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Revisiting timelike geodesics in the Schwarzschild spacetime: general expressions in terms of Weierstrass elliptic functions

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The theory of Schwarzschild timelike geodesics is revisited. Based on Weierstrass and Biermann's result, a formula describing all non radial, timelike trajectories in terms of Weierstrass elliptic functions is derived. A single formula works for an entire geodesic trajectory, even if it passes through turning points. Additionally, with this formula's help, expressions for the proper and coordinate time along the geodesic are derived.

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