

However, the theorem of the center of gravity may be of a special nature and be restricted to certain groups of effects in which no moving forces occur in the ether, as this is in fact the case with the usually observed ponderomotor effects is actually the case. Under all circumstances this point is to be kept in mind for the further theoretical education especially in the eye.

After we have discussed the two theoretical constellations, we will take a look at the attempts to make, which have been carried out so far. The main experiments, that relate to our question are the following:

A. Experiments with positive results.

1. the aberration of the light of the fixed stars. The aberration found a simple explanation by the emission hypothesis of light. The difficulties in the undulation theory have been removed only very recently by H. A. Lorentz by the assumption of resting ether.

2 The Doppler principle is by its nature of general kinematic importance. of general kinematic importance, it must be taken into account in the question of the question of moving or resting ether. be taken into account.

8 The experiment of Fizeau and its repetition by Michelson and Morley. A ray of light passing through flowing water in the direction of the movements, experiences an acceleration of the passage in the ratio $1 + v \left(1 - \frac{1}{n}\right)$, where v is the velocity, n the refractive index of the water denote. This result finds its complete explanation in the assumption of resting ether its complete explanation.

1. the attempt of Arago, whether by the movement of the the refraction of the light coming from the fixed stars. light coming from the fixed stars.

2. the interference experiment of Ketteler.

Through two tubes filled with water and inclined against each other, the two beams of an interferential refractor are sent through two tubes in such a way that one of the beams passes one tube after the first reflection (at the one glass plate), the other beam the second tube after the second reflection (from the other glass plate), i.e. in the opposite direction. Despite the fact that both tubes are carried along by the movement of the earth no change of the interference fringes can be seen, although one beam is accelerated, the other one is decelerated, Both results follow directly from the assumption resting ether.

3 The experiment of Klinkerfues, whether the absorption line of the sodium vapor is influenced by the motion of the earth.

The positive result of Klinkerfues would be inconsistent with the theory of resting ether. But the found shift is so small that observation errors are not excluded.

4) The experiment of Des Coudres, whether the induction-effect of two wire coils on a third one is influenced by the fact that the direction of the induction of each roll once in the direction of the earth's the direction of the earth movement, then in the direction of the right.

H. A. Lorentz has verified that this influence with resting ether only from the square of the relation of the velocity of the earth to the velocity of light is not observable, because by the earth movement an electrostatic charge is generated on the conductors, which cancels the first order effect.

5. the experiments of Lodge, in order to investigate, in how far to what extent the movement of heavy or magnetizable the surrounding ether is entrained by the movement of heavy or magnetizable masses.

6. the experiments of Zehnder to find out whether the ether is carried away by the movement of a piston in an air-diluted space. is moved.

The experiments of both observers were performed with sensitive interference methods. interference methods and gave negative results, thus agreeing with

result, thus agreeing with the assumption of resting ether.
without further ado.

7) The experiments of Mascart on the rotation of the plane of polarization plane in quartz. There was no change in the of the rotation, if the light beams once followed the direction of the of the earth's movement, then the opposite.

H. A. Lorentz has given the theory of this phenomenon. and finds that under the assumption of resting ether the earth's earth movement once changes the existing rotation and still independently adds a second one.

The negative result of Mascart's observations would show would show that in quartz these two rotations are caused by the influence of the rotations caused by the influence of the earth's movement just cancel cancel each other out.

8. the attempt of Roentgen, whether by the movement of the earth the motion of the earth from a charged condenser. forces are generated.

The negative result of this experiment is not compatible with the assumption of a resting resting ether.

Also electric charges and magnets would have to produce magnetic magnetic forces by the movement of the earth.

by the movement of the earth. The absence of these forces would also be

The absence of these forces would also not be compatible with the assumption of resting ether.

9 Fizeau's experiment on the influence of the earth's movement on the on the rotation of the plane of polarization by glass- columns. The positive result of this experiment is recently doubted. doubted

been doubted.

It would

with the assumption

dormant

ether according to the investigations of H. A. Lorentz.

be compatible.

10. the experiment of Michelson and Morley. If the ether is at rest, then the time, which a ray of light needs to go back and forth between two glass plates must change, if

the plates move.

The change

depends on

depends on the magnitude v^2/c^2 , but should be observable when using inter-

should be observable with the application of interferences.

