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The LISA benchtop simulator at the University of Florida[1] JAMES THORPE, RACHEL CRUZ, SRIDHAR GUNTAKA, GUIDO MUELLER, University of Florida — The Laser Interferometer Space Antenna (LISA) is a joint NASA-ESA mission to detect gravitational radiation in space. The detector is designed to see gravitational waves from various exciting sources in the frequency range of 3×10^{-5} to 1 Hz. LISA consists of three spacecraft forming a triangle with 5×10^{9} m long arms. The spacecraft house proof masses and act to shield the proof masses from external forces so that they act as freely-falling test particles of the gravitational radiation. Laser interferometry is used to monitor the distance between proof masses on different spacecraft and will be designed to see variations on the order of 10 pm. Pre-stabilization, arm-locking, and time delay interferometry (TDI) will be employed to meet this sensitivity. At the University of Florida, we are developing an experimental LISA simulator to test aspects of LISA interferometry. The foundation of the simulator is a pair of cavity-stabilized lasers that provide realistic, LISA-like phase noise for our measurements. The light travel time between spacecraft is recreated in the lab by use of an electronic phase delay technique. Initial tests of the simulator have focused on phasemeter implementation, first-generation TDI, and arm-locking. We will present results from these experiments as well as discuss current and future upgrades in the effort to make the LISA simulator as realistic as possible.

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