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Astronomy's "Next Big Thing:" What can we expect from direct gravitational-wave observations?

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Advanced LIGO's ongoing observation runs provided humanity with the first direct detection of gravitational waves, just in time for the 100th anniversary of Einstein's prediction. Beyond the discovery, there is a growing focus on incorporating gravitational waves as a new window on questions from violent transients to cosmology. I will discuss some aspects of (i) the instrumental breakthroughs that enabled the unprecedented sensitivity reached by Advanced LIGO and (ii) the key scientific directions in which gravitational wave searches can be utilized, directly as well as in the context of multimessenger astronomy.

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