Advanced LIGO Engineering Change Request (ECR)

ECR Title: Change ETM HWS light source from pick-off of ALS beam to green LED and couple in via orthogonal polarization

DCC No: E1800129-v1

Date: April 30, 2018

Requester: Aidan Brooks

Impacted Subsystem(s): TCS_HWS, ALS

Description of Proposed Change(s): Change ETM HWS light source from a pick-off of the ALS beam to a fiber coupled green incoherent LED source. Polarize the source light as p-polarized (horizontal). Couple into the ALS beam (which is s-polarized [vertical] via a polarizing beam-splitter (ALS on reflection, HWS on transmission).

Reason for Change(s): ETM HWS do not work effectively in conjunction with the ALS system and when the arms are open [e.g LLO aLOG 36650]. Also the spatial coverage of the ALS beam is 50% the area of the 1064nm beam, meaning when used as a HWS beam, much less than 1064nm beam diameter is sampled, making it inadequate for detecting point absorbers.

Estimated Cost: $15K (rough estimate given the required parts for a prototype, multiplying that by 4 and adding some head-room).

Schedule Impact Estimate: 2-3 days to install and align equipment per ETM for a total of 12 days across the 4 ETMs. ALS system will be offline during that time. Best done during a time when other installation work is going on.

Nature of Change (check all that apply):

- ☐ **Safety**
- ☐ **Correct Hardware**
- ☐ **Correct Documentation**
- ☒ **Improve Hardware**
- ☐ **Improve Software**
- ☐ **Improve/Clarify Documentation**
- ☒ **Change Interface**
- ☐ **Change Requirement**

Importance:

- ☐ **Desirable for ease of use, maintenance, safety**
- ☐ **Desirable for improved performance, reliability**
- ☒ **Essential for performance, reliability**
- ☐ **Essential for function**
- ☐ **Essential for safety**

Urgency:

- ☐ **No urgency**
- ☐ **Desirable by date/event:** _____
- ☒ **Essential by date/event:** __Next Full IFO before O3___
- ☐ **Immediately (ASAP)**

Impacted Hardware (select all that apply):

- ☐ **Repair/Modify. List part & SNs:** _____
- ☐ **Scrap & Replace. List part & SNs**:_____
- ☐ **Installed units? List IFO, part & SNs:** _____
- ☐ **Future units to be built**

Impacted Documentation (list all dwgs, design reports, test reports, specifications, etc.):

D1100607, D1400241, D1201448, T0900144

Impacted Software (list all that apply):

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Disposition of the proposed change(s):

The disposition of this proposed engineering change request is to be completed by Systems Engineering and indicated in the "Notes and Changes" metadata field in the DCC entry for this ECR. The typical dispositions are as follows:

- **Additional Information Required**: in which case the additional information requested is defined. The ECR requester then re-submits the ECR with the new information using the same DCC number for the ECR but with the next version number.
- **Rejected**: in which case the reason(s) for the rejection are to be given
- **Approved**
- **Approved with Caveat(s)**: in which case the caveat(s) are listed
- **TRB**: the ECR is referred to an ad-hoc Technical Review Board for further evaluation and recommendation. It is the System Engineer's (or designee's) responsibility to organize the TRB. The System Engineer (or designee) then makes a technical decision based on the TRB's recommendation. Links to the TRB's documentation (charge, memos, final report, etc.) are to be added to the "Related Documents" field for this ECR.
- **CCB**: a change request for approval of additional funds or schedule impact is to be submitted to the Configuration Control Board. Links to the CCB's documentation (CR, etc.) are to be added to the "Related Documents" field for this ECR.

Concurrence by Project Management:

Acknowledgement/acceptance/approval of the disposition is to be indicated by the electronic "signature" feature in the DCC entry for this ECR, by one the following personnel:

- Systems Scientist
- Systems Engineer
- Deputy Systems Engineer