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Is the choice of the center of mass of a spinning extended body just a gauge?

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In this talk we discuss the issue whether the center of the mass of a spinning extended test body moving in a black hole background is just a gauge. The discussion is in the framework of the Mathisson-Papapetrou-Dixon equations, for which a spin supplementary condition is used in order to fix the center of the mass. To get the answer we employ novel and in principle analytical methods of finding circular equatorial orbits of spinning extended bodies around a black hole for different spin supplementary conditions.

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