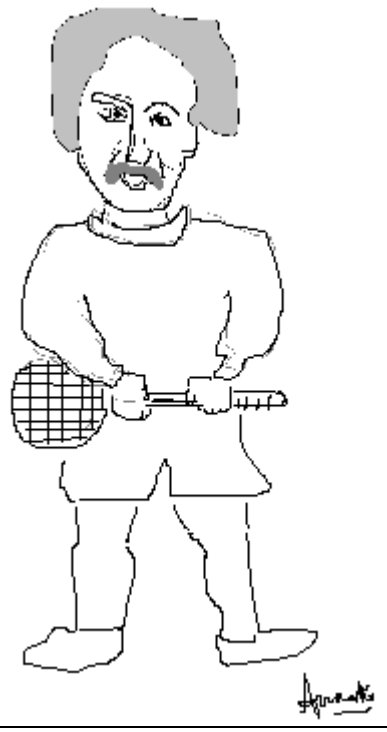
Match – point, Einstein!



Scientists at Duke University, USA have laid at rest a suggestion that speeds higher than that of light may be possible, says **S.Ananthanarayanan**.

The celebrated Theory of Relativity was born because scientists found that the speed of light stayed constant even when the source and point of reception were moving in relation to each other. If we were moving in a car at 120 kmph, for instance, and were to throw a ball at 80 kmph from the car, the ball would move at 200 kmph or at 40 kmph, depending on which way we threw the ball. But if we detected a light beam from a moving source, the light would come to us at the same speed, regardless of the motion of the source.

Nature's speed limit.

Einstein resolved the contradiction by reformulating our ideas of space, time and mass. In the Special Theory of Relativity, lengths and time interval contract when measured from moving platforms and speeds also do not add up in the usual way, but in such a way that the total never reaches the speed of light.

These effects become perceptible only at speeds nearing that of light and at these speeds they have been exactly verified. But in ordinary experience the effects are negligible and our usual ideas are good enough approximations.

Reversing Cause and Effect

Because the time of occurrence of an event depends on where it takes place and the motion of the observer, different observers would see the same thing happening at different times. If the positions and speeds were right, even the order of events could be reversed. It can be shown that

this is possible only so long as a light signal from the first event could not have reached the second event before it took place.

But if a signal could move at speeds greater than light, then this would not necessarily hold, the sequence of cause and effect could be reversed and our ideas of right and wrong would go topsy-turvy.

Contradictory evidence?

A few years ago, Lijun Wang and others at Princeton and Anedio Ranfagni and Co. at Florence reported that they had got a blob of light to move a short distance at what looked like many times its usual speed! It was generally agreed that it was not really an entity capable of carrying information that had be moved faster than the limit, but the entire scientific community could not just dismiss what had been done.

When a group of light waves, of different frequencies (ie, colours) move together, there are points at which all the waves would be ‘in step’ and add up to a ‘large wave’, like happens sometimes on the beach. The place where this ‘packet’ forms would then move forward, depending on the difference frequencies, and not at the speed of the waves themselves.

It was such a ‘light packet’ that the two groups of researchers had moved through a cell faster than light. It was seen as being like shining a torch on the moon and then swinging the torch across. The lighted spot could move faster than light, but there is nothing moving in fact!

Storm clouds recede

The work of Michael Stenner, Daniel Gauthier and Mark Neifeld at Duke University, North Carolina, has now formally shown that even if information were coded into the ‘wave packet’, which moved faster than light, the delays that nature imposes on decoding that information makes sure that the light waves actually reach before the information in the ‘packet’ becomes available.