

NWS15-2015-000098

Abstract for an Invited Paper  
for the NWS15 Meeting of  
the American Physical Society

### **Beginning the Search for Gravitational Waves with the Advanced LIGO Detectors<sup>1</sup>**

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Approximately 100 years after the publication of General Relativity, the Laser Interferometer Gravitational-Wave Observatory (LIGO) is commissioning its second-generation detectors as part of an evolving worldwide network of the largest and most sensitive surveying instruments on Earth. Advanced LIGO detectors in Hanford, WA and Livingston, LA will begin observations this year, to be followed by the Advanced Virgo detector near Pisa, Italy next year. Their goal is to detect the gravitational waves from coalescing binary neutron stars routinely by the end of this decade. The detectors use lasers and suspended mirrors, acting as survey markers for space and forming a Fabry-Perot-Michelson Interferometer, to read out the spatial distortion in the two arms. Their sensitivity to strains in space is of the order of  $10^{-22}$ , which requires resolving differential displacements of a billionth the size of atom between the two 4-km-long arms. These detectors will operate at the fundamental limits determined by the quantum nature of light and the atomic nature of matter, as well as the physical environments of the detectors. This talk will describe the technical challenges of building and operating this new generation of detectors, the strategy underlying the commissioning and observing plans for the next several years as well as the current status.

<sup>1</sup>The LIGO Laboratory was constructed and is operated for the National Science by Caltech and MIT under cooperative agreements PHY-9210038, PHY-0823459 and PHY-0757058.