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The path to a gravitational-wave detector in space

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Following the selection of the Gravitational Universe for the third large mission (L3) by ESA and NASAs interest in partnering with ESA, we are now about a dozen years away from the earliest possible launch of the first space-based observatory. The idea of such an observatory was first formulated about a dozen years after Gertsenshtein and Pustovoit in the USSR and later Weber and Weiss in the US voiced their ideas of using laser interferometer for ground-based gravitational wave observatories. The design of the L3 mission will likely follow the LISA design which was developed from the late 1990s until the original LISA project was terminated in 2011. The revised LISA mission will detect many mergers between massive and super-massive black holes out to large redshifts, will detect solar mass black holes years before they produce merger signals in ground-based observatories, will measure the distribution of compact galactic binaries and test general relativity in the strong relativistic regime with large signal to noise ratio. I will review the scientific motivation for LISA, present its status, and discuss the next steps towards its realization.