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Investigating the detectability of galactic double white dwarfs and confusion noise for the micro-Hz gravitational wave missions

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A large number of galactic binary systems emit gravitational waves (GW) continuously with frequencies below ~ 10 mHz. The LISA mission could identify tens of thousands of binaries over years of observation and will be subject to the confusion noise around 1 mHz yielded by the unresolved sources. Beyond LISA, there are several missions have been proposed to observe GWs in the sub-mHz range where the galactic foreground is expected to be overwhelming the instrumental noises. In this talk, we report our investigation on the detectability of sub-mHz GW missions to detect the galactic double white dwarf (DWD) binaries and evaluate the confusion noise produced by the undistinguished DWDs. This confusion noise could also be viewed as a stochastic GW foreground and be effectively observed in the sub-mHz band. The parameter determinations for the modeled foreground are examined by employing different detector sensitivities and population models. By assuming the determined foregrounds could be subtracted from the data, we evaluate the residuals which are expected to have power spectral densities two orders of magnitude lower than the originals data.

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