

## **Homodyne Detector Characterization**

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Currently, Advanced LIGO makes use of a DC readout scheme, a type of heterodyne detection in which the light containing the gravitational wave signal is sensed against a local oscillator field generated by a static differential arm length. An alternative scheme is balanced homodyne detection, in which an external local oscillator is combined with the signal beam on a beamsplitter at the dark port. Both outputs are detected and subtracted to yield the gravitational wave readout. This scheme has several advantages, including common mode noise cancellation and facilitating the measurement of sub-quantum noise provided by squeezed light. This work is an evaluation of the difficulties associated with operating such a detector in air and achieving a high degree of noise isolation.