Special Theory of relativity & Break down of Classical Physics:

The Einstein in 1905 proposed the fundamental postulates of Special theory of relativity

The postulates can be stated as follows:

1- It is physically impossible to detect the uniform motion of a frame of reference from observation made entirely within that frame.

- The postulate is quite clear in itself we can explain it further to emphasize its meaning. It means that any experiment gives precisely the same result whether it is performed in reference frame (Rf)-1 or in reference frame-2 (Rf-2) or whether it is performed in a stationary or in a moving vehicle as long as there is no acceleration.

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If we are given some Physical law like $F_1 = m_1 a_1$ Newton's 2nd law of motion which is valid in RF-1 there exists an identical law $f_2 = m_2 a_2$ which is valid in RF-2

Infact There must exists a transformation that renders (shows) all the laws of nature are identical in RF-1 & RF-2.

2- The Speed of light is independent of sources and is constant in all frames.

Break down of Classical Laws:

Example-1 : Particle velocities never exceeds "c":

The usual expression for $K.E = \frac{1}{2} m v^2$ in Classical mechanics, of mass 'm' of an object moving with velocity 'v', can not be correct in relativistic frame of reference as the velocity of the particle does not increase indefinitely as its energy increases. Instead velocity approaches

asymptotically (A curve & a line that are closer but do not intersect), the velocity of light $c = 3 \times 10^8$ m/sec.

Example 2: The addition of velocities!

In classical vector addition which is applied in Galilean frame of reference. e.g if a passenger walks with velocity 'v' toward the front of a train that itself moves forward towards the passenger with velocity V. then his velocity with respect to the ground is simply vector sum $v+V$. But this simple addition of velocities is found to be incorrect at relativistic velocities i.e near the speed of light rather resulting velocity found always smaller than $v+V$ & never exceeds "c".

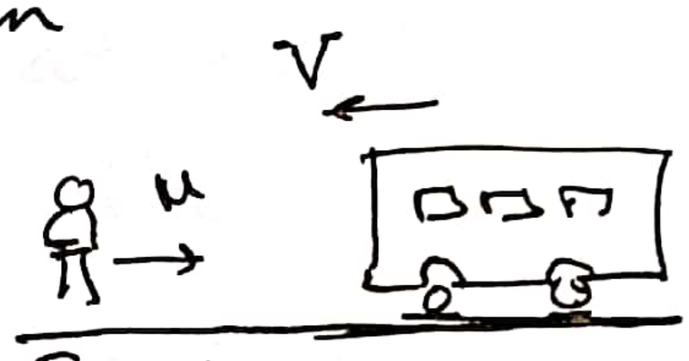

Fig-1

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Example 3: Time Dilation:

The Galilean assumes that the time 't' as measured in the moving train is the same as that measured on the ground, if the observers have identical synchronized clocks. This also found experimentally in correct at relativistic velocities the time is dilated.

The Galilean transformation failed to explain the electromagnetic fields phenomenon in the propagating EM-wave.
