



LIGO Laboratory / LIGO Scientific Collaboration

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H1 HAM4 97/3 BS Installation

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LHO

This is an internal working note
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1. Required Equipment

1	Class A	(waivered) CVI 97/3 beamsplitter
3	Class A	(temporary) forks and fasteners
1	Class B	2" silvered steering mirror, post and DLC
2	Class B	mount
1	Class B	irises, posts and mounts
1	Class B	handle for gussets
1	Class B	pan with general tools
1		Green light laser pointer and mount
2		Zoomable video cameras
1		Tripod
1		Monitor
1		Box foil

1. Installation Goals

This document details the procedure to swap the 50/50 DC/RF output beamsplitter (OBS) in HAM4, for the eLIGO final configuration one of 97/3.

The alignment procedure seeks simply to install the 97/3 splitter and reproduce the alignment of the existing 50/50 one. We use two alignment fiducials: i) via a green laser, and ii) via the locked MC (in-air), on the OMC.

2. Procedure:

Steps to be completed *prior to vent*:

1. Measure the wedge of the 97/3 OBS splitter.
2. Swap MC driver, and lock the 4k MC and observe the alignment on the OMC
3. Unlock the MC and ready for vent

Steps to be *completed after the vent but prior to HAM5 door removal*:

1. Revisit MC locking, now in air, 30mW max power, and confirm alignment on the OMC

The following steps of the procedure assume *the H1 vertex has been vented and the South door of HAM5 has been removed*.

1. Relock the 4k MC in air, 30mW max power, and confirm alignment on the OMC. Some alignment into OMC may be made.
2. Install the (zoom) video camera on tripod, with Al foil-clad wiring and external monitor, in HAM5 to survey the septum window and note the position of the IR beam on that septum window. Mark the IR spot on the monitor with a marker
3. Place the green laser and two steering mirrors on the HAM4 table, to direct the beam onto the existing DC/RF 50/50 splitter. The beam need not be exactly coaligned with the IR one
4. Using the installed temporary steering mirrors, direct the beam though the HAM5 baffle, onto the septum window, landing approximately on the IR spot position
5. Check for the septum AR reflected spot on the HAM4 dedicated dump (alternatively, an iris may be set up on HAM4). If the spot is found, this is the position to which the Green optical lever must be returned once the 97/3 splitter is installed. If the spot is not observed, it is not clearing the HAM5 baffle and the beam needs to be resteeered on HAM4 until it can clear the baffle
6. Ascertain the position of the wedge of the 50/50 splitter via the forward-reflected ghost beam position. This wedge position must be replicated on the 97/3 splitter
7. Remove the 50/50 splitter from its mount. Do not disturb the mount or post
8. Install the 97/3 splitter, HR surface upstream, on the DLC mount. Set the position of the wedge to that of the 50/50 OBS
9. Steer the OBS until the Green optical lever beam is returned to the fiducial on the HAM4 dump (or iris, if this was set up).
10. Remove the Green laser and steering mirrors, irises, any temporary item that was added to HAM4. Relock the MC. Check the IR spot on the septum window as per the mark (made at the outset) on the monitor

11. Check the locked MC beam on the OMC to confirm position. Refinements in the 97/3 OBS angle can be made here (or not – one has to check for drifts in the input beam for this to be a useful fiducial)
12. Remove remaining hardware, including camera and cables
13. Exit checks