**Interferometric gravitational-wave detectors: new levels of sensitivity in optical measurements**

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**Abstract:** Gravitational waves are perhaps the most revolutionary prediction of Einstein’s Theory of General Relativity, and their observation can reveal information about astronomical objects in ways that electromagnetic observations cannot. Over the past few years, a new generation of large-scale ground-based instruments, based on precision optical interferometry, has begun the search for a first detection. These detectors, which must measure motions less than one-thousandth of the diameter of a proton over multi-km baselines, are driving a wave of developments in optical measurement. In this talk, I will describe the design of one these detectors--the U.S. Laser Interferometer Gravitational-wave Observatory (LIGO).

Even as the current ground-based interferometers were being pushed to reach their design sensitivities, the plans were being laid for the future. Advances in technology and lessons learned from the first generation devices have pointed the way to an order of magnitude improvement in sensitivity, as well as expanded frequency ranges and the capability to tailor the sensitivity band to address particular astrophysical sources. I will also describe the prospects for these future detectors and the growing trend toward international cooperation aimed at building a truly global network.