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Clock Desynchronization Conflict in Special Relativity

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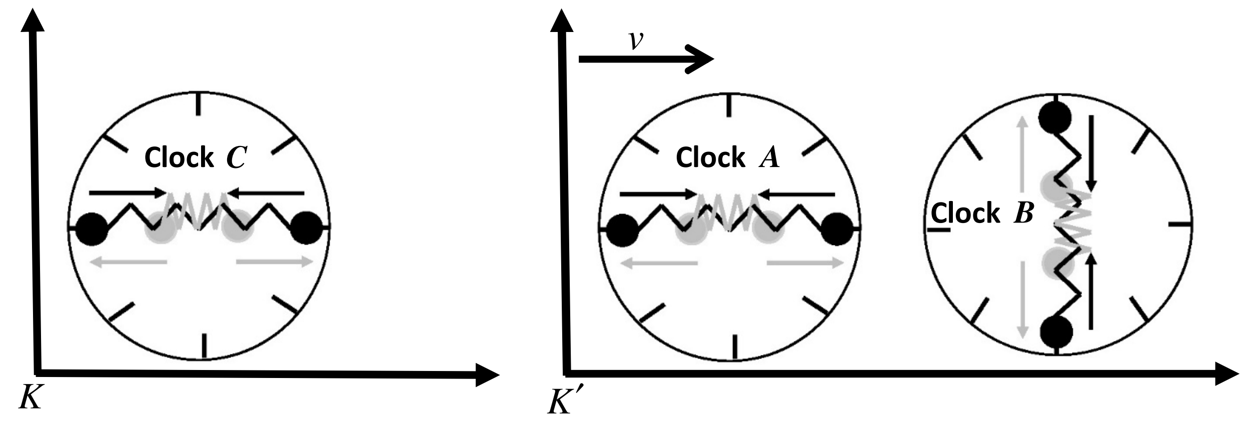

Clocks A, B and C are identical clocks that keep the time by using the period of an oscillating spring. Clocks A and B are fixed in the "traveling" inertial frame K'. They are placed such that the oscillating spring of clock A is oriented parallel to the relative motion direction, while the spring of clock B is oriented in the transverse direction. Clock C is fixed in the "stationary" inertial frame K.

Let's assume at the instant of time $t = t' = 0$, the two frames were superimposed, and at that instant the three clocks were synchronized.

Clocks A and B will formally measure the elapsed time in K', while clock C will equally measure the elapsed time in K.

According to Special Relativity, with the passing of time, clock C will progressively lose its synchronization with clocks A and B, since the latter clocks will run slower than the former, relative to the "stationary" frame K.

Clocks A and B have identical springs with respect to K', so according to the laws of physics, they will keep the same time in K'; i.e., they will run at the same rate with respect to the "traveling" frame.

On the other hand, the springs of clocks A and B will have different physical dimensions with respect to K, according to the Special Relativity length contraction. Therefore, according to the laws of physics, they cannot run at the same rate with respect to K.

The paradoxical question to be raised now is to which "traveling" clock, A or B, should the "stationary" clock C, placed in the "stationary" frame K, be compared with in order to relate the time in the two relatively moving frames K and K'? In other words, if an observer in K is "tracking" clock A and comparing its reading to clock C, he or she will draw a different conclusion as to the time relation between the two frames from that drawn by tracking clock B, since the two clocks A and B are not ticking at the same rate relative to the "stationary" observer.

This inconsistency creates a real dilemma reflecting a critical incoherence in the Special Relativity predictions. What we can conclude here is that the dependence of the length contraction—in Special Relativity—on the relative motion direction induces as well a time transformation dependence on that direction, and hence resulting in conflicting time measurements between relatively moving frames. This is in contradiction with the Special Relativity prediction of the time dilation independently of the relative motion direction.