z = 0{\cdot}000067\ wvt^2\,d^2 f_R/m\ \text{(ft.)}. \qquad (3)$$

Equation (3) is easy to use, but is valid at short times of flight only. The result is better at subsonic velocities than at supersonic velocities.

It is hoped that a full account of this will appear elsewhere.

This note is published by permission of the Chief Scientist, Ministry of Supply.

K. Pennycuick

18 Bournville Road,
London, S.E.6.
Feb. 15.

Negative Point-to-Plane Corona—a New Mode of the Discharge

A number of investigators[1,2] in the field of negative point-to-plane corona have reported on the unsteady nature of the discharge at high values of gap voltages. Reference has been made to the movement of the active-spot about the point, and the formation of 'plural spots'. I have found that, with certain gap geometries, a new mode of discharge can be observed.

As the applied voltage is increased, the point discharge passes through an unstable 'switching phase', sometimes with two or more active spots, but quickly settles down to the new mode. This consists of a ring-shaped discharge fitting neatly and symmetrically about the point, almost like a halo. Its structure is similar in appearance to that of the single spot, namely, a miniature glow discharge, with a negative glow of pronounced luminosity, a Faraday dark space, followed by a diffused and flared positive column. As yet I have been unable to achieve sufficient optical resolution to observe the Crookes's dark space.

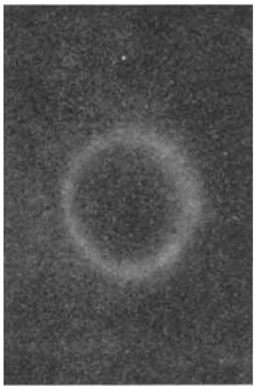

Fig. 1

It is obviously impossible to obtain a direct view on to the tip of the point, the line of vision being obscured by the plane; however, by using a highly polished plane, the image of the point and the discharge, in the plane, may be readily seen with the aid of a suitable optical system. Observations are best carried out in total darkness with a dark-adapted eye.

Fig. 1 shows a photograph of the ring on a 1-mm. diam. steel point, taken in this way; the point-to-plane gap was 10 mm., and the applied voltage and mean current were 10·9 kV., and 65 μamp., respectively. Fig. 2 shows a sketch of the point, drawn to the scale of Fig. 1, for the purpose of comparison.

In its new mode, the pulsating character of the corona persists, but oscillographic measurements

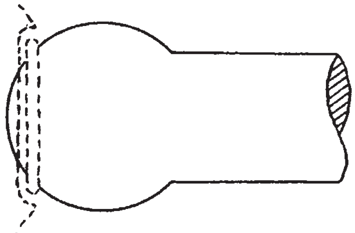

Fig. 2