Impact of magnetism on gravitational waves emitted by compact galactic binaries

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The LISA mission will observe gravitational waves from space in the bandwidth from 0.1 mHz to 1 Hz. Within this frequency window it is expected that LISA will detect a superposition of gravitational waves signals coming from tens of thousands of compact galactic binaries. The complete success of the LISA mission will depend on how accurate the processing of this foreground noise will be. Among all the galactic binaries, there are the "*verification binaries*" which are known from electromagnetic observations and are already identified as certified gravitational waves sources for LISA. These binaries will serve for calibrating the sensitivity of the detector. Therefore, an error in the modelling of verification binaries can potentially affect the determination of other extra-galactic sources observed by LISA. Currently, the data processing assumes that galactic binaries are quasi-monochromatic sources of gravitational waves which corresponds to the assumption that the binary systems are in inspiral circular orbits. However, the galactic binaries comprise white dwarfs and neutron stars, which both exhibit complex internal processes and also really intense magnetic fields. Internal physics and magnetism can thus change the quasi-monochromatic picture of the gravitational waves detected by LISA and hence biased the calibration of the detector. In this work, we investigate the impact of magnetism on gravitational waves emitted by galactic binaries in quasi-circular orbits. We describe how a non-null eccentricity perturbs the quasi-monochromatic approximation and then, how the presence of magnetism can be looked for in the future observations of LISA.