# Attachment Number A 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

# February 15, 2000

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 LIGO I Development Group (L1DG). The period of performance for the activities in this Attachment is from February 15, 2000 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 LIGO I Development Group (L1DG), and as indicated in item No. 8 below.

4. LIGO I Development Group - The LIGO I Development Group is the scientific collaboration for implementing and exploiting the initial LIGO detector and physics through the initial sci-

ence data run. Only groups who establish a specific Attachment approved by the LIGO Laboratory, which defines a sufficient contribution and participation in LIGO I development, implementation or data analysis will be part of this initial LIGO data run and science. Participation in future data runs and science that follow LIGO I will be possible for other groups, with guidelines to be determined by the LIGO Scientific Collaboration. It is anticipated that LIGO I data will only be made available through formal collaboration within the LIGO I Development Group during the first two years following its collection.

The general guideline for institutional membership in the LIGO I Development Group is that the contribution per collaborator of any new group to the design, construction, and implementation of the initial LIGO detector and to the first data run be comparable to that of the LIGO Laboratory scientists.

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 February 15, 2000 to August 15, 2000, UFLIGO will perform as follows:

   a) Installation and Commissioning of the LIGO Input Optics

   Finish installation and commence commissioning and characterization of the Input Optics at LIGO Livingston Observatory. Toward the end of the LSC period, commence installation of the Input Optics for the 4 km LIGO Hanford interferometer, including installation of the PSL table optics, suspended mirror preparation, and in vacuum installation. (Haisheng Rong, Sany Yoshida, Malik Rakhmanov, David Tanner, Dave Reitze)

   b) End-to-End Simulation

   Continue to maintain and update the IO simulation module to follow the development of the End-to-End model, with focusing on the improvement of the IO control system simulation. (Sergei Klimenko, Guenakh Mitselmakher)

c) Data Analysis and Noise Characterization

Develop the first version of the Wavelet Analysis Tool (WAT) class library for LIGO data analysis. It will include the I/O interface to read frame data, interface to ROOT and a set of lifting and Gaussian wavelets.

Mains interference line removal for data compression will be investigated using efficient frequency transforms and non-linear fitting algorithms.

Noise consequences of violin line removal using a linear Kalman filtering method will be examined. Similar analysis to that for mains harmonic lines will be provided. Extension to include non-linear techniques will also be investigated.

A toolbox of statistical methods for evaluating data and data treatment will continue to be developed. Correlation with other channels will be implemented. Application to additional data sets will be sought. (Sergei Klimenko, Guenakh Mitselmakher, Bernard Whiting, Robert Coldwell)

9. During the period February 15, 2000 to August 15, 2000, the LIGO Laboratory will share, as requested and appropriate, LIGO data of relevance to the research focus in Item No. 8 above.

10. The research effort pursuant to this Attachment A will be coordinated by Guenakh Mitselmakher and Albert Lazzarini 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 IOO design and fabrication and detector integration and operations.

    b) Provide accommodations for UFLIGO investigators while on LIGO research assignment at Caltech, and/or LIGO sites.

Approved:

Barry Barish
LIGO Laboratory Director

4-17-00
Date

Guenakh Mitselmakher
UFLIGO Principal Investigator

3/17/00
Date

Albert Lazzarini
LIGO Staff

29 FEB 2000
Date