

Gravitational waves emitted by the orbit of a massive object around a Boson Star

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The future mission LISA will observe gravitational waves in a frequency range going from 10^{-4} to 10^{-1} Hz through three satellites orbiting in a heliocentric orbit. It is expected that this mission will detect the orbit of solar mass star orbiting around the compact object at the center of the Milky Way, Sagittarius A. *Depending on the orbit and the star's mass, the gravitational waves emitted by such a system should be observable by LISA, frequency and amplitude-wise. This might help the community in confirming or denying the nature of Sgr A as a supermassive Black Hole.* In this project, we worked under the assumption that Sgr A is a supermassive Boson Star with no interaction to matter apart from gravity. Using the GYOTO code, written by the LESIA in collaboration with the LUTH, we have computed the timelike geodesics around the compact object considering a numerically solved metric around a boson star of mass equivalent to Sgr A. Then, with the quadruple formula in the case of an EMRI, we have generated the form of the gravitational waves emitted by numerous orbits and analysed them in order to try and find waveform unique to EMRI's orbits around a Boson Star.

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