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Introducing Balanced Homodyne Detection for the O5-run of LIGO

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For the O5 run of LIGO, it is planned to make a change to the detection scheme, operating with balanced homodyne detection. This involves the introduction of a local oscillator beam derived from the power recycling cavity, to be re-combined with the signal beam from the interferometer in the detection chamber. The layout of the detection chamber has been re-designed to accommodate dual output mode-cleaners and automated wave-front control. We will present Zemax models of both the interferometer and detection chamber and will discuss the challenges presented with the inclusion of new elements.

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