aerial, can sufficiently attenuate the harmonics. Filters play an increasing part in multi-channel microwave systems; Darlington's and Cocci's methods of network synthesis are being successfully applied to designs involving irises and posts in rectangular wave-guides.

The transmission of telephony and television at microwave frequencies could not be successfully undertaken without precision measuring equipment. Group-delay distortion of a frequency-modulated multi-channel telephony system results in inter-modulation products of which little can be tolerated. The distortion introduced by filters, travelling-wave tube amplifiers and other components, over a band-width of 50 Mc./s. centred at about 4,000 Mc./s., can now be displayed on a cathode-ray tube with a sensitivity of 1 cm./mμsec.

Equipment for long-distance radio communication in the 4–30 Mc./s. band is judged in part by its ability to combat the fading and multipath effects characteristic of ionospheric propagation. Because testing in service is slow and inconvenient, a fading machine simulating the natural effects is a great asset. An early machine, producing frequency-selective fading by combining two or three differently delayed signals of constant amplitude, but varying relative phase, has recently been modified so that the differently delayed signals individually fade in a near-random way, more closely simulating field conditions.

NEWS and VIEWS

Nobel Prize in Physics: Prof. Max Born, F.R.S.

PROF. MAX BORN, who has been awarded a share of the Nobel Prize in Physics for 1954, is known for many contributions to modern theoretical physics, particularly to the development of quantum mechanics and to the theory of crystals. The work mentioned specifically in the announcement of the Nobel award is the interpretation of the wave functions as probabilities for the positions of particles, a vital step in the development of the modern view of the relations between particle and wave aspects of atomic theory. This dates from a period when, in collaboration with Heisenberg and others, Born took an important part in the development of quantum mechanics, which form one of the two independent approaches to modern quantum theory. Other important work of that period, which has become classical, includes his use of perturbation theory for scattering problems and the Born–Oppenheimer theory of molecules. The theory of crystal lattices has formed another continuing interest, from the earliest papers which showed the basic ideas of lattice vibrations and their relation to the inter-atomic forces, to several treatises covering all aspects of the theory. Born has also taken an active interest in many other aspects of quantum theory. His effect on theoretical physics should, however, be measured not only by his own papers, numerous as they are, but also by the work of his pupils. His school at Göttingen was for a long time one of the most important centres to which young theoreticians went to find guidance and inspiration and to be infected with that enthusiasm and optimism which characterize Born's own work. The men who worked with him later at Cambridge and Edinburgh also include many who have made their mark on modern physics.

Prof. W. Bothe

PROF. W. BOTHE, of the University of Heidelberg, who shares the 1954 Nobel Prize in Physics with Prof. Born, is known for many important contributions to modern physics. The best known of these include his introduction of coincidence methods into counting techniques and the work in which, together with Geiger, he applied the coincidence method to the Compton effect and showed that the conservation laws are satisfied in each individual event and not merely on the average. This was fundamental for the interpretation of atomic processes. With Kohlhörster he applied coincidence methods to the study of cosmic rays and thus helped to establish the presence of penetrating charged particles. Later, in the course of systematic work on nuclear reactions, he discovered the unusual radiation, emitted by beryllium under α-particle bombardment, which was later identified as neutrons. Other fields in which he did pioneer work include the study of hard γ-rays and the nuclear photo-effect produced by such rays and the problems of multiple scattering of electrons and of neutrons. On problems of scattering he has not only done experimental work of great importance but has also made valuable contributions to the theory.

Nobel Prize for Chemistry: Prof. Linus Pauling, For.Mem.R.S.

THE Nobel Prize for Chemistry for 1954 has been awarded to Prof. Linus Pauling, of the California Institute of Technology. This award will be acclaimed by chemists of all kinds, for Prof. Pauling's contributions have brought about a revolution in the entire field of chemistry. His early work was concerned with the determination of crystal structures by X-ray crystallography, an interest which he has retained; his recent views on the constitution of proteins are based largely on detailed crystallographic analyses of amino-acids and peptides. The study of crystal structure led him to consider the nature of chemical bonds, and already in 1926 he published a remarkable paper on the structures of benzene and its analogues in terms of the Bohr atom. This, however, was soon followed by an impressive series of papers in which the new methods of wave mechanics were applied to chemical problems of all kinds, and in which the resonance theory was developed as a general qualitative approach to such problems. This work led to the recognition of additivity of bond energies and covalent radii in unconjugated molecules (that is, those with a unique classical structure), to the concept of resonance energy and intermediate bond character in conjugated molecules, and to the concept of electronegativity as a factor in determining covalent bond energies. Prof. Pauling's original tables of bond energies, covalent radii and electronegativities are still widely used, and later work has altered them only in detail. Many of these covalent radii were deduced from bond-lengths measured in his laboratory by the newly developed and difficult technique of electron diffraction. In recent years Prof. Pauling has made further notable contributions in fresh fields: a new theory of the metallic state, a theory