The negative result is incompatible with the assumption' of resting ether is incompatible. This assumption can only be by the hypothesis that the length dimensions of solid bodies are bodies are changed by the movement through the resting aether through the resting ether are changed in the same proportion to the to compensate the lengthening of the path of the light ray. The assumption of moving ether would give the possibility possibility that the ether is carried along by the motion of the earth and and rests relative to it. This would explain all negative experimental results would be explained. There would remain then but the explanation of the aberration would remain.

Gravity and inertia.

The fact that gravitation takes an exceptional position and has no noticeable relations to the other natural phenomena. has often been emphasized. Their

Attribution

to pressure forces

is supported by the fact

er-

that the energy reserve of a gravitating system is system has its greatest value at infinite distance of the individual has its greatest value. However, it is not always clearly enough emphasized that the acceleration of heavy masses is most likely is most probably connected with gravitation, because through acceleration and by gravitation two independent definitions of mass are independent definitions of the mass are obtained, which, as far as the very the here very exact observations reach, agree completely.

agree.

If one demands a further explanation of the gravitation, then it would have to account at the same time for the fact that give,

why

expenditure of work

to accelerate

heavier

masses is necessary. The fact that the two definitions of mass should then come out as a consequence of this explanation. explanation.

Whether such a theory has to be based on the aether, cannot be asserted with certainty, but it is with certainty, but it is probable.

It must be emphasized here, however, that it is not at all certain is by no means certain whether a traceability of all effects to tensions in the can be traced back to tensions in the ether, just as "8 it remains doubtful whether the processes in the aether can be represented by the can be represented completely satisfactorily by the laws of can be represented completely satisfactorily.

If we now summarize the results, the impression is that there are still a number of questions to be settled before we can decide which way to go for science. the path to be taken by science.

The assumption of mobile ether without inertia leads, inertia leads, as we have seen, to less probable consequences. consequences.

As an experiment, which would be of importance for this assumption, the experiment is the experiment, which would be important for this assumption.

by the movement of reflecting transparent media.

by the movement of reflecting transparent media.

But since the ether is set in motion by the movement of solid bodies by the motion of solid bodies, so far known, so a negative result is a negative result is probable.

The assumption of completely resting ether is opposed by the following difficulties:

1. violation of the theorem of the center of gravity (concerning the equality of action and counteraction).
2. the negative results of the experiments of Michelson and Morley, that of Roentgen and possibly the attempts of Mascart and Fize. attempts of Mascart and Fizeau.

It would therefore be urgently desirable to to repeat or to carry out the following experiments.

1) Does the motion of the earth affect the rotation of the polarization plane

a) of naturally rotating substances,

b) by glass columns.

2. does the earth movement cause by the movement of electrical charges the magnetic forces demanded by the theory and by the movement of magnets the corresponding electric forces?

When the results of these experiments are completely clear will be shown whether the otherwise so simple theory of resting of resting ether is to be retained or abandoned. Should it has to be abandoned, then, as it seems to me, only the way out given by Des Coudres would remain; namely influence of gravitation on the light ether.

This

assumption seems to me tantamount to the presupposition of a low of a small inert mass of the light ether.

It would then become clear that the earth due to its significant

gravity

pulls the ether

drags along,

while

the

movement of small solid bodies on the earth has no influence'.

has. The negative result of the mentioned experiments would be explained explained without further ado.

Then, however, the difficulties in the explanation of the would remain in the explanation of the aberration, to which H. A. Lorentz has pointed out.

Whether the same

can not be overcome, if the co-movement of the ether under

of the ether under the influence of gravitation is taken into account.

is taken into account,

requires a special

investigation.

For this

the hydrodynamic problem would have to be solved, to determine the

of a fluid through which a point moves with constant velocity

point moves with a constant velocity, which is the

individual parts of the fluid according to Newton's law.

attracts.

The Maxwellian stresses which would set the ether in motion:

would set the ether in motion,

are always, because they move with the reciprocal speed of light.

speed of light

with the reciprocal velocity of light, are so small that the

movements

also

at

very

low

inert

mass

in

all.

In general, the effects become imperceptible.

It would then be the task of the theory to search for such examples where the movement of the ether could actually be observed.

could be observed.