# SIM TECHNOLOGY DEVELOPMENT OVERVIEW -- LIGHT AT THE END OF THE TUNNEL

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The Space Interferometery Mission (SIM) drives the state-of-the-art in optomechanical and optoelectronic systems as well as presenting daunting challenges in precise stabilization of lightweight deployable structures and coordinated computer control of numerous optical surfaces. Among the most stressing requirements is the sub-nanometer sensing of optical element motions (using laser metrology) along with similar picometer regime readout of stellar fringe position on CCD detectors. Thermal control of critical optics must be maintained to milliKelvins over many minutes in order to keep optical element deformations within the same 10's of picometers. Beyond the sub-nanometer sensing and thermal deformation requirements are the nanometer class requirements on jitter of elements in the optical beam trains. This level of stabilization demands a combination of an inherently quiet structural platform, vibration isolation, and high bandwidth control of active optics. This latter, in turn, leads to a significant number of sensors and actuators tied together by nearly 100 closed loop realtime computer controlled servos. This represents a significant challenge for system integration and autonomous on-orbit operation.

The Jet Propulsion Laboratory (JPL) has been working for the better part of the last decade to develop and test this technology. Progressing from the derivation and flow-down of requirements through the laboratory demonstration of technology at the component level, the JPL program is now at the point of demonstrating interferometer technology at the system level in representative ground integration testbeds. The paper will describe this work and will discuss plans for future development culminating in technology readiness for the Space Interferometry Mission.