Abstract Submitted
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Investigations on a LISA Telescope Spacer[1] AARON SPECTOR, JOSEP SANJUAN, ALIX PRESTON — The Laser Interferometer Space Antenna (LISA) is a space-based mission designed to observe gravitational waves from 0.1 mHz to 1 Hz. Using a triangular constellation of three spacecraft separated by $5x10^6$ km, LISA will be able to detect the length changes between the spacecraft induced by gravitational waves. These length changes can be detected with pm/rtHz sensitivity using laser interferometry. Each spacecraft must contain two telescopes that can transmit and receive light between spacecraft. To expand and collimate the beam, a two-mirror system was designed with a primary and secondary mirror separated by a spacer. The noise requirements for LISA demand that the telescope spacer must be extremely stable. Two designs, on-axis and off-axis, are being considered for the telescope spacer. Various materials are also being examined. An on-axis silicon carbide telescope test structure was built to assess the stability of this configuration. A Michelson Interferometer was used to monitor length changes of the test structure while being cooled to space-like temperatures. Stability measurements are currently being made by locking the telescope laser to a cavity mounted on the test structure and then the beat note between the telescope laser and another cavity-locked laser is observed. A beat note between another laser locked to the Doppler-free spectral lines of iodine and the telescope laser will be used to determine the long term stability of the test structure.

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