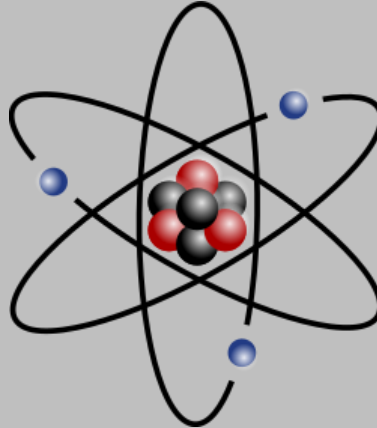




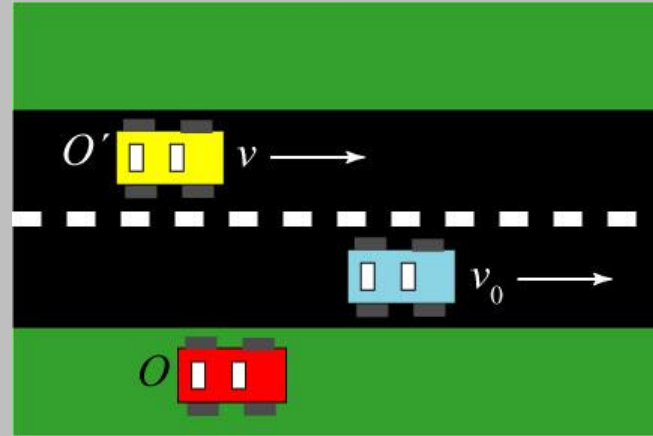
International House Tashkent
Subject: Physics
Department: ES, Course 1
Lesson 6. Galilei's principle of relativity



Galilean Principle of Relativity

Any two observers moving at constant speed and direction with respect to one another will obtain the same results for all mechanical experiments.

-Galileo Galilei



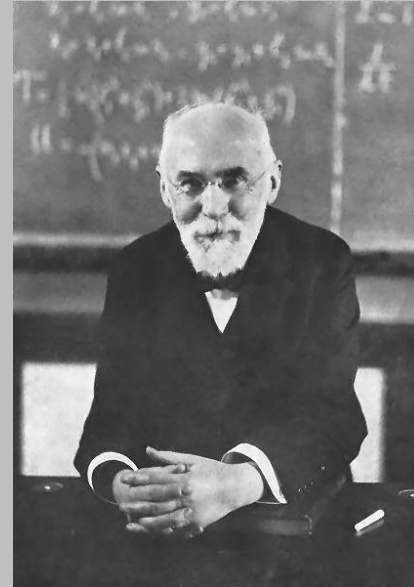
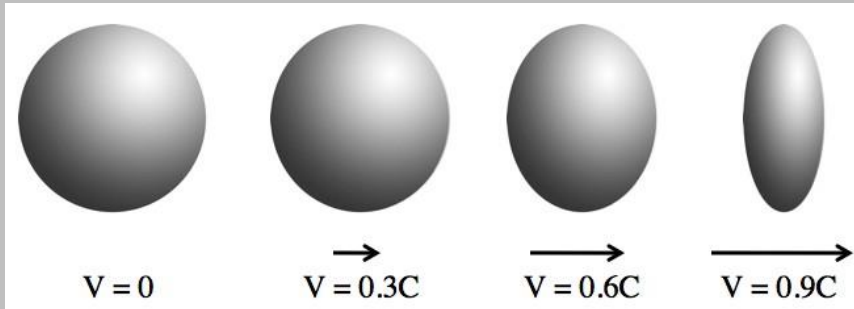


Postulates of Special Relativity

- **The Principle of Relativity** – The laws by which the states of physical systems undergo change are not affected, whether these changes of state be referred to the one or the other of two systems in uniform translatory motion relative to each other.
- **The Principle of Invariant Light Speed** – "... light is always propagated in empty space with a definite velocity [speed] c which is independent of the state of motion of the emitting body." (from the preface). That is, light in vacuum propagates with the speed c (a fixed constant, independent of direction) in at least one system of inertial coordinates (the "stationary system"), regardless of the state of motion of the light source.

