

Automated Noise Budgeting for the LIGO 40 m Test Facility

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Abstract

The Laser Interferometer Gravitational Observatory (LIGO) is currently prototyping new technologies at the 40 m test bed facility at the California Institute of Technology. Because LIGO's success depends critically on its ability to limit noise sources which may interfere with the detection of weakly interacting gravitational waves, much time and effort has been spent on cataloguing various noise sources. This SURF represents an extension of that effort. A suite of matlab scripts have been developed to automatically compile such a noise catalogue, called a noise budget, for the LIGO sites in Livingston, Louisiana and Hanford, Washington. Efforts have been made in the past to adapt these methods for the 40 m site. These efforts have been hampered by the site specific nature of a noise budget, the constantly changing conditions at the 40 m facility, and an obtuse coding style used in the automated noise budget scripts.

The SURF focused on re-writing parts of the automated noise budget suite to make them compatible with the 40 m facility. Efforts focused on the seismic, DARM, PRC, SRC, and MICH noise sources. Furthermore, a magnetometer was installed at the 40 m site to measure the effect of nearly static magnetic fields on the beam splitter optic. It is the intention of the author to add this noise source to a working automated noise budget script for the 40 m facility.