

Trajectory of Light ray due to a charged body via Optical Medium Approach

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The gravitational deflection of light ray is an important prediction of general theory of relativity. In this paper we have developed an analytical expression of the deflection of light ray without any weak field approximation due to a charged gravitating body represented by Reissner-Nordström (RN) and Janis-Newman-Winicour (JNW) space-time geometry, using material medium approach. It is concluded that although both the geometries represent the charged, non-rotating, spherically symmetric gravitating body, the effect of charge on the gravitational deflection is just opposite to each other. The gravitational deflection decreases with charge in the RN geometry and increases with charge in the JNW geometry. The calculations obtained here are compared with other methods done by different authors. The formalism is applied to an arbitrarily selected gravitating body, as a test case and compared with the standard Schwarzschild geometry for comparison purposes.

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