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Arm locking performance for the new LISA design[1] SOURATH GHOSH, JOSEP SANJUAN, GUIDO MUELLER, University of Florida — LISA is a future space-based gravitational wave (GW) detector which will detect GW in the low frequency regime (0.1 mHz to 1 Hz). The sources in this regime are: supermassive binary black hole mergers, extreme mass ratio binary inspirals and galactic compact binaries.LISA's interferometer signals will be dominated by laser frequency noise which has to be cancelled by about 7 orders of magnitude using an algorithm called time delay interferometry (TDI). TDI has been expanded to also subtract differential clock noise between the ultra-stable oscillators on each spacecraft. It is currently being studied if apparent length changes caused by spacecraft jitter also have to be subtracted via TDI. For the classical LISA mission, arm locking had been proposed to reduce the laser frequency noise by a few orders of magnitude to reduce the potential risks associated with TDI and its expansion. McKenzie et al. 2009 calculated the expected performance of arm locking for the original LISA mission with 5 Gm arm length taking into account clock noise, residual spacecraft motion and shot noise. We updated this calculation and will present the expected residual laser frequency noise for the new LISA mission with 2.5Gm arm lengths, the currently assumed clock noise, spacecraft motion and shot noise.

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