molecules have orientations similar to the dibenzyl orientation, and the other two can approximately be derived from them by a rotation of 180° about the *a* axis, and a translation of $\frac{1}{2}c$. The resulting structure explains the pseudo-orthorhombic properties, the approximate halvings, and the principal X-ray intensities. It is contrary to a structure previously deduced from magnetic measurements by Krishnan, Guha, and Banerjee, who predicted a twisted and distorted molecule; but it is shown that the new structure is equally capable of explaining the magnetic data. Detailed measurements have not yet been made on tolane and azobenzene, but the preliminary data are sufficient to show that they are both closely similar to the stilbene structure.

The Scattering of Positrons by Electrons with Exchange on Dirac's Theory of the Positron

By H. J. BHABHA, Ph.D., Gonville and Caius College

(*Communicated by R. H. Fowler, F.R.S.—Received October* 20, 1935)

It has been shown by Mott† that exchange effects play a considerable part in the collision and consequent scattering of one electron by another. Mott's original calculation was non-relativistic, and there the exchange effect vanishes when the two electrons have their spins pointing in opposite directions. Møller‡ later developed relativistically invariant expressions for the collision of two charged particles with spin, and it may be seen directly from Møller's general formula for the collision cross-section that, in the collision of two identical particles, the effect of exchange does not in general vanish even when the two colliding particles initially have their spins pointing in opposite directions. It tends however to zero in this case as the relative velocity of the particles becomes small compared to *c*, the velocity of light, in agreement with the calculation of Mott.

The effect of exchange in the general relativistic case will still be considerable if one of the two electrons be initially (and therefore finally) in a state of negative energy. (If one of the electrons be initially in a negative energy state, then it follows from the conservation of energy

† 'Proc. Roy. Soc.,' A, vol. 126, p. 259 (1930).
‡ 'Ann. Physik,' vol. 14, p. 531 (1932).