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Search for Gravitational Waves with the LIGO Interferometers¹

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The LIGO (Laser Interferometer Gravitational-Wave Observatory) project is designed to measure the infinitesimal perturbations of the curvature of spacetime due to the motion of astronomical bodies. The experiment consists of three interferometers with Fabry-Perot cavity arms for increased effective arm length, sensitive to strains of $h \sim 10^{-21}$ from 40 Hz to 1 kHz. Sources of astronomical interest in this frequency range include binary inspirals of neutron stars or black holes, “burst” sources such as supernovae, periodic signals from pulsars, and stochastic sources. In order to measure such small strains, great care must be invested in seismic isolation of the optics, suppression of thermal noise and thermal lensing effects, high-powered laser stabilization, optical configuration, and other issues. The LIGO interferometers reached design sensitivity in 2005, and a science run to collect one year of triple-coincidence data is currently in progress. This talk will cover the status of that run, science results to date, and continued efforts to improve the strain sensitivity in this and future iterations of the LIGO detectors.

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