

**Attachment Number C to the
Memorandum of Understanding (LIGO-M960071-00-M)
between the
University of Florida Laser Interferometric Gravitational Wave Group
(UFLIGO)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory
August 15, 1999**

This Attachment to the Memorandum of Understanding LIGO-M960071-00-M covers the role of the University of Florida Laser Interferometric Gravitational Wave Group (UFLIGO) as a Charter 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, 2000. This period may be modified by agreement to a revision of this Attachment.

1. LIGO Scientific Collaboration - The LIGO Scientific Collaboration is organized as a separate organization from the LIGO Laboratory. It includes scientists from the LIGO Laboratory, and those from collaborating institutions, and has 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 commenced on March 1, 1997 and ended following the first full meeting of the Collaboration at which the Collaboration Council assumed its role.

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 University of Florida Laser Interferometric Gravitational Wave Group (UFLIGO) and the LIGO Laboratory concerning the activities of UFLIGO as a Collaborating Institution in the LIGO Scientific Collaboration (LSC) and in the Lasers/Optics Development Group (LODG). Specific research to be undertaken in support of LIGO is as indicated in item No. 8. below.
4. Lasers/Optics Development Group - The Lasers/Optics Development Group (LODG) is 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 on 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 - UFLIGO will provide a status report on its activities in support of LIGO every six months. The report will consist of: a) a summary status on research by topic as indicated item No. 8 below 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, b) updated List of Collaborators, and c) a plan of activities for the succeeding six-monthly period. The report will be due one month before the close of the period of performance under the Attachment in question.
6. Term of Membership - The Membership will be renewed every six months upon evidence of satisfactory performance of agreed upon duties.

The coordinates of UFLIGO members are included in the Attachment Z to the Memorandum of Understanding LIGO-M960071-00-M.

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 August 15, 1999 to February 15, 2000, the following UFLIGO personnel will participate in the LODG as follows:
 - a) EOMs: Continue testing EOMs for dynamic RFAM in the LIGO gravity wave band by demodulating the RFPD output at the modulation frequency to better understand how frequency noise sources couple to the phase modulation to produce amplitude modulation.
 - b) LiNB3 Testing: Initiate the testing of a larger aperture LiNB3 at higher laser powers to determine the effects of damage, second harmonic generation, etc. This research will be collaborated with the Stanford University to utilize their high power, single frequency laser capability.
 - c) Alternative Modulation Architectures: Initiate development of alternative modulation architectures which circumvent the problems associated with high power laser beam propagation through phase modulators. Earlier measurements on March Zender interferometric modulation will be extended.
9. During the period August 15, 1999 to February 15, 2000, the LIGO Laboratory will share, as requested and appropriate, the LIGO data of relevance to the research focus in Item No. 8 above.

10. The research effort pursuant to this Attachment C will be coordinated by Guenakh Mitselmakher and Syd Meshkov on behalf of UFLIGO and LIGO Laboratory, respectively.
11. 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. 8, as indicated below. These resources will be in addition to the coordination effort and data to be made available per Item No. 9 above.
 - a) LIGO research effort at the University of Florida is supported in part with the LIGO Laboratory funds under the Caltech Purchase Order for IO design and fabrication and detector integration and operations.
 - b) LIGO Laboratory provides partial funding for IAP/Nizhny Novgorod effort in support of research in this Attachment C under a Caltech Purchase Order with the University of Florida for IO design and fabrication and detector integration and operations.
 - c) Provide accommodations for UFLIGO collaborators while on research assignment on LIGO at Caltech and/or at LIGO Hanford and LIGO Livingston Observatory sites.

Approved:

Barry Barish
Barry Barish
LIGO Laboratory Director

Guenakh Mitselmakher
Guenakh Mitselmakher
UFLIGO Principal Investigator

Jan 10, 2000
Date

Jan 15, 2000
Date