

**Attachment Number C to the
Memorandum of Understanding (LIGO-M970020-00-M)**

between the

**Institute of Applied Physics (IAP) of the Russian Academy of Sciences at
Nizhny Novgorod**

and the

Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory

February 15, 1999

This Attachment to the Memorandum of Understanding LIGO-M970020-00-M covers the role of the Institute of Applied Physics (IAP) of the Russian Academy of Sciences at Nizhny Novgorod as a member of the LIGO Scientific Collaboration (LSC) and a member of the Lasers/Optics Development Group (LODG). The period of performance for the activities in this Attachment is from February 15, 1999 to August 15, 1999. This period may be modified by agreement to a revision of this Attachment.

1. LIGO Scientific Collaboration - The LIGO Scientific Collaboration will be organized as a separate organization from the LIGO Laboratory. It will include scientists from the LIGO Laboratory, and those from collaborating institutions, and will have its own leadership and governance. The Collaboration will ensure equal scientific opportunity for individual participants and institutions. It will organize the research, publications, and all other scientific activities. The Collaboration will report to the Laboratory Directorate for final approval of its research program, technical work, observational physics publications, and talks announcing new observations and physics results. This will be done through regular reports to the Directorate and its PAC.
2. Charter Membership - An initial period for formation of the Charter group of institutions in the LIGO Scientific Collaboration will commence on March 1, 1997 and will end following the first full meeting of the Collaboration at which the Collaboration Council will assume its role. We expect that this transition will occur within six months. Membership in the Collaboration during this charter period will be initiated by proposal to the LIGO Laboratory Directorate.

Following the charter period proposals will be evaluated through the Collaboration Council. With Collaboration approval, an MOU with the LIGO Laboratory, including Attachments defining specific work, will be required for any participating institutions.

3. This document is an agreement between the Institute of Applied Physics (IAP) of the Russian Academy of Sciences at Nizhny Novgorod and the LIGO Laboratory concerning the activities noted below, under provision 8, of the Institute of Applied Physics (IAP) of the Russian

Academy of Sciences at Nizhny Novgorod as a Collaborating Institution in the LIGO Scientific Collaboration (LSC) and in the Lasers/Optics Development Group (LODG).

4. Lasers/Optics Development Group - The Lasers/Optics Development Group (LODG) will be the scientific collaboration for defining and developing future high power lasers and required improvements in optics for use in advanced subsystems for the initial LIGO interferometers or in entirely new advanced interferometers. A specific Attachment will define the roles and responsibilities of groups in this development group. Members of this group will normally be authors in publications reporting the work of the group and will normally be eligible to participate in data runs and science beyond the LIGO I data run.
5. Report of Progress - The Institute of Applied Physics (IAP) of the Russian Academy of Sciences at Nizhny Novgorod will submit a complete report on its activities every six months, supply an updated List of Collaborators, and a plan of activities for the next six months. This report should be submitted one month before the updated attachment will take effect.
6. Term of Membership - Membership will be renewed every six months upon evidence of satisfactory performance of agreed upon duties.
7. Intellectual Property Rights - The rights to intellectual property developed under this Attachment will be subject to the National Science Foundation Grant Policy as indicated in Section 730, Intellectual Property.
8. During the period February 15, 1999 to August 15, 1999, the IAP research group will pursue the following goals as its contribution to LIGO development:
 - a.) enhancement of sensitivity and completion of software support for the advanced phase-modulated white light interferometer to characterize the surface quality of the LIGO core optics (clear aperture up to 25cm, absolute accuracy better than $/1000$, measurement radius of curvature 3000m and more);
 - b.) Experimental investigation (at 1064nm wave length) of novel designs of Faraday isolators at high average power radiation;
 - c.) Development of experimental techniques based on nonlinear optical effects for high precision remote (in situ) probing of LIGO optics components, including:
 - 1.) Comparison of solid and liquid nonlinear mediums from the viewpoint of measurement of small wave front distortion with absolute precision up to $/2000$;
 - 2.) Investigation of stimulated Raman scattering projection image receiver for remote measurement of large-scale surface deviation and phase bulk non-uniformity of LIGO core optics.

Approved:

Barry Barish

Barry Barish
LIGO Laboratory Director

5/6/99

Date

Alexander Sergeev

Alexander Sergeev
IAP Department Head

May 14, 1999

Date