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"BOLSHEVIKI OF SCIENCE" WHO FOLLOW EINSTEIN

THE conclusions of Einstein are radical enough in all conscience; but he has disciples who appear to be trying to outdo him. These gentry are called by Sir Oliver Lodge "enthusiasts whose propositions complicate the universe unduly," and he queries whether "they ought not to be regarded as Bolsheviki and pulled up." In a communication to the British Association, Sir Oliver bids his readers note that what he is criticizing is not the equations of Einstein, which, he says, "seem to have justified themselves by results," but what he calls "popular relativity," which depends on some of the modes of interpreting it in ordinary language. In other words, the go-betweens who are endeavoring to explain the Einstein theory to the ordinary reader, and to "put it into simple language," have gone far to justify its author's original statement to the effect that not more than twelve living men could understand it. Sir Oliver is quite sure that they have made it mean things that can not possibly be true. Says *Nature* (London) in an abstract of his paper:

"Especially do I attack that proposition which asserts that to every observer the velocity of light will not only be constant in reality, but will also superficially appear constant even when he ignores his own motion through the light-conveying medium—a proposition or postulate or axiom which has been shown to lead to curious and, as I think, illegitimate complications, threatening to land physicists in regions to which they have no right of entry, and tempting them to interfere with metaphysical abstractions beyond their proper ken.

"Not that a physicist's proper ken is limited to what he immediately observes; he is entitled, and indeed required, to interpret appearances rationally by taking into account every relevant adventitious circumstance, including complications due to his own unobserved, and perhaps unobservable, travel through space.

"In a relative discussion at the Physical Society recently a member is reported to have asked the pertinent question, 'Does an observer merely observe, or does he think as well?' If he thinks, I urge that he can allow for changes in his measuring instruments and any other consequences of possible motion, and can refrain from making deductions about space and time on the strength of experiments on matter.

"He will know that his senses are material senses, and that all his experiments are made ultimately by their aid. He will know that he can only experiment even on the ether of space indirectly by means of matter, for he has no other means of getting a grip on it. Possibly he may be unable to grip it even thus, but matter gives him his only chance; he certainly can not experiment on abstractions like space and time.

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"Every student who accepts the ether of space as a reality is probably ready to admit that the velocity of light through free ether is an absolute constant, not dependent on anything that either the observer or the source is doing, has done, or may do.

"But this admission has been erected into a fetish by the theory of relativity, at least when expressed in ordinary words, and is interpreted as requiring that to every observer, whatever he may be doing, the velocity of light in every direction will appear the same.

"That is not only a different, it is a contradictory, proposition. Given the constancy of the real velocity of light—if an observer travel to meet it, it must appear to arrive more quickly than if he travel away from it, provided he has any means of making the observation at all. He may be unable to make the observation, but suppose he can make it, say, by the aid of Jupiter's satellites, and detected a discrepancy, he need not infer any real change in the velocity of light; because, if he thinks, he can attribute any observed difference to his own motion, and thereby emerge with clear and simple views. If he sets out with the gratuitous notion that he can never become aware of his own motion, or that his own motion has no meaning, he will indeed encounter a puzzling universe.

"But it may well be extremely difficult for an observer to measure the velocity of light through the ether except with the aid of some return signal which the ether likewise has to transmit in the opposite direction; and in that case he may find that the to-and-fro pair of journeys take exactly the same time in every direction. This, as every one knows, has been done for a to-and-fro journey of a beam of light.

"A mathematical doctrine of relativity may be based upon this experimental result, and may be convenient for reasoning purposes, but no such doctrine is required by the facts. The facts are patient of the doctrine; they do not compel it, nor do they justify it. Why, then, proceed to build up on an equation an elaborate metaphysical structure? And, especially, why imagine that the success of the Einstein equation proves the observed velocity of light to be the same whatever the motion of the observer? If the observer thinks he will know that such a proposition is not true, he will know that the velocity of light is not equal in all directions in a relatively drifting medium.

"The uniformity of the ether makes the obtaining of positive results difficult; there seem to be always compensations. Some day we may be able to evade this experimental difficulty, but meanwhile, if we choose to make the supposition that motion of the observer can never have any directly observable effect, or that one set of axes of reference is necessarily equivalent to every other and indistinguishable by any kind of superficial observation, then we seem to be in accord with present

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experience. From that supposition definite consequences can, with adequate skill, be deduced, and the deductions have been subjected to successful verification.

"But if on the strength of that remarkable achievement some enthusiasts proceed to formulate propositions which by ignoring the motion of the observer and all its consequences complicate the rest of the universe unduly, then, however much we may admire their skill and ability, I ask whether they ought not to be regarded as Bolsheviki and pulled up."

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