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The motion of gyroscopes and spinning particles on closed timelike curves.

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In General Relativity, time travel is associated with the existence of closed timelike curves. Such trajectories model the history of point particles, and so in this description, the body travelling into its own past is devoid of any structure. In order to begin the process of describing time-travelling extended bodies, we consider the motion of gyroscopes and spinning particles along closed timelike curves. We argue that such motion generically involves contradictions that are enforced by the laws of physics - as expressed in the equations of motion of these bodies. This presents a challenge to Novikov's self-consistency principle of time travel.

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