

Second Law of Motion in Cyclic Time

First law of motion in cyclic time states that inertial motion of particles is on a velocity dependent circle. The law has a statistical character, in the sense, that if one has an ensemble of particles, their future path lies on a torus, and exact path is not specified. It should be interesting to see, if this can be linked up with probability concept of quantum mechanics. However, what happens when the particles are interacting, colliding with each other? How is recurrence being ensured in presence of collisions, and forces, which modify geodesic motion defined in first law, which would otherwise ensure recurrence? This is purview of second law - motion in presence of forces.

It is clear, that where as some particles may interact, only a few times (such as weakly interacting neutrinos), other may interact many times (such as strongly interacting hadrons). There may be exceptional particles, which may not interact at all, due to sheer chance. Therefore, what is required is a simple rule, which will ensure recurrence, of initial position, velocity and acceleration of the particle, irrespective of how much it has interacted. This is possible by defining a second law of motion as follows -

Disturbance of original pure motion of particle, induces a metric force on the particle, which is proportional to inverse powers of remanant time in the time cycle, and leads to restoration of the original configuration in a violent manner.

What the law means is that motion of a particle after a collision is not the simple circular inertial motion defined in first law, rather, it is an accelerated motion which will restore its original position, velocity, acceleration etc., at the end of time cycle. The source of this acceleration, is attributed to the space-time metric which will define recurrence geodesic of the particle. Recurrence geodesic means, a geodesic, along which the particle's motion will lead to restoration of original configuration. Thus, the metric (defining recurrence geodesic) as experienced by a particle, will depend upon its past history, and critically on its initial configuration, at the start of time cycle.

This disturbance of original pure motion due to interactions can be regarded as the natural mechanical entropy, which increases through out the time cycle. This mechanical entropy is reduced to original level, during the final violent movement of the particles, when the restoring metric pseudo-force becomes unopposable by all other interactions. This final motion will be experienced as destruction, by sentient creatures. Thus in this second law, destruction, entropy increase, as well as entropy restoration, all are inbuilt. Entropy need not be introduced as an empirical idea in thermodynamics, which keeps increasing, but follows naturally from second law. Second law of thermodynamics (increasing entropy) thus is inbuilt within second law of motion.

One guiding principle in this exercise of developing physics in cyclic time, is that as the size of time cycle tends to infinity, time assumes a linear character, and hence the laws, should assume a form, they have in linear time. This idea can be regarded as the correspondence principle between cyclic time, and linear time. That this happens in first law is clear, as the size of time cycle increases, size of velocity dependent circles also increases, and when time cycle size tends to infinity, the circles tend to become straight lines. Further, all the distinct possible circles, merge into a single straight line, in the limit. The law thus loses its statistical character in linear time. This suggests that the reason for poor understanding of foundation of use of probability in quantum mechanics could be because, it has been based on linear time. Even Newtonian mechanics in cyclic time is having a statistical character. A reformulation of quantum mechanics in cyclic time should be interesting.

That this new second law of motion in cyclic time leads to conventional linear time second law, as the time period tends to infinity is also clear. As size of time cycle tends to infinity, restoring, metric pseudo-force will always be zero, hence subsequent motion of a particle after an interaction, will be the conventional inertial (straight line). Entropy will also keep on increasing, - there never will be a moment of entropy reduction. This new formulation also has a statistical character, in the sense, that there will exist a whole class of recurrence geodesics. It is likely, that proper development of this idea, would lead to cessation of distinction between Newtonian mechanics and quantum mechanics. Foundations of quantum mechanics therefore need to be re-examined in cyclic time.