



Exploring the motion of photons in spacetimes sourced by nonlinear electrodynamics

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Within nonlinear electrodynamics, photons follow null geodesics of an effective geometry, which is different from the geometry of the spacetime itself. We explore some effects of the effective geometry on the background of the Irina Dymnikova regular black hole solution, which is a static and spherically symmetric spacetime with a nonlinear electrodynamics source. We show how a static observer in the Irina Dymnikova spacetime perceives the motion of photons in the effective geometry. We also present a new interpretation for the motion of photons in the effective geometry: It can be seen as a non-geodesic curve subjected to a four-force term from the perspective of an observer in standard geometry.

Key-words: nonlinear electrodynamics, regular black holes, null geodesics.