|  |  |
| --- | --- |
| Document | **LIGO-M1200276-v1** |
| Date: | August 3, 2012 |
| Title: | RODA: Increase of Schnupp Asymmetry from 5 cm to 8 cm |
| To the Attention of: | Calum Torrie, Mike Smith, Ed Chavez, Eddy Sanchez, aligo\_sys |
| cc: |  |
| From/signatories: | Name/Title: Peter Fritschel, Systems Scientist / ISC leadName/Title: Dennis Coyne, Systems Engineer*See the LIGO Document Control Center (DCC) for electronic approvals* |
| System(s) affected: |  |
| Nature/Scope: |  |
| Subsystem(s)affected | SYS, ISC, INS |
| Primary Contacts | Group or Affiliation and Contact  |
| Reference Documents: |  |

DECISION/AGREEMENT STATEMENT:

The Schnupp Asymmetry is being increased from 5.0 cm to 8.0 cm, to improve the global length sensing with the signal recycling mirror transmission of 35%. A side effect of how this is implemented is that the arm lengths are each shortened by 15 mm.

**Background:**

Based on studies of interferometer sensitivity versus input power, the initial transmission of the signal recycling mirror (SRM) was increased from 20% to 35% in spring 2012; see LIGO-M1200134. Also studied was the effect of this change on the global sensing signals for the vertex lengths. This is detailed in [LIGO-T1200128](https://dcc.ligo.org/cgi-bin/private/DocDB/ShowDocument?docid=88611). The conclusion was that with the higher transmission SRM, the Schnupp asymmetry should also be made larger.

**Decision:**

The Schnupp asymmetry is increased from 5.0 cm to 8.0 cm, which is accomplished by:

* Moving ITMX 15 mm in the direction away from global zero (further from the beamsplitter)
* Moving ITMY 15 mm in the direction toward from global zero (closer to the beamsplitter)
* Leaving ETMX as is
* Moving ETMY 30 mm in the direction toward global zero (closer to the beamsplitter)

Note that as a result the arm cavity length is shortened by 15 mm, with a new length of: 3994.485 m. This change is small enough (4e-6 fractional change) that RF modulation frequencies are not affected.

See also [E1200345](https://dcc.ligo.org/cgi-bin/private/DocDB/ShowDocument?docid=89880) for a discussion of the impact of these moves on the BSC chamber layouts.