correlation is decidedly useful and should be extended. A detailed report will be presented later.

Mr. J. F. Herd[6] has described a synchronized "grid-blocking" transmitter, recently developed by the (English) Radio Research Board for sending the short pulses which are used in echo measurements. This is the circuit which we used in field measurements last summer, and described at the October meeting of the Institute of Radio Engineers in Cambridge. We have no desire to claim priority, or to dispute the usefulness and convenience of the circuit for the "Polar Year" work. However, the inherent frequency-modulation, produced by this simple type of modulated oscillator, renders it unsuitable for extensive use in the crowded channels now encountered in America, and we hope that it will not be generally adopted here. We have prohibited the use of this device in our own laboratory since October, as it is quite possible to use circuits which will produce less interference with other important services.[7] The transmitter should have frequency stability, the pulse length should be readily controllable, and should not be unnecessarily short. A description of our present apparatus will soon be offered for publication.

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April 19, 1933.

[6] J. F. Herd, Proc. Phys. Soc. (London) **45**, 221 (1933).
[7] H. R. Mimno and P. H. Wang, Phys. Rev. **48**, 501A (1933).

Band Spectrum of the H^1H^2 Molecule

The spectrum of the H^1H^2 molecule has been photographed in emission in the first order of a 21 foot grating. The bands of H^1H^2 corresponding the $H\alpha$ bands of H_2 have been measured. The Q branches have been found in considerable intensity in all of the bands measured up to the present time—namely the $0''$–$0'$, $0''$–$1'$, $1''$–$1'$, $1''$–$2'$. The R lines have been identified up to $R=4$ for the $0''$–$0'$ band. The order of intensity Q, R, P is the same as the $H_2{}^{11}$ molecule for the $H\alpha$ bands.

The rotational and vibrational isotopic shifts check the calculated values to within the accuracy of the present preliminary calculations and measurements. RP combinations have been used to check the rotational levels of the $^3\Sigma$ lower state. An electronic isotopic shift of about 2.4 wave numbers has been observed.

More than 300 new lines have been observed in the limited region studied and a more detailed analysis will be carried out. This investigation is preliminary to a study of the nuclear spin of H^2, from an analysis of the H^2H^2 bands, undertaken in collaboration with Professor G. N. Lewis, who has provided the high concentration of hydrogen isotope used in the present work.

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Search by Deflection-Experiments for the Dirac Isolated Magnetic Pole

The recent discovery of a positively charged particle of e/m similar to that of the negative electron, presumably related to the positive electron predicted by Dirac, perhaps justifies calling the attention of other experimentalists briefly to the possibility of detecting the existence of single isolated poles, as predicted by Dirac,[1] by proper deflection-experiments with magnetic or electric fields, most conveniently the former. Simple calculations made by the writer more than a year ago, in connection with Richardson's[2] suggestion of a possible relation of such isolated magnetic poles to phenomena of the penetrating radiation, indicated that with reasonable assumptions as to its mass such a single pole having a kinetic energy even as great as 10^8 electron-volts should have a path of appreciable curvature in an apparatus similar to Anderson's,[3] but this curvature, being at right-angles to that of an electrically charged particle, would not be observable with the camera axis parallel to the magnetic field, even if such a high-speed isolated magnetic pole should be an ionizing particle. No high-energy deflection-experiments reported to date would have detected such a phenomenon, with the possible exception of the recent experiments of Blackett and Occhialini[4] who used stereoscopic cameras.

By Dirac's Eq. (9) the magnetic charge on a one-quantum pole should be $\mu=hc/2e$, where μ is in magnetic units, e in electrostatic units, and h is Planck's constant divided by 2π. The force on such a one-quantum isolated magnetic pole in a magnetic field of one gauss is then 3.28×10^{-8} dyne. This is nearly 70 times the force on an electron in unit electrostatic field, and similarly 70 times the transverse force on an electron of $v\cong c$ moving in a magnetic field of unit strength. If these single poles are contained in the structure of the nucleus, their dimensions must be of the order of nuclear dimensions. They must then be comparable to the electron in size; hence their (potential) energy and rest-mass must be at least as great

[1] P. A. M. Dirac, Proc. Roy. Soc. **A133**, 60–72 (1931).
[2] O. W. Richardson, Nature **128**, 582 (1931).
[3] C. D. Anderson, Phys. Rev. **41**, 405–421 (1932).
[4] P. M. S. Blackett and G. P. S. Occhialini, Proc. Roy. Soc. **A139**, 699–726 (1933).