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Gravitational-Wave Detectors and Applied Quantum Sensing[1]

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Observations of gravitational waves over the last 5 years have been enabled by a new generation of LIGO detectors, Advanced LIGO, the most sensitive laser interferometers ever built. The Advanced LIGO detectors are limited by quantum noise across the entire detection band, making the application of quantum optics techniques (e.g., squeezed vacuum states) an appealing option to further extend their astrophysical reach. I will describe the LIGO detectors and the use of squeezed states to improve their sensitivity in the last observing run. I will also touch on recent spin-off experiments in macroscopic quantum measurement that have been performed with the LIGO detectors and show quantum correlations between the light in the detector and its 40-kilogram mirrors.

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