

**LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY**  
**-LIGO-**  
CALIFORNIA INSTITUTE OF TECHNOLOGY  
MASACHUSETTS INSTITUTE OF TECHNOLOGY

<b>Safety Protocol</b>	<b>LIGO-M070367-00-L</b>	<b>23 October 2007</b>
<b>Optics Lab 100 W Laser Usage SOP</b>		
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*Temporary Optics Lab 100 W Laser Usage SOP*

The primary laser from the HPLF is a 100 W, continuous wave, class IV Ytterbium fiber device. Built by IPG Photonics, the YLR-100-LP laser is a diode pumped device and delivers near-infrared radiation (1064 nm). This radiation is not visible by the unaided human eye. Only one fiber coupled output port exists and is used for all operating powers.

Additional Considerations: see HPLF SOP/Laser Safety Plan for specific hazards.

Optics Lab:

Only authorized personnel, the laser safety officer, and the LLO site head are permitted to operate this device. The laser may not be operated above 50 W without consent from the site head or laser safety officer. The beam may not leave optics lab table 1's perimeter or exceed 18" above said table. Further, appropriate beam dumps must be used. The perimeter belt may not be utilized as a standard dump except in instances of alignment. Finally, the 100 W Laser may not be left in a potentially active state (power-on condition) without authorized personnel's presence.

All other rules applicable to HPLF are applied to the optics lab but do not exceed the above guidelines. A notable exception is that there is neither active interlock nor emergency shutdown devices in the optics lab.

In case of an emergency, such as fire, tornado, etc., where an evacuation is necessary, the laser shall be turned off and the laser warning sign will be switched to green "no hazard" before leaving the lab area.

An extra personnel barricade will be placed near the NHZ area. A list of authorized personnel will be posted at the labs entrance and a white board will be used showing the responsible laser operator currently working in the lab.

MAIN BEAM 1064 nm wavelength  
100 W max. power output  
Continuous wave output  
3 mm diameter at aperture  
Hazard Areas: HPLF, Optics Lab  
Required OD = >6.0

### Vacuum and in-air measurement of isolation ratio and thermal drift in the ELIGO Faraday Isolator

As part of the E-LIGO project, a measurement of the isolation ratio and of the thermal drift will be carried out in the clean optics lab. Fig. 1 shows the experimental setup.

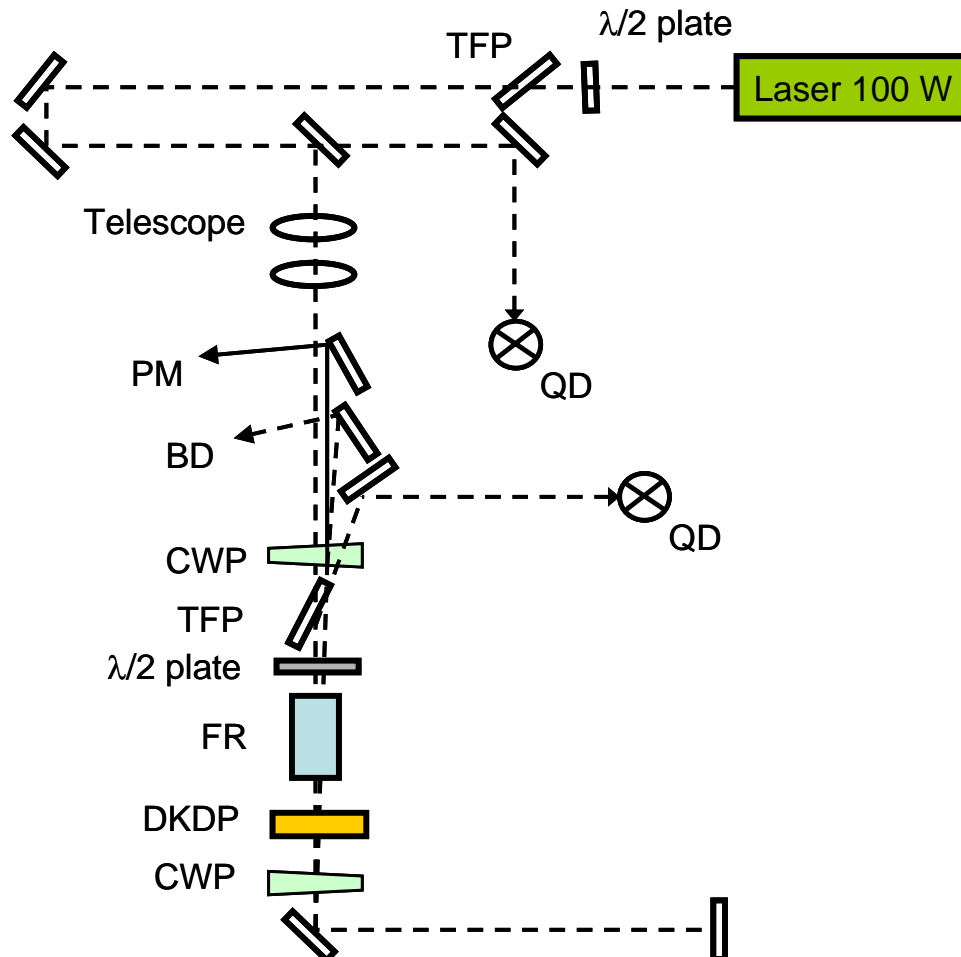


Fig. 1 Proposed setup for measuring isolation ratio and thermal drift in the ELIGO Faraday isolator.

IR detectors, phosphor cards, IR viewers, and CCD cameras will be used to locate the laser beam. Special attention will be devoted to aligning the laser beam in the center of each optical element at lowest power levels. For this purpose irises will be placed to locate the laser beam during alignment procedures.