

**Attachment Number A to the**  
**Memorandum of Understanding (LIGO-M950059-00-M)**  
**between the**  
**LSU Experimental Relativity Group (LSUERG) of the Louisiana State**  
**University**  
**and the**  
**Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory**  
**August 15, 2000**

This Attachment to the Memorandum of Understanding LIGO-M950059-00-M covers the role of the LSU Experimental Relativity Group (LSUERG) of the Louisiana State University as a Charter Member of the LIGO Scientific Collaboration (LSC) and a member of the LIGO I Development Group (LIDG). The period of performance for the activities in this Attachment is from August 15, 2000 to February 15, 2001. 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 LSU Experimental Relativity Group (LSUERG) of the Louisiana State University and the LIGO Laboratory concerning the activities of LSU-ERG as a Collaborating Institution in the LIGO Scientific Collaboration (LSC) and in the LIGO I Development Group (LIDG). Specific research to be undertaken in support of LIGO is as indicated in Item No. 9 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 science 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 - LSUERG 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. 9 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 LSUERG members are included in the Attachment Z to the Memorandum of Understanding LIGO-M950059-00-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. Software Deliverables for LIGO I

It is necessary that any delivered code conforms to the LAL style as laid out in the LAL specification T990030. This includes; 1) coding style, headers, etc; 2) use of function calls, etc; 3) organization of software in the directory structures indicated in the document; 4) inclusion of test codes and validation tests to enable users to very successful installation of implementing; and 5) documentation to enable users to understand and adopt code.

9. During the period August 15, 2000 to February 15, 2001, LSUERG members will be involved as follows:
  - a) Seismic Isolation and Suspension

Joe Giaime and Ed Daw will work to commission the fine actuator control system to reduce

microseismic motion in the LLO one-arm test.

b) Detector diagnostics

Daw will support detector characterization at LLO, working full-time there. Daw will maintain the LLO-detector-specific E2E model, as well as one of the GDS computers, facilitating collaborator use of this machine and software.

As part of the DC working group, Daw will build and maintain a bandwidth-limited RMS monitor package. Also, he will continue development of a seismic motion monitor for the sites.

Cheng Zhang, Warren Johnson, Daw, and Giaime will continue general commissioning support at LLO.

Roger McNeil will familiarize himself with the global diagnostics system requirements in preparation for his participation in the system installation and operation.

c) Source Analysis

Joel Tohline will continue work began during his semester on sabbatical at Caltech, in collaboration with Kip Thorne's group. This involves use of Tohline's 3-D hydrodynamic modeling code to study GW sources. With Lindblom, he is studying R-mode instability just after a supernova. With Michelle Vallisneri, the tidal disruption of a star orbiting a Kerr BH is under study. Also, a paper on neutron star bar-mode instability is in preparation in collaboration with Joan Centrella (Drexel) and Kimberly New (Los Alamos).

d) Joint LIGO - ALLEGRO run preparation

Heng Syong, Daw, Giovanni Santostasi and Johnson will begin calculations and preparation for a LIGO-ALLEGRO correlation/coincidence experiment to be carried out during the LIGO science run.

10. During the period August 15, 2000 to February 15, 2001, the LIGO Laboratory will share, as requested and agreed, LIGO data of relevance to research topics in Item No. 9 above.
11. The research effort pursuant to this Attachment A will be coordinated by Warren Johnson, and Albert Lazzarini on behalf of LSUERG and the LIGO Laboratory, respectively.
12. 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. 9, as indicated below. These resources will be in addition to the coordination effort and data to be made available per Item No. 10 above.
  - a) Provide accommodations for LSUERG investigators while on LIGO research assignment at Caltech, and/or LIGO sites.

Approved:

Barry Barish  
Barry Barish  
LIGO Laboratory Director

2/28/01  
Date

Warren Johnson  
Warren Johnson  
LSUERG Principal Investigator

15 Mar 2001  
Date

Albert Lazzafini  
Albert Lazzafini  
LIGO Laboratory Data and Computing  
Group Leader

24 Jan 2001  
Date