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Telescope Spacer Design Investigations¹ DANILA KORYTOV, JOSEP SANJUAN, GUIDO MUELLER, University of Florida, JEFFREY LIVAS, ALIX PRESTON, PETAR ARSENOVIC, NASA Goddard Space Flight Center, RU-VEN SPANNAGEL, Institut fur Optische Systeme, UNIVERSITY OF FLORIDA COLLABORATION, NASA GODDARD SPACE FLIGHT CENTER COLLABO-RATION — Space-based interferometric gravitational wave observatories will measure changes in the distance between free falling proof masses inside widely separated spacecraft with pm sensitivity. These observatories will use fast telescopes to exchange laser beams. These telescopes are part of the probed optical distances and any length change in the gravitational wave band between secondary and primary can limit the sensitivity of the observatories. Furthermore, the large distance between and space constrains on the spacecraft require to use very fast telescopes with f-numbers approaching unity. These telescopes are very sensitive against any absolute length change which would reduce interferometer visibility and, ultimately, sensitivity. Our group has assembled a Silicon Carbide test structure and investigated its dimensional stability in the 10^{-4} to 1Hz frequency band at different operating temperatures. We also measured the overall length change and started investigating asymmetric length changes during cool down which would lead to misalignments in the telescope

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