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The LISA Pathfinder: Results and Implications for LISA

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The LISA Pathfinder (LPF) is a technology demonstration space mission for the Laser Interferometer Space Antenna (LISA), a proposed future space-based observatory for gravitational waves in the milli-Hertz band. Launched in December of 2015, and beginning operations this past March, LPF has already published exceptional preliminary results, fully proving the sensitivity of the gravitational reference measurement technology required for a gravitational-wave space observatory. The LPF mission placed two test masses into drag-free flight and measured the relative acceleration between them to a few a femto-meters per second per second in the sensitive frequency band, over measurement periods of days to weeks, validating a number of critical technologies for any LISA-like gravitational wave observatory. These technologies include the sensing and control of the test masses, drag-free control laws, microNewton thrusters, and picometer-level laser metrology. The LPF mission was led and built by ESA and European member institutions, with NASA contributions. Although the formal partnership between NASA and ESA to pursue LISA was dissolved in 2011, ESA has selected the Gravitational Universe theme for its third Large-class mission (L3), to be fulfilled by a space-borne gravitational wave observatory, and NASA has expressed interest in participating. Any such mission will take advantage of the significant technology achievements already made by LPF. This talk presents preliminary results, current status, and future plans for the LISA Pathfinder mission.

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