Large Ultra-Lightweight Photonic Muscle Telescope  
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Missions such as Terrestrial Planet Imager require lightweight mirrors with minimum diameters of 20 to 40 meters. Unprecedented advances in nanoengineered-materials have recently produced a laser actuated material with controllable reversible bi-directional bending. These Photonic Muscle substrates finally make precision control of giant apertures possible. Membrane mirror shape and dynamics can now be precisely controlled with low power light. This enables innovative missions for imaging the cosmos, resolving spectral and spatial details of exosolar planets and searching for life, including evidence of Earth’s Origins, while substantially reducing mass, launch and fabrication costs. Missions like TPI will now be feasible.

*Figure: Optical metrology and control setup.*