tained. They, too, recognize that the hope that free institutions can be safeguarded on a secular basis must prove self-defeating, and some at least repudiate a determinist theory of history. If some cannot accept in their entirety the premises and conclusions of Christian thought even as displayed in the Lambeth Report, they may, none the less, be grateful for the evidence it affords of powerful support for many of the policies which they would wish to see pursued. The resolutions of the Conference may well lead to action and to the mobilization of moral and spiritual power behind the measures necessary no less for the furtherance of science than for the preservation of society and its highest cultural and spiritual values.

THE EINSTEIN ENIGMA

Einstein

His Life and Times. By Philipp Frank. Pp. 367. (London : Jonathan Cape, Ltd., 1948.) 16*s*. net.

THOSE who, like the present reviewer, are personally unacquainted with Einstein, will read this book with a shock of surprise. While Dr. Frank's sympathies are all with Einstein, the portrait presented to us is not altogether a pleasant one. We see a man developing early into the traditional type of nineteenth-century 'professor'. He regards himself as free to develop any eccentricity of behaviour, whether those about him like it or not, and to talk shop in season or out of season, a characteristic illustrated (p. 144) by the description of a courtesy visit to a non-mathematical colleague in Berlin, in which, after subjecting his hosts to a forty-minutes discourse on relativity, Einstein left abruptly. This lack of appreciation of the fact that ideas and interests which did not happen to interest him might still be as valuable as those that did may well explain Einstein's difficulties in the Berlin Academy, or his failings as a teacher. Always, apparently, ready to lecture on his researches of the moment or to deliver popular discourses, Einstein was not prepared to teach his students systematically what they had need to learn. An attitude of this kind is not incompatible with a deep concern for abstract causes such as pacificism or Zionism, and his lack of human contacts had one good result : it turned Einstein in the early 1920's from becoming a political leader of the Zionist movement. But there is another side to the picture : an impulsive kindliness made him only too ready to help refugee scholars after 1933, or to aid by correspondence a student in Prague (p. 331), or to instruct in arithmetic, at her own suggestion, a little girl of ten who lived near him in Princeton (p. 356).

Dr. Frank does not, of course, aim at an exposition of relativity theory; but he does describe Einstein's philosophical views in some detail (pp. 259 and 336). Einstein adopts a logical positivist view on the basic theoretical laws of Nature, which are for him free creations of the imagination confirmed by observation. Logically, this should lead to the acceptance of Newtonian mechanics as an equally good alternative to relativistic mechanics when we reflect on the enormous body of observational confirmation the former receive in engineering and astronomy, for example. At the same time, Einstein holds a realist view on electromagnetic and gravitational fields, light, atoms, electrons, etc. They are 'physical realities' and not concepts freely created for the purpose of interpreting observations. Nor is it easy to see how a belief in the rationality—almost the mathematical character—of Nature (p. 340) can be reconciled with his view of the character of scientific law. If Nature is rational, surely its laws are there to be discovered, and not created, by the man of science?

Dr. Frank's account of the times in which Einstein lived is written from the point of view of a Central European who sees Germany and her immediate geographical neighbours as the world-focus of scientific activities. Many quotations illustrate the strange vagaries of the totalitarian mind : in Nazi Germany relativity theory is the expression of Jewish physics, in Russia the theory is at first contrary to and later in accordance with dialectical materialism. Dr. Frank's selection among Einstein's contemporaries of those worthy of mention is very odd indeed. The venomous ideological crank Philipp Lenard, is often referred to and freely quoted; but men who most nearly reached Einstein's intellectual stature and who developed and made known the theory of relativity receive scant attention. Hermann Weyl and de Sitter are not mentioned at all, and the three references to Eddington scarcely do justice to his contributions to the theory. Indeed, Einstein is credited (p. 326) with proving after 1933 that the geodesic principle is deducible from the field equations, though a proof of this theorem is to be found in the "Mathematical Theory of Relativity" written in 1923. Again, from pp. 346–351, we obtain the impression that the atom bomb was due to the scientific and political efforts of Einstein, O. Hahn, L. Meitner, E. Wigner, E. Fermi and L. Szilard. Even if Chadwick and Cockcroft are not worthy of mention, surely some native-born American physicists had a hand in the matter !

G. C. McVittie

THE CAVITY MAGNETRON

Microwave Magnetrons

Edited by George B. Collins. (Massachusetts Institute of Technology; Radiation Laboratory Series, Vol. 6.) Pp. xviii + 806. (New York and London : McGraw-Hill Book Co., Inc., 1948.) 54*s*.

THE origin and excellence of the Radiation Laboratory Series of monographs is now well known, and can need little in the way of introduction to the physicists and engineers on both sides of the Atlantic who took part in the great war-time venture of radar. Without the cavity magnetron it is more than doubtful whether micro-wave radar could have become the decisive weapon it turned out to be. In this sense, therefore, the volume under review is perhaps the most important of the series, providing the central theme without which many of the other volumes could not have been written.

The cavity magnetron as a micro-wave generator of pulsed power of the order of a few kilowatts was taken to the United States by Sir Henry Tizard and Prof. J. D. Cockcroft in May, 1940, in a form entirely suited to manufacture; and this after only a few short months of work by those concerned. This early work, the later use of higher peak voltages and magnetic fields, the introduction of strapping in 1941, and the later achievements of peak powers of 2 or 3 $\times$ 10^6 watts at a frequency of 3 $\times$ 10^9 mc./sec.,