

SYMPOSIUM ON NEW TECHNOLOGIES FOR FUTURE SPACE ASTRONOMY MISSIONS (A7)
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BLACKHOLE DETECTION TECHNIQUES USING SPACE BASED OBSERVATIONAL SYSTEMS IN
HIGH EARTH ORBIT

Abstract

This paper focuses on the various proposed methods for the detection of black holes using space based detectors and sensors. The Black holes are invisible objects of high mass density and can be only detected by the effects that they can produce on the surrounding environment. In order for us to detect these black holes from space based instruments, we need to first understand the physical phenomenon which can lead to their possible detection. We discuss the processes in detail as well as the techniques that can be employed in order to measure these effects. If a Black hole is present in space, it acts as a source of X-rays. The strong gravitational force of the black hole would attract dust particles from the surroundings. The in falling material would get heated up due to friction and emit X-rays. However, since the X-rays cannot penetrate our atmosphere, we have to use satellites to observe these X-ray sources in the sky. In particular, we can use X-ray detectors on nano-satellites in polar orbits around earth and measure the X-ray flux from observed sources and then match the data with the visible spectrum. Another manner of detecting a black hole is by focusing on the binary systems with invisible companions, and by measuring the X-ray fluxes coming from those directions. At this stage, it is possible to employ the space based X-ray detectors and look for the X-ray flux. Strong Gamma ray bursts have also been seen to be associated with such binary systems, in which the process occurring is such that the accretion belt around the black hole gets unstable and collapses onto the black hole, releasing a huge amount of energy in the form of Gamma Rays. One more technique that can be used is the lensing effect that is produced by a black hole that comes in the path of a star and the earth. Such a conjecture would focus the light of the star on earth to make the star appear brighter and the black hole would be indirectly implied by its lensing effect. The first two methods discussed above require X-ray and gamma ray detectors based in space to perform the desired search. We plan to analyze appropriate range instruments to detect these X-rays and gamma rays associated with the mentioned cosmic events. This paper focuses on the aerospace detection part of black holes.