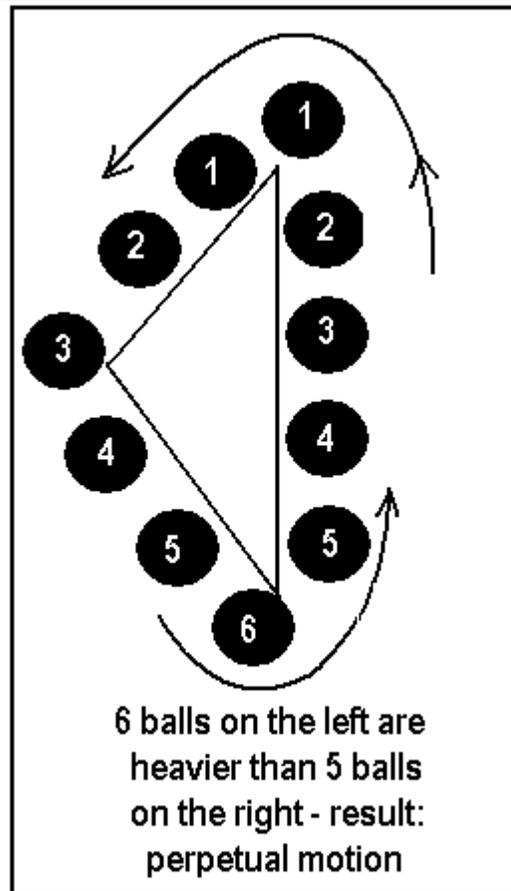


Einstein weathers attack

Knocking Albert Einstein down from his perch is still some way off, says S.Ananthanaryanan.

Attempts to prove Einstein wrong have begun to look like the perpetual motion machines that people tried to design in the 16th and 17th centuries. This is not to say that a change in the speed of light can never be found, but claims that something has moved faster than light in vacuum are consistently proving to be not incorrect, if not bogus. Another such claim has just been made by 2 physicists, Günter Nimtz and Alfons Stahlhofen of the University of Koblenz in Germany.

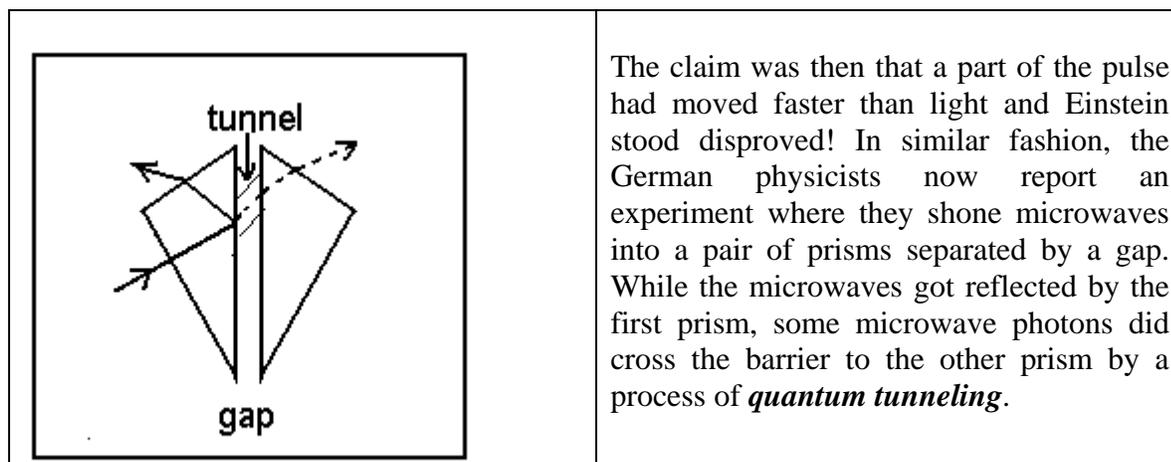


Speed of light

The cornerstone of the Theory of Relativity is an *experimental* discovery that the speed of light does not change when the source and target are moving with respect to each other. In everyday experience, if we are in a car moving at 100 kmph and we throw out a stone at 10 kmph, we expect the stone to hit something at 110 kmph. Or 90 kmph if we threw it backwards. But it seems it does not work like this with light. If a star moving at 100,00,000 km per sec emitted light in the forward direction, the light would reach a detector not at 400,00,000 kmphs but at 300.00.000 kmphs. What Einstein did was to rework the laws of dynamics so that this was the way speeds added when speeds were high, like with the star, and still were like everyday experience when speeds were low, like with the car. But the offshoot of this new way of thinking was that when things moved faster, time itself got slow, measuring rods grew small and things became more massive. So much so that it was impossible to reach the speed of light, leave alone surpass it!

Claims staked

Back in 2000, Lijun Wang of NEC Research Instt, Princeton and Anedio Ranfagni & Co at the Italian National Research Centre, Florence, claimed that they had got a pulse of light to pass through a small chamber filled with atoms of elemental cesium. A pulse of light can be considered to have two different speeds - one for the individual light waves in the pulse and another for the way the waves add up, as a group. Oddly, when a pulse enters a gas cavity, some waves can travel backward for miniscule amounts of time, creating a sort of "tail" behind forward-moving waves. A light wave and its tail could thus leave the gas cavity at different times, creating the effect that the light beam has left the cavity before it entered!

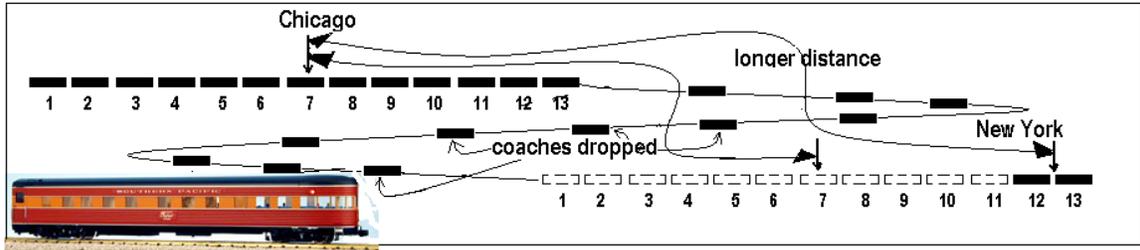


In the physics of very small dimensions, particles do not have well defined positions and there is some probability of a particle being found on the other side of a barrier. A significant thing is that the particle does not 'go' there, it was already there! Quantum tunneling across the gap, then, appears to happen *instantly*, which violates Einstein!

Resolution

An explanation for the claim of Wang and others was that it was a mathematical entity that changed position faster than light, not any material thing. The main point was that the possibility of transfer of information faster than light had not been demonstrated.

In the current claim, Aephraim Steinberg, a quantum optics expert at the University of Toronto, Canada explains that what has been done is like measuring the speed of a train from Chicago to New York. The rules are that the speed is measured with reference to the center of the train, but the train drops one coach every 100 kms. Over the distance of 1145 kms, the train would drop 11 coaches. The centre of the train would thus move some 880 feet ahead and appear to move faster than the train! We can easily see that the point being taken as the final centre was ahead even at the start and did not move faster at all.



To put it differently, the position of the photon is uncertain to the extent of the dimensions of the gap. The starting point for the photon at the gap is thus uncertain to that extent and speeds depending on that uncertainty cannot be relied upon.

Einstein can rest easy that something wrong with what he said has still not been found.