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A New Optical Bench Concept for Space-Based Laser Interferometric Gravitational Wave Missions ANDREW CHILTON, STEPHEN APPLE, GIACOMO CIANI, TAIWO OLATUNDE, JOHN CONKLIN, GUIDO MUELLER, University of Florida — Space-based interferometric gravitational wave detectors such as LISA have been proposed to detect low-frequency gravitational wave sources such as the inspirals of compact objects into massive black holes or two massive black holes into each other. The optical components used to perform the high-precision interferometry required to make these measurements have historically been bonded to Zerodur optical benches, which are thermally ultrastable but difficult and time-consuming to manufacture. More modern implementations of LISA-like interferometry have reduced the length stability requirement on these benches from $30\frac{\text{fm}}{\sqrt{\text{Hz}}}$ to a few $\frac{\text{pm}}{\sqrt{\text{Hz}}}$. We therefore propose to alter the design of the optical bench in such a way as to no longer require the use of Zerodur; instead, we plan to replace it with more easily-used materials such as titanium or molybdenum. In this presentation, we discuss the current status of and future plans for the construction and testing of such an optical bench.

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