

Berlin-Grunewald, 14 February 12

Most esteemed Doctor,

I would rather answer your valued letter (along with the postscript) of the 11th right away today than wait until at some point I have somewhat more time at my disposal to do so. However, I have to ask you in exchange to make do with a little, which should nonetheless be enough to characterize my position in relation to your question. Naturally, I can only give you my personal opinion, and indeed my current one. To err is always human.

First and above all, I have to emphasize that the assumption  $c = \textit{constant}$  is absolutely incompatible with the new Abraham theory, and that all consequences to be drawn from this assumption have no binding value within the framework of this theory. The transformation formulas  $x' = \gamma(x - \beta ct)$ , . . . of the usual theory of relativity therefore also have no general significance in the Abraham theory. They contradict invariance (with respect to “Lorentz transformation”) of degree and of degree  $\Phi$ , which is postulated in the Abraham theory. The place of those transformation

formulas, therefore, must be taken by other, more general ones, perhaps  $dx' = \gamma(dx - \beta c dt)$ , . . . From a general perspective, therefore, Abraham's conclusions cannot be maintained in connection with the elementary law of gravitation.

However, this does not exclude the possibility that, especially in the case of slow movements and in weak fields,  $c$  can be considered as constant to a high degree of approximation, and consequently that many conclusions of the usual theory of relativity appear as approximate theorems of the new theory. This must nevertheless be specially investigated in every case. Perhaps the results

obtained by Abraham can then also be upheld in this approximated sense. Little can be said about this in advance. If I have understood Abraham correctly, this is also his opinion with regard to the significance of his elementary law of gravitation.

Now, permit me in addition to express my sincere sympathy for the great loss you have suffered in the death of your mother. What a comfort that you were able to be with her even in her last moments, and that your father has recovered somewhat from his severe spiritual and bodily depression!

With the best of greetings, from my family as well, your most devoted

M. Planck