Title:	Trajectories of particles around lower dimensional rotating and non-rotating black holes
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Abstract:	According to Einstein's Theory of General Relativity, gravity bends space- time and objects follow this curved geometry. If a particle or object comes in the gravitation field of given mass source, it gets attracted because mass source bends spacetime and object follows the structure of spacetime. This is all happening due to the potential field generated by the mass source. So curvature can be thought of as the force field. Black holes are objects whose potential field is so high that classically nothing can escape. Therefore it is essential to get the region for which we are accessible to get all information about the particle and below which we do not have access to the physics of the particle. In simple words, a horizon is a region which separates two regions by a null boundary. In this thesis, first, we studied possible trajectories of a particle around a given mass source in Newtonian theory, and then we find the correction to this theory. We apply this general theory of relativity to Schwarzschild and BTZ black hole and find the trajectories of massive and massless particles. All in all, the aim is to look at potential field produced by black holes. We also go through the general mathematical structure of identifying horizon and describe the physics of lightcones in different coordinate systems to make sure that the physics is well defined on the horizon. At last, we focused on the null trajectories around black hole geometry in the presence and absence of cosmological constant. We obtain the location of photon sphere, the position of photons at which it exhibits circular motion.
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