Attachment SUS to the Memorandum of Understanding LIGO-M050315-00 between the Hobart & William Smith Colleges LIGO Group (HWSLG) and the Laser Interferometer Gravitational Wave Observatory (LIGO)

For The Period

August 15, 2008 - August 14, 2009

This Attachment SUS to the Memorandum of Understanding LIGO-M050315-00 defines the role of the Hobart & William Smith Colleges LIGO Group (HWSLG) as a Member of the LIGO Scientific Collaboration (LSC), and a member of the Isolation/Suspension/Thermal Noise Development Group (ISTNDG). The period of performance for the activities in this Attachment is from August 15, 2008 - August 14, 2009.

1. Collaboration

The Isolation/Suspension/Thermal Noise Development Group (ISTNDG) is the scientific collaboration for defining and developing instruments in optics for use in advanced subsystems for the initial LIGO interferometers or in entirely new advanced interferometers. MOU Attachment SUS defines the roles and responsibilities of workgroups in this development group.

2. Participation

During the period August 15, 2008 - August 14, 2009, the members of HWSLG will participate in in ISTNDG in the following areas:

a. Coating Losses

Coating Thermal Noise

The HWSLG will complete measurements on the mechanical loss in silica coatings as a function of annealing temperature and coating thickness. This data should isolate the excess loss arising in silica from the coating process. Preliminary measurements indicate that the excess loss arises mostly from the residual stress due to the coating process.

Southern University has the capability to use X-ray scattering to measure the bond angle distribution in the coatings and in an uncoated surface. That data would allow the PI to test if the coating loss and the surface loss resulted predominantly from the distortion of these bonds at the surface.

These bond angle distribution measurements would also be an important check on the accuracy of Prof. Hai Ping Chen's model of fused silica. If this theoretical model is able match the measured characteristics of silica, then ideally a similar theoretical approach could be used to model tantala. A theoretical understanding of the tantala coating could be the most efficient means to determine how to reduce its mechanical loss.

Finally the Coating Group has issued a white paper to several coating vendors requesting feedback about their measurement capabilities that might help in either lowering the coating loss or in determining the fundamental loss mechanism in the coating materials. The direction of our future experiments will be strongly influenced by the responses we receive. In any case, the HWSLG will remain a main contributer to this research.

b. Suspension Design for Advanced LIGO

Not Applicable

c. Other Contributions

Suspension Thermal Noise for Enhanced LIGO and/or Advanced LIGO

The PI will complete the tests of the ribbon test mass suspension. The sapphire prism standoffs should be finished by 1 August. The PI aims to have a complete set of measurements using the HWS test apparatus by mid-September. If these results appear promising, the PI would like the MIT group to test this design on the Pathfinder optic suspension. If these results demonstrate a significant reduction in thermal noise, the PI will propose an upgrade to the Enhanced LIGO suspensions.

If this design successfully reduces the thermal noise for Large Optic Suspensions, then we will propose that the design be considered for possible application to the HAM small and large triple suspensions for Advanced LIGO as a future replacement for the baseline wire suspensions.

3. Resource Sharing

The LIGO Laboratory will contribute resources including allocation of appropriate scientific and engineering personnel, research facilities, and funding in support of the effort in Item No. 2, as indicated below.

a. Research accommodations for HWSLG group members while on LIGO research assignment at any LIGO Laboratory site.

We require continued support from the LIGO Lab for our coating research. This support would include the purchase of substrates and coatings for our coating research and the allocation of lab personnel to help support and coordinate these efforts.

b. Access to LIGO data through established LSC channels in support of this work.

Not Applicable

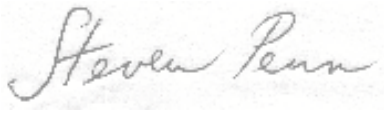
4. Coordination and Reporting

HWSLG will perform research within the structures established by the LIGO Laboratory and the LSC where appropriate. n particular, activities described in Item 2 will be carried out within the Isolation/Suspension/Thermal Noise Development Group of the LSC.
This includes keeping the Group leaders informed of activities and plans, reporting to the group at meetings and telecons, and through technical documents submitted to the LIGO Document Control Center.
In addition, an annual report will be submitted with the update to this Attachment, giving a summary status on research by topic as indicated in Item No. 2, including progress against the milestones if any, significant accomplishments such as new insights/discoveries or publications, issues of concern if any, and an indication of invested time.
This Attachment will be updated at least annually with a plan of activities for the succeeding one-year period. These documents will be due one month before the close of the period of performance under this Attachment.

5. Computer Code

All computer code delivered to the LSC under this Attachment must be developed in consultation with the LSC Data Analysis Software Working Group (DASWG) and archived, documented and reviewed as determined by that group.

Jay Marx
LIGO Laboratory Director



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