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MR. EINSTEIN LECTURES

BY MAURICE SAMUEL

One expected him as a voluminously bearded Jew, with a vast forehead, bright, sparkling eyes, and a certain obscurity of manner; for this, according to the conventions of the light literature which moulds our views, is the successful Continental professor from anywhere east of the Rhine. Instead, there walked on to the crowded platform a rather tired-looking schoolmaster in middle age, clean-shaven but for a moustache, and indifferently dressed. An easel and blackboard had been arranged on the platform. The professor picked up a piece of chalk from the table and began to talk in an unenthusiastic voice. Not once during the course of the lecture did he make use of either the chalk or the blackboard. I believe they were provided by a sensible committee to put him at his ease.

The vast Concert Hall was crowded. A week before the date of the lecture I had ransacked Vienna for a ticket to Professor Einstein's lecture on the 'Relativitäts-theorie,' and though the lecture hall was to be the large Concert Hall, with a capacity of nearly three thousand, neither love nor money could procure me a ticket. In the end, I obtained a place through the courtesy of an Inter-Allied Commission — a box seat close to the platform, so that I could watch the audience, and then hear the lecturer without difficulty.

The opening remarks of the professor were a disappointment. He seemed to deliver them with an indifference begot partly of familiarity with his subject, and partly of contempt for his audience. Then, as he advanced into the argument, himself exhibiting only the mildest interest in it, a change came over us. We were aware, to our astonishment, of a sudden capacity for thought; we were actually able to understand him; we were following him through bewildering intricacies, and masters of ourselves — firm in our sanity. We began to forget ourselves.

'I strike my hand twice against the table,' said the professor, 'one, two. What is your description of these phenomena? You are inclined to say that two knocks, at different moments, have been delivered on the same spot. Is this true? You are aware, of course, that this room, placed as it is on the earth, is moving through space; firstly, because the world is turning on its own axis; then, because the world is revolving round the sun; and then, because the solar system is itself moving through space. It was, therefore, wrong to have said that two knocks were delivered on the same spot at two different times. The sameness of the spot was only relative to the room in which we were placed. And if we wanted the spot to remain the same in an absolute sense, we should have to annihilate the sense of time — that is, the two knocks would have to take place simultaneously.'

This is perfectly clear; is this Einstein the Incomprehensible? He continues:

'You, therefore, see that identity of place is only possible when the sense of time is absolutely annihilated, and that

place is only relative to time. But the converse is equally true; that is to say, there is no time-sameness except when the factor of space ceases to exist.'

An exhilarating illusion of clarity comes over us. We understand the professor even before he explains. He continues:

'The simultaneity of two events is purely relative. For instance, supposing that at two points, equidistant from you, two flashes of light were to become simultaneously visible. You would be inclined to say that since light travels with a uniform speed, and the two points were equidistant from you, the outbreaks of light occurred simultaneously. But were you and were the two points of light stationary from the moment of the outbreaks of light, until the moment of the arrival of the light at your eyes? Of course not, for the very earth is not stationary. And your motion with the earth necessarily affected the relativity of the speed of the light to yourself. You were going toward one light and away from the other, and therefore one light came faster toward you, and the other more slowly. Hence, what you saw simultaneously did not occur simultaneously.'

We become almost delirious with the joy of perfect understanding. The professor continues:

'If, on the other hand, the bodies which emitted the light, and yourself, remained relatively unchanged in position during the experiment, that is, none of you moved relatively to the others, would you still be justified in saying that the outbreaks of light occurred simultaneously? I mean, for instance, if the lights were fixed on the earth, and, therefore, moved through space with you. No, not even then. For all three bodies are then moving through space. You are aware that light moves with a certain fixed velocity. What is that velocity relative to? To the ether. Light radiates from a luminous point with equal velocity in all directions, but with equal velocity, — not away from the luminous point, for that itself may be in motion,— but with equal velocity in relation to a fixed point in the ether. If, therefore, the luminous body is itself moving through space, the light which is traveling in the same direction as the luminous point itself is only leaving that luminous point at a velocity equal to the velocity of light, minus the velocity of the luminous point.

'We have taken the hypothesis that the observer is stationary relative to the luminous points in our experiment. He is, therefore, moving in the same direction as they. Now, we have seen that the light traveling from a moving luminous point in the same direction as the point, moves away from that point more slowly than the light traveling away in the opposite direction. It will, therefore, take that light longer to reach the observer if he is in front of the moving point of light, than if he is behind.

'I will make myself clearer. Supposing there is a luminous point in space which is traveling with the same absolute velocity as light. It is clear that those rays of light which travel in the same direction as the luminous point will never leave the luminous point, for the luminous point will always be catching up with them. Suppose an observer to be in front of the luminous point of light, and suppose he is stationary, relative to the point of light; that is, he is moving in the same direction, with the same velocity. Then, as the rays of light never leave the luminous point in that direction, they will never reach the observer. If, however, the common velocity of the luminous point and of the observer diminishes, the light will steadily leave