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Abstract for an Invited Paper
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Science with LIGO[1]

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The LIGO Science Collaboration has entered an extended period of searching for gravitational wave emissions from the near universe. While other talks at this meeting will highlight the current status of LIGO and give results of searches for gravitational waves, I will focus mainly on Advanced LIGO, a second generation ground-based detector. The Advanced LIGO interferometers are designed to detect gravitational waves with a ten-fold sensitivity increase over the current LIGO interferometers and a projected detection rate of 10 - 500 events per year for binary neutron star inspiral events. This enhanced sensitivity will come about from major upgrades to all of the interferometer subsystems, including a significant increase in the input laser power and the use of associated high power handling optics, better low frequency performance through the use of triple and quadruple pendulum suspended mirrors and active seismic isolation, low loss fused silica test masses with engineered optical coatings, the addition of a signal recycling mirror for tuned operation, and homodyne readout of the GW signal. This talk will discuss the current status of Advanced LIGO as well as some of the interesting physical effects and challenges associated with high average power operation of km-class interferometers.

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[2]Speaking for the LIGO Science Collaboration