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LISA Pathfinder: First steps to observing gravitational waves from space PAUL MCNAMARA, European Space Agency, LISA PATHFINDER COLLABORATION — With the first direct detection of gravitational waves a little over a year ago, the gravitational window to the Universe has been opened. The gravitational wave spectrum spans many orders of magnitude in frequency, with several of the most interesting astronomical sources emitting gravitational waves at frequencies only observable from space The European Space Agency (ESA) has been active in the field of space-borne gravitational wave detection for many years, and in 2013 selected the Gravitational Universe as the science theme for the third large class mission in the Cosmic Vision science programme. In addition, ESA took the step of developing the LISA Pathfinder mission to demonstrate the critical technologies required for a future mission. The goal of the LISA Pathfinder mission is to place a test body in free fall such that any external forces (acceleration) are reduced to levels lower than those expected from the passage of a gravitational wave LISA Pathfinder was launched on the 3rd December 2015 from the European Spaceport in Kourou, French Guiana. After a series of 6 apogee raising manoeuvres, the satellite left earth orbit, and travelled to its final science orbit around the first Sun-Earth Lagrange point (L1). Following a relatively short commissioning phase, science operations began on 1st March 2016. In the following 3 months over 100 experiments and over 1500hours of noise measurements have been performed, demonstrating that the observation of gravitational waves from space can be realised.

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