Lorentz Contraction

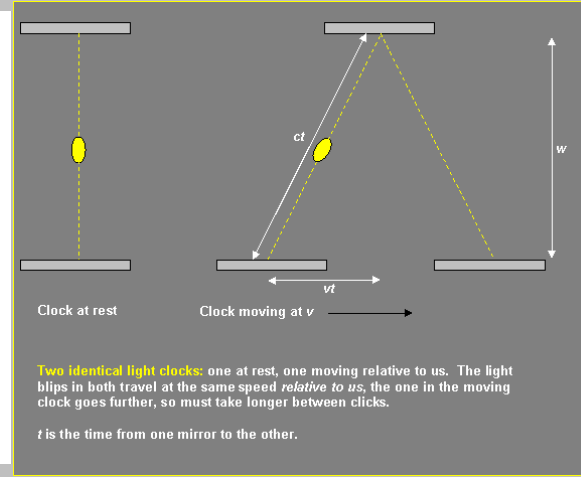
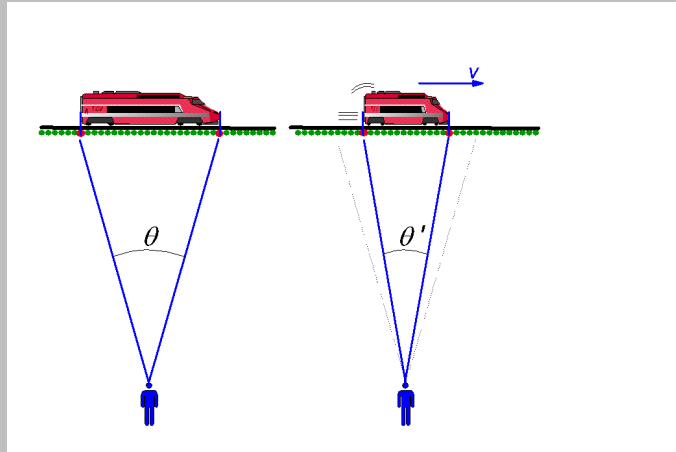
- Einstein used the mathematical tools generated by Hendrik Lorentz in his 1905 paper on special relativity.
- Lorentz maintained that the ether must exist.



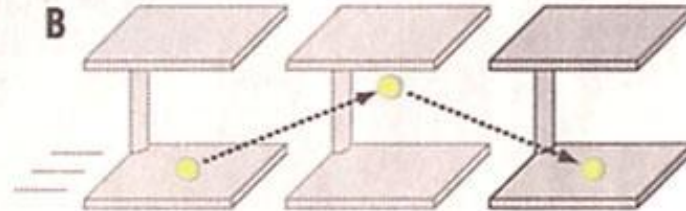
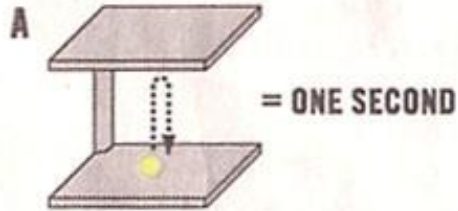
Hendrik Antoon Lorentz,
(1853-1928) Netherlands

Consequences of the Postulates of Relativity

- Time and distance are measured differently in different inertial frames.
- Time is dilated and lengths are contracted in the direction of motion.
- Thus, between two different inertial frames, measurements of time and distance are relative.



HOW DOES MOTION SLOW THE PASSAGE OF TIME?



A hypothetical clock consists of two parallel mirrors with a photon (a ball of light) that bounces between them (A). If the mirrors are the right distance apart, the photon will complete the round-trip journey in one second. However, if the clock is moving (B), the photon travels on a diagonal path – a longer distance – and hence (since the speed of light is constant) takes longer to bounce between the mirrors. From our perspective, each second on the moving clock is thus longer than on the stationary clock.

- A theory about gravity in space time
- Published in 1916
- Principle of equivalence

