



**Attachment OPT to the
Memorandum of Understanding LIGO-M050347-00
between the Institute of Applied Physics Russian Academy of
Science (IAP)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO)
For The Period
August 15, 2008 - August 14, 2009**

This Attachment OPT to the Memorandum of Understanding LIGO-M050347-00 defines the role of the Institute of Applied Physics Russian Academy of Science (IAP) as a Member of the LIGO Scientific Collaboration (LSC), and a member of the Optics Development Group (LDG). The period of performance for the activities in this Attachment is from August 15, 2008 - August 14, 2009.

1. Collaboration

The Optics Development Group (ODG) 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 OPT defines the roles and responsibilities of groups in this development group.

2. Participation

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

a. Optics Characterization

Enhancements to Advanced LIGO: - We will develop a new computer algorithm to optimally design a permanent magnet system for Faraday isolators capable of handling kW powers. - We will assemble a prototype system with a magnet field of 25-30kOe (double the current field) as a way of reducing the magneto-optical material path length. - Theoretical and experimental characterization of thermal lens in ceramic-based magneto-optic materials as compared to single crystal materials will be undertaken. - We will numerically investigate the adaptive birefringence and thermal lens compensation in non-steady-state regime.

Advanced LIGO risk reduction: - We will work on development of magnet segments with reduced contamination potential (outgassing) that will meet the Advanced LIGO vacuum requirements. - We will study effect of Faraday isolator optics contaminations on major characteristics: isolation ratio, thermal lens, beam

axis deviation. Also we will study degradation of isolation ratio due to reduce of polarizers contrast induced by contamination. - We will compare contributions of intrinsic background second harmonics generation from coating interfaces and from laser-induced heating to determine the viability and efficacy of in-situ contamination monitoring. - Installation of laser set up for diagnostics of contamination of a surface by means of surface second harmonics generation.

b. Other Contributions

Not Applicable

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 IAP group members while on LIGO research assignment at any LIGO Laboratory site.

at LLO on October-November, 2008 and/or March-April 2009

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

at LLO on October-November, 2008 and/or March-April 2009

4. Coordination and Reporting

IAP will perform 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 the Optics Development Working 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



Alexander Sergeev
Principal Investigator(s)
IAP



David Reitze
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