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Gravitational lensing by a black hole in Poincaré gauge theory

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One of the consequences of Einstein's general theory of relativity is bending of light as it passes through a gravitational field. Examining the path of light in a very strong gravitational field of a black hole can provide a huge amount of information about the geometry and characteristics of the surrounding space.
On the other hand, the path of light rays, extent, and shape of gravitational lensing, are directly related to the type of background geometry in which light is emitted. Since the theory of general relativity in very high energies and very strong gravitational fields is expected to be corrected, researchers have been looking at the phenomenon of gravitational lensing in the context of alternative theories for general relativity to find out the needed corrections for the results of general relativity and these corrections are likely to be more significant in a very strong gravitational field of a black hole.
Among the various theories that have been proposed for correcting the gravity in high energies, gauge theories of gravity have great importance. One of the important results of these theories is changing the geometry for the background in general relativity, Riemannian space-time, to a non-Riemannian geometry in which, in addition to curvature, there is also torsion. In these theories, the presence of torsion coupled to spin of a matter can affect the path of light rays and correct the results of gravitational lensing.
In this work, we want to study the effects of non-Riemannian geometry on the gravitational lensing of a black hole, and in particular the effects of torsion and spin in this context.

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