as can occur even in a homogeneous Riemann space, whereas matter-electrical phenomena depend on the inhomogeneity of space. This may well have something to do with the absence of spherical symmetry in the spin inseparable from the electron.

So far as the quantities ^sh are concerned, the new auxiliary condition is of the second order. The new Einstein field equations will probably not be of the second order when written in terms of the $g_{\lambda\mu}$'s, but it is not clear that the Weyl equations will escape this criticism. The supplementary condition (1) leaves untouched the work of Wigner, Vallarta, and myself. Thus the Dirac equations may be treated relativistically on the basis of the Einstein 1916 theory.

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Diamagnetism and Crystal Structure.

PROF. EHRENFEST has suggested (*Physica*, vol. 5, p. 388, 1925) that the high diamagnetic susceptibility of bismuth is to be ascribed to the existence in the metallic crystal lattice of electron orbits of large area including several atoms within their radius. There seems good reason to extend Ehrenfest's hypothesis to the case of carbon as well, since it affords an illuminating insight into the magnetic behaviour of the different forms of this element. It is known that graphite possesses a high specific susceptibility, which according to the most recent measurements of Vaidyanathan with carefully purified samples, is $-5{\cdot}1 \times 10^{-6}$, that is, quite ten times larger than the specific susceptibility of diamond ($-0{\cdot}49 \times 10^{-6}$), the latter being practically the same as that of carbon in organic compounds as found from Pascal's additive law. The abnormal susceptibility of graphite becomes intelligible in terms of the peculiar structure of the substance and its electrical conductivity, if we assume that there are electron orbits circulating round the plane hexagonal rings of carbon in the crystal-lattice. This fits in with the known fact (observed by Honda and Owen) that the susceptibility of graphite is six or seven times greater normal to the planes of cleavage than parallel to them. Diamond, on the other hand, being a dielectric would naturally not show the abnormal susceptibility.

Careful studies made by Mr. P. Krishnamurthi of the X-ray pattern of sugar charcoal and lamp-black prove conclusively that these substances do not possess any crystalline structure. The fact that amorphous carbon has the normal susceptibility ($0{\cdot}51 \times 10^{-6}$), and not the high value of graphite, is therefore quite to be expected. The great diminution in the susceptibility of bismuth which occurs on fusion may be regarded as an analogous phenomenon.

Ehrenfest's hypothesis would appear to have also other fruitful applications, for example, in the explanation of the remarkable diminution in the susceptibility of graphite at high temperatures and of the dependence of susceptibility on particle size in colloidal substances. We need not, however, enter into those details here.

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Salt Haze.

I HAVE at intervals during the last few years directed attention to the presence of salt particles in the air and their importance in facilitating the formation of fog, since in the presence of a haze of sea salt condensation would commence upon the particles long before saturation is reached.

On May 27 last I was fortunate enough to observe a salt haze in process of generation. I was on the north bank of the Tagus at about 8 A.M., summer time. It was a bright sunny morning, with a light wind from the north-west, and looking across the river I observed a long stretch of sandy shore extending southward from the mouth of the Tagus. I had a good view along this stretch of shore, and noticed that a well-marked haze commenced along the line of the breakers and was carried seaward by the wind, extending gradually so that it partly obscured the hills in the distance. There was a clearly defined line over the breakers where the haze commenced, and it was obviously formed from the spray. On looking in the opposite direction over the land visibility was good, and practically no haze was to be seen.

Later in the day, that is about 11 A.M., in passing up the coast northward from the Tagus I saw another example of the same thing.

In a small bight or bay of the coast there was a large number of rocks projecting from the water, and these caused a good deal of disturbance and spray due to the waves ; from the surface of this bay a drift of haze was quite visible passing inland. The sun was shining brightly at the time, and in this case, as well as in the first mentioned, the haze was white. In the latter case, doubtless the fine salt particles were carried inland to a considerable distance. It is possible that few of them survive the cool, still night, when the air becomes cooled and condensation on the particles must tend to bring them down.

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Rise and Fall of the Tides.

IN NATURE of April 27, Mr. A. Mallock writes on rise and fall of the tides, and illustrates his views by three specific cases in which a constant amount of energy is continually concentrated into a diminishing mass. To quote briefly : A heavy flexible cord passes through a hole in a fixed horizontal plate. The part below the plate is given an initial oscillation and swings as a pendulum. The cord is then drawn upward through the hole. The part above the plate is stationary, and the energy it contained is transferred to the part still hanging free, the mass of which continually decreases. Hence the velocity of oscillation tends to become infinite when the length vanishes.

Surely in this case it has been overlooked that as the cord is pulled up work is being done against the centrifugal acceleration, so that the kinetic energy of the moving portion is not constant, but is continually increasing ?

The case is analogous to that of a conical pendulum formed by a bob at the end of a string ; if the string be shortened by any means the kinetic energy of the system is increased. The same principle occurs in two common forms of human activity ; the child swinging rhythmically raises his centre of gravity while his angular velocity is great and lowers it while it is small ; the skater, moving over the ice by what is known as the Dutch roll, progresses by a series of alternating curves, never lifting his skates from the ice. He rhythmically raises his centre of gravity while going round the curve (*i.e.* shortens the conical pendulum), and lowers it while reversing the curvature of his path. By this means he steadily puts energy into the moving system, without its being obvious to the non-skater how he is doing it.

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