

Retrofitting the Readout of a Large Interferometer in Washington

by

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Submitted to the Department of Physics
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2035

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Abstract

The road approaching a direct detection of Gravitational Waves is long and hard, I am just one of many to walk this road. Here is my story.

Thesis Supervisor: Nergis Mavalvala

Title: Professor

Acknowledgments

This is the acknowledgements section. You should replace this with your own acknowledgements.

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Gravitational Radiation

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Experimental Efforts for Detection

2.1 iLIGO Interferometers

Chapter 3

Interferometer Retrofitting

3.1 Increased Input Laser Power

3.2 Re-engineered Thermal Compensation

3.3 Non-modulated Signal Extraction

3.3.1 Optical SNR as Compared to RF Modulated Extraction

3.3.2 Laser Noise Coupling

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Chapter 4

The Output Mode Cleaner

4.1 Optical Design

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4.4 Noise Sources Introduced in the OMC

4.4.1 OMC Length Noise

4.4.2 Beam Jitter Noise

Sensitivity to Beam Motion

Sources of Beam Jitter

Appendix A

Tables

Table A.1: Armadillos

Armadillos	are
our	friends

Appendix B

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Figure B-1: Armadillo slaying lawyer.

Figure B-2: Armadillo eradicating national debt.

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