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Abstract:	Spacetime geometries corresponding to various Black hole solutions are known in Gen- eral Relativity. The corresponding time-like and light-like geodesics in such Black hole spacetimes have been extensively studied and various predictions have been made regard- ing observable quantities related to photon orbits. One such observable property that is now part of current research is Black hole shadows. It is well known that there is an intricate relationship between a Black hole shadow, light-rings and photon region for Kerr Black hole. In this thesis we have dealt with the generalized axis-symmetric stationary spacetime and worked to generalize and extend the methodology from current theorems and literature re- garding the existence of light rings around such Black holes to the existence of photon region. Our method does not assume the separation of action to solve for the photon region as done in the case of Kerr black holes. Since the photon region is where the spherical geodesics exist, its existence thus points to the existence of black hole shadow.
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