

**Attachment Number A to the
Memorandum of Understanding (LIGO-M970038-00-M)
between the
University of Oregon Experimental Relativity Group (UOERG)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory
February 15, 2002**

This Attachment to the Memorandum of Understanding LIGO-M970038-00-M covers the role of UOERG 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 February 15, 2002 to August 15, 2002. 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 Oregon Experimental Relativity Group (UOERG) and the LIGO Laboratory concerning the activities of UOERG as a Collaborating Institution in the LIGO Scientific Collaboration (LSC) and in the LIGO I Development Group (LIDG), and as indicated in Items No. 8 and 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 - UOERG 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 UOERG members are included in the Attachment Z to the Memorandum of Understanding LIGO-M970038-00-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. Notes - 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 implementation; and 5) documentation and users manuals (html or pdf) to enable users to understand and adopt code.

9. During the period February 15, 2002 to August 15, 2002, UOERG will do the following:

On-site Observatory Support

- a) Participate in the testing and commissioning of the Physical Environment Monitoring System at Hanford.
- b) Assist in hardware integration at Hanford.

- c) Aid in commissioning the Hanford interferometers.
- d) Contribute to the effort to reduce the frequency noise from some of the sources that have been identified (e.g. table leg and periscope resonances).

Detector Characterization

- e) Develop techniques for detector characterization within the LSC Data Analysis working group.
- f) Help end-to-end modelers model environmental influences.
- g) Help prepare for and man shifts for the engineering science runs.
- h) Lead the environmental transients investigations group for the engineering runs.
- i) Co-lead the intersite correlations group for the engineering runs.

LIGO I Data Analysis

- j) Participate in activities of the bursts upper limits group.
- k) Assist in the development of Global Diagnostic System (GDS) tools.

Milestones

March 2002

Produce Level 2 reduced data set, without decimation, for the LSC.

Present work on RDS generation and list of future work and decisions to be made regarding LIGO reduced data sets at the LSC detector characterization session at the March 2002 LSC meeting.

March 2002 (and continuing)

Participate in the weekly LDAS dataconditioning API user's group teleconference, mainly to facilitate the task of producing reduced data sets for future LIGO science runs using the LDAS system.

Perform tests and investigations of the LDAS system's capability and readiness to produce reduced data sets, including the capability to do resampling.

Provide feedback to LDAS software engineers, from a user's point of view, regarding the performance of the LDAS system in producing reduced data sets, and regarding improvements which can be made in the future to better accomplish the said task of producing reduced data sets.

Write tcl script which submits jobs to LDAS at LHO and LLO to continuously generate reduced data sets at the two sites.

June 2002

Complete integration of particle detector as a complete system at LHO.

In-situ measurement of transfer functions from magnetic fields to IFO control signals.

Major update of GlitchMon (for E8)

Generate Level 2 reduced data set for the eighth LIGO engineering run using the LDAS system.

Generate Level 2 reduced data set for the first LIGO science run using the LDAS system.

Evaluate the performance of the LDAS system to produce reduced data sets and identify performance issues, if any, which should be addressed.

Perform quantitative comparisons of the original data channels in the original data set with the resampled data channels in the generated reduced data set to investigate the effects of data resampling.

July 2002

Use LIGO cosmic ray systems as part of an outreach program.

First tests using new gust meter for studying the coupling of gusts and optic motion

August 2002

Determine the source of the 2.295 Hz signal, the 19.6 Hz signal and other environmental contributors to large peaks in IFO signals.

September 2002

Complete installation and commissioning of particle system for LLO.

Complete commissioning of cosmic ray system at LHO and incorporate into the run data stream, if possible.

Have cosmic ray signals from N. American arrays ready as an external trigger for LIGO.

Complete LIGO-doc T010088-00-H on cosmic ray system

Extend UTBRG's Newtonian noise estimates from Hanford to Livingston.

Contribute to a paper on line correlations

Identify the source of the excess coupling (by at least two orders of magnitude) between the ambient magnetic field and IFO control

October, 2002

Contribute to veto infrastructure by writing DMT absolute glitch monitor and determining environmental couplings.

Measure, using simulated gravity waves, the coupling between GW and auxiliary IFO channels to prevent vetos based on MICH_CNTRL and other IFO channels from vetoing GW waves and producing erroneously low upper limits.

November, 2002

Develop a scheme to monitor the ratio's of resonance peaks to their upconverted counterparts so that the main sources of upconversion can be identified and corrected. (upconverted peaks that are disproportionately large indicate problems associated with the mode producing the peak).

10. During the period February 15, 2002 to August 15, 2002, the LIGO Laboratory will share, as requested and appropriate, the LIGO data of relevance to the research topics in Item No. 9 above.

11. The research effort pursuant to this Attachment A will be coordinated by James Brau, and Gary Sanders and Albert Lazzarini on behalf of UOERG 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.

a) Accommodations for UOERG investigators while on LIGO research assignment at Caltech, and or LIGO sites.

b) Continuing funding support for UOERG investigators is being coordinated with the LIGO Laboratory.

Approved:

Barry Barish
LIGO Laboratory Director

Date

James E. Brau
UOERG Principal Investigator

Date

Albert Lazzarini
LIGO Laboratory Data and Computing
Group Leader

Date