

Advanced LIGO First Light: Multimessenger Astrophysics at the Birth of Gravitational-Wave Observatory

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Advanced LIGO's direct observation of gravitational radiation from a binary black hole merger has sent quakes through the physics and astronomy community. In a few short years, the search for gravitational waves will complete its transformation from an experimental effort into a new discipline of observational astronomy as we rapidly build a sample of merging compact binaries. However, the greatest prize of all may come from combining our new GW observatories with existing electromagnetic ones—uncovering the host environments and formation channels of compact binaries, exposing the mechanism behind short GRBs, explaining the cosmic inventory of r-process elements, and even testing if stellar-mass black hole binaries are truly barren of matter and magnetic fields. I will describe the LIGO/Virgo EM follow-up program and the GW150914 and GW151226 follow-up campaigns in detail. They bring together new real-time GW data analysis techniques and 63 groups who are searching for counterparts of LIGO sources using ground- and space-based partner facilities spanning gamma ray, x-ray, optical, infrared, and radio wavelengths, as well as neutrinos. I will discuss the anticipated trajectory of the worldwide GW detector network from the standpoint of sky localization, and I will conclude with some ideas for future follow-up strategies.

Summary

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