

**LASER INTERFEROMETER GRAVITATIONAL WAVE
OBSERVATORY**

-LIGO-

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Modification of the IFO Input Laser Power Control		
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This note describes the proposed change to the existing Intensity Stabilization System (ISS).

The proposed scheme incorporates the control of the adjustable wave plate into the ISS. The purpose of the new control scheme is to adjust the interferometer input power to within 5% from a single set point. This is desired during an interferometer input power increase from ~1.5W to ~4.5W to avoid the changes of the loop gains of the Mode Cleaner and Common Mode frequency servos. The MC and CM loop gain are compensated electronically in the power up process.

The increase of the interferometer input power is currently accomplished by the increase of the transmission through the adjustable wave plate between cross polarizers. The DC coupled ISS has insufficient dynamic range and requires changing the set point during the power ramp. The ISS is disabled during this step. After the power up is completed the ISS is enabled. The set point of the ISS is adjusted to null the error point. This procedure relies on the wave plate/cross polarizers transmission calibration.

In the proposed scheme the wave plate will be controlled by the ISS via the software loop. The interferometer input laser power will be set from the ISS set point. The absolute level of the input light will be determined by the ISS in- and/or out-of-loop photo-detector when MC is locked and by the MC input power monitoring photo-detector when MC is not locked. Therefore the power levels into the MC (before it locks) and into the interferometer (after MC locks) are determined by the stability of the photo-detector calibration.

