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Light ray as charge distinguisher of black holes in nonlinear electrodynamics

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It is well-known fact that a light ray does not follow the null geodesics of spacetime in nonlinear electrodynamics, instead it follows the null geodesics of so-called effective spacetime. Moreover, in general relativity coupled to the nonlinear electrodynamics the spacetime cannot possess both electric and magnetic charges at the same time. By combining these two phenomena, we aim to discover possibility whether it is possible to distinguish the type of charge of the spacetime, via the motion of light ray in it. The results show that if the spacetime is solution of general relativity coupled to the nonlinear electrodynamics, one cannot distinguish its type of charge (magnetic or electric) through the motion of light ray around it.

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