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LISA Pathfinder as a micrometeorite instrument JAMES THORPE, NASA/GSFC — The Solar System contains a population of dust and small particles originating from asteroids, comets, and other bodies. These particles have been studied using a number of techniques ranging from in-situ satellite detectors to analysis of lunar microcraters to ground-based observations of zodiacal light. We describe an approach for using the LISA Pathfinder [LPF] mission as an instrument to detect and characterize the dynamics of dust particles in the vicinity of Earth-Sun L1. Launched on Dec. 3rd, 2015, LPF is a dedicated technology demonstrator mission that will validate several key technologies for a future space-based gravitational-wave observatory. The primary science instrument aboard LPF is a precision accelerometer which we show will be capable of sensing discrete momentum impulses as small as 4 10-8 N s. We then estimate the rate of such impulses resulting from impacts of micrometeoroids based on standard models of the micrometeoroid environment in the inner solar system. We find that LPF may detect dozens to hundreds of individual events corresponding to impacts of particles with masses ¿ 10-9 g during LPFs roughly six-month science operations phase.

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