in the 24-hour Fourier wave than in the waves of shorter period. This implies in the average day a reduction in the difference between day and night.

There is an important difference in Europe between quiet and disturbed days. On quiet days the magnetic changes are much larger in the day than in the night hours; but during large disturbance the night hours are the most active. Large disturbance in Europe is much more common between 4 P.M. and 4 A.M. than between 4 A.M. and 4 P.M.; it is rare near 10 A.M. This difference between night and day is not, however, universal all over the earth. In the Antarctic, from 1911 to 1913, disturbance was much more in evidence during the day than the night hours. The distribution of magnetic disturbance throughout the 24 hours in high northern latitudes still apparently awaits investigation.

Another result of interest is that the regular diurnal variation, whether in years of many or of few sunspots, tends to be larger on disturbed than on quiet days. This seems to imply that in addition to local irregularities in the conductivity of the 'conducting layer,' due presumably to the irregular distribution of the sources of ionisation, there is during magnetic disturbance a decided increase in the average conductivity. This phenomenon is comparatively trifling in southern England, but increases in prominence as we go north. If we may judge from what happened in the Antarctic in 1911 to 1913, it is exceedingly prominent in high magnetic latitudes, at least in years of few sunspots. At Cape Denison, the base station of the Australasian Antarctic Expedition, the range of the regular diurnal variation of H in the midwinter months for an average international magnetic character of 1·05—which implies only very moderate disturbance—was nearly six times the range from the international quiet days. Magnetic disturbance in these high latitudes is much larger and more persistent than in central Europe. This suggests that the natural place to study the relationships between wireless and magnetic phenomena is not the south of England but the north of Scotland, or still more northern regions. There are now magnetic observatories at Lerwick, Sodankylä (Finland), Matochkin Shar (Novaya Zemblya), Godhavn (Western Greenland), Meanook (Canada), and Sitka (Alaska). Wireless observations at two or more of these stations ought to provide in a short time a lot of interesting material.

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The Symmetrical Top in Wave Mechanics.

IN a recent issue of NATURE (Dec. 4, 1926, p. 805) there appeared a letter of Messrs. R. de L. Kronig and I. I. Rabi, in which they gave, on the basis of the new wave mechanics of Schrödinger, an expression for the energy of a symmetrical rotator, *i.e.* a rigid polyatomic molecule having two equal moments of inertia.

A like result has also been obtained by F. Reiche (*Zeit. f. Phys.*, **39**, 444, 1926) using the wave mechanics. Furthermore, under the assumption that the molecule possesses a permanent electric moment along the direction of its figure axis, Reiche derived to first order approximation the addition to the energy expression caused by placing the molecule in an external electric field. Independently of Reiche, also using the wave mechanics, we have carried the calculation to the second order of approximation and have thus been able to compute the dielectric constant. We find for the total energy $W^*_{j,m,n}$ of the molecule in the presence of an electric field of strength F

$$W^*_{j,m,n} = W_{j,n} - \mu F\frac{mn}{j(j+1)} + \frac{(\mu F)^2}{h^2/8\pi^2 A}4(\Phi_{j,m,n} - \Phi_{j+1,m,n}),$$

where $W_{j,n}$ is the energy of the molecule without electric field, as already given by D. M. Dennison (*Phys. Rev.*, **28**, 318, 1926) using the matrix mechanics. μ represents the permanent dipole-moment, A the moment of inertia about an axis perpendicular to the figure axis, and j, m, and n three quantum numbers. The first of these may take all positive integral values not including zero, while the others may take both positive and negative integral values including zero, subject to the restriction that the absolute value of each shall not exceed the value of j. The function $\Phi_{j,m,n}$ is a numerical factor depending only upon the quantum numbers:

$$\Phi_{j,m,n} = \frac{(j^2 - m^2)(j - n^2)}{(2j-1)(2j)^3(2j+1)},$$

$\Phi_{j+1,m,n}$ is the same expression, where only $j+1$ is substituted in place of j.

From the energy expression given above, the dielectric constant of a perfect gas is found to have the following value at high temperatures:

$$1 + \frac{4\pi}{3}\frac{N\mu^2}{KT},$$

where T is the absolute temperature, N the number of molecules per unit volume, and k the Boltzmann constant. This result is in complete agreement with the value of the dielectric constant of such molecules already found by Kronig (*Proc. U.S. Nat. Acad. Sci.*, **12**, 608, 1926) using the matrix mechanics, and it means that at high temperatures the dielectric constant obeys the law of Langevin-Debye. We have found that at usual temperatures the departure from this law cannot exceed a few per cent.

It may be remarked that the second term in the energy expression given above predicts the existence of a Stark effect of the first order in the band spectra of symmetrical molecules, whereas for diatomic molecules an effect only of the second order is to be expected. The separation of the lines in the Stark effect of the first order for symmetrical molecules depends upon the magnitude of the dipole-moment and the field strength, but *not* upon the moments of inertia of the molecule. The intensity of the lines, on the other hand, is dependent upon the moments of inertia. The separation of the lines in the Stark effect of the band spectra of polyatomic molecules, which a simple calculation shows to be of a sufficient magnitude to be measured experimentally, thus provides a means of finding the dipole strength of such molecules. One finds $\Delta\lambda/\lambda \doteq 22 \times 10^{-6}$ with $F = 50{,}000$ volts/cm. and $\mu = 1 \times 10^{-18}$ C.G.S. units.

A detailed paper covering the work outlined here will appear shortly by one of us in the *Physikalische Zeitschrift*.

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The Homologues of the Adrenal or Suprarenal Bodies in Teleostean Fishes.

THE homologues of the adrenal or suprarenal bodies in teleostean fishes have long been the subject of discussion. In 1884, Weldon (*Quart. Jour. Micr. Sci.*, 1884, **24**, 171-182) thought that the adrenals were frequently absent from this group, and that the lymphoid head-kidney took their place in these cases. This theory was refuted by one of us in 1896 (Swale Vincent, *Proc. Birm. Nat. Hist. and Phil. Soc.*, **10**, Part I, 1896). In the meantime it was commonly