

**Attachment SUS to the
Memorandum of Understanding (LIGO-M050360-00-M)
between the
Moscow State University Relativity Group (MSURG)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO)
August 15, 2005**

This Attachment SUS to the Memorandum of Understanding LIGO-M050360-00-M defines the role of the Moscow State University Relativity Group (MSURG) 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, 2005 to August 15, 2006.

1. Isolation/Suspension/Thermal Noise Development Group - The Isolation/Suspension/Thermal Noise Development Group (ISTNDG) is the scientific collaboration for defining and developing future isolation and suspension improvements for use in advanced subsystems for the initial LIGO interferometers or in entirely new advanced interferometers. MOU Attachments define the roles and responsibilities of groups in this development group.
2. During the period August 15, 2005 to August 15, 2006, the members of MSURG will participate in ISTNDG in the following areas:
 - a) *Coating Losses* – I.A.Bilenko will implement a new installation in which:
 1. Thin tiny model of the mirror's Brownian noise will be measured, the mirror's surface will be coated with the same type of coating as it will be used in Adv. LIGO. The goal: to pinpoint the excess noise due to the coating.
 2. In the same installation the density of light (by focusing) will be managed to exceed the one in the Adv. LIGO. The goal: to observe the precursors of the laser breakdown.
 - b) *Suspension design for AdvLIGO* –
 1. V.P.Mitrofanov and K.V.Tokmakov will continue to improve the sensitivity and to perform the measurements of electrical charging of the mirror. The goal: to obtain the value of the short time fluctuations of the charge and thus to predict the possible mechanical action on the mirror due to AC component of Coulomb force.
 2. V.P.Mitrofanov and K.V.Tokmakov are planning to implement and to test the low noise tranquillizer which has to demonstrate the decrease of the violin mode Q (from $Q = 10^8$ to $Q = 10^6$) with the small increase of thermal noise.
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 MSURG members while on LIGO research assignment at any LIGO Laboratory site,
 - b) Access to LIGO data through established LSC channels in support of this work.
4. Coordination and Reporting – MSURG will perform this research within the structures established by the LIGO Laboratory and the LSC where appropriate. In particular activities described in Item 2 will be carried out within Isolation/Suspension/Thermal Noise Development Group of the LSC. Coordination will include 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 on-year period. These documents will be due one month before the close of the period of performance under this Attachment.

Approved:

Barry Barish
LIGO Laboratory Director

Vladimir Braginsky
MSURG Principal Investigator

Peter Saulson
LSC Spokesperson

Joseph Giaime
ISTNDG Leader