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LISA: Observing the Universe with Gravitational Waves from Space

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LISA (Laser Interferometer Space Antenna) is the future large mission by the European Space Agency aimed at observing the Universe with gravitational waves. It was approved in 2017 following the success of the technological demonstrator LISA Pathfinder and the detection of gravitational waves by ground-based observatories LIGO-Virgo. LISA has nearly completed its detailed definition phase (phase B1) and will be formally adopted in January 2024 to commence the full building phase. It is scheduled for launch in 2035 and will operate for a minimum of 4.5 years starting from 2037. LISA will observe a wide range of Gravitational Wave sources, including SuperMassive Black Hole Binaries up to very high redshift, Extreme and Intermediate Mass Ratio Inspirals, Stellar Mass Black Hole Binaries, Galactic Binaries, Stochastic Gravitational Wave Background from the early Universe, and various foregrounds. It is expected to have a huge scientific impact in Astrophysics, Fundamental Physics and Cosmology. In this talk, we will first present the mission, the instrument, the data analysis, the planning and the organisation of LISA. We will then review the gravitational wave sources in the milliHertz band and discuss LISA's observation capabilities for these sources. Finally, we will conclude by highlighting the scientific objectives of the mission.

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