

## **First Law of Motion in Cyclic Time**

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Every high school student knows Newton's first law of motion, which states that every body continues in a state of rest or uniform rectilinear motion, unless acted upon by an external force. This law was actually initially formulated by Galileo - Newton's original contribution lay in formulation of the second and third laws of motion. Second law states that acceleration of a body is inversely proportional to its mass and directly proportional to the applied force. While the third law states that action and reaction are equal and opposite and act on different bodies. These three laws form the basis of classical physics, based upon which other developments, of classical mechanics, celestial mechanics, statistical mechanics, have occurred. However, as shown below, this law leads to problems and conflicts when applied in conjunction with spiritual philosophy system of Brahma Kumaris World Spiritual University, which proclaims that events repeat in identical cycle every 5000 years. Cyclic of events requires that all particles return to their original position at the end of time cycle, where as Galileo-Newton first law of motion would suggest that particles would continue to move in a straight line, and therefore at the end of time cycle, would be at a large distance from their initial starting point. How do we resolve this conflict? Clearly discussion is only for particles which don't collide or interact with other particles, through out the time cycle, and thus are in preview of first law, which considers motion without forces.

Lets consider how the first law of motion should be modified, when the universe is repeating itself in identical cycles. Clearly, if time is cyclic, all particles should resume their original position, after completion of the time cycle. In the formulation of first law of motion, given above, this is not possible in a straight forward manner, and additional constraints are required. For example, if the universe is a higher dimensional sphere (hyper-sphere), with circumference such that, in a single time cycle, light particles (photons) are able to travel around the universe and return to their starting point, then at least light particles, have resumed their original position at the end of time cycle. However, particles traveling slower than light will require a longer time period to complete their circle of universe, and therefore will not be at their original position when the time cycle is completed. In a cosmological model with cyclic time, additional constraint has to be imposed on free motion of particles.

Since, incorporation of non-Euclidean geometry in physics, with advent of general theory of relativity, propounded by Einstein, concept of free motion of particles has been gradually redefined. If the space itself is curved, then straight lines do not exist. For example, on a plain, a stream of water can flow in a straight line. However, if the stream is on a mountain, it takes a curved path - the path of least resistance or obstruction. This is the concept of geodesic. The curved path taken by a stream of water on a mountain is an example of geodesic motion. Thus what we require in cyclic time, is closure of all geodesics, i.e., closure of all particle paths in a single time cycle. What this means is, no matter what path a particle takes, it should return to its starting point in a single time cycle. Thus a re-formulation of first law of motion, when no forces are acting on the particle, is as follows

Natural particle paths are circles whose radii are directly proportional to particle's velocity.

Interestingly, ancient Greeks believed, that natural particle paths were circles, rather than the Galileo-Newtonian straight lines. Their conclusion was based upon the apparent daily rotation of heavenly bodies around the stationary earth based on belief in Aristotelian cosmology. However, the Greek first law of motion was based upon the 24 hour cycle of day and night. In contrast, our new first law of motion is based upon identical repetition of events in a 5000 year cycle also called as Brahma's day and Brahma's night, in spiritual philosophy system of Brahma Kumaris.