

**Attachment Number B to the  
Memorandum of Understanding (LIGO-M950037-00-M)  
between the  
University of Colorado  
and the  
Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory  
August 15, 1998**

This Attachment to the Memorandum of Understanding LIGO-M950037-00-M covers the role of the University of Colorado JILA Gravity Group (JILAGG) as a Charter Member of the LIGO Scientific Collaboration (LSC) and a member of the Isolation/Suspension/Thermal Noise Development Group (ISTNDG). The period of performance for the activities in this Attachment is from August 15, 1998 to February 15, 1999. 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 Colorado JILAGG and the LIGO Laboratory concerning the activities of JILAGG as a Collaborating Institution in the LIGO Scientific Collaboration (LSC) and in the Isolation/Suspension/Thermal Noise Development Group (ISTNDG), and as indicated in Item No. 8 below.
4. Isolation/Suspension/Thermal Noise Development Group - The Isolation/Suspension/Thermal Noise Development Group (ISTNDG) is the scientific collaboration for defining and developing future isolation and suspension improvements for use in advanced subsystems for the ini-

tial 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 - JILAGG 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 JILAGG members are included in the Attachment Z to the Memorandum of Understanding LIGO-M950037-00-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. JILAGG consists of James Faller (Division Chief, NIST Quantum Physics Division at JILA, NIST senior scientist), Peter Bender (JILA Fellow), Robin Stebbins and Joe Giaime (Senior Research Associates at JILA), Tara Trumbull (University of Colorado graduate student) and David Crooks (University of Glasgow undergraduate, University of Colorado REU student). Funding for two additional Postdoctoral Fellows is in hand, and a search is underway.

JILA is a joint institute of the University of Colorado at Boulder and of the National Institute of Standards and Technology (NIST). The JILAGG is currently carrying out NSF-funded active seismic isolation research with possible future applications to LIGO. John Hall (JILA Fellow, NIST senior scientist) participates in JILAGG on LSC related activities.

During the period August 15, 1998 to February 15, 1999, JILAGG will continue research in advanced isolation/suspension systems in cooperation with the Stochastic Forces, Suspensions and Isolations Development Group of the LSC. In this time period JILAGG will:

a) Continue development of JILA's proof-of-principle low frequency active isolation platform. This is a 3 stage platform designed to isolate a 60 kg payload from ground vibration by approximately 40 dB per stage. Currently, two stages are operational, as are interferometrically read out seismometers. Activities for this period will include studies of limiting noise and investigations of improvements to reduce that noise.

b) Carry out laboratory testing and numerical simulation of improved components for active isolation platforms, which might be used in an advanced LIGO suspension/isolation system.

Investigation will be initiated into the integration of a multiple pendulum final suspension model acquired from the GEO Project with a seismic isolation model similar to the one developed by JILAGG.

c) Exercise an electromagnetic model of a switchable eddy-current damping system for advanced seismometers as part of the advanced seismometer systems development effort.

d) Fabricate a vibration table for testing a switchable eddy-current damping system for advanced seismometers.

9. During the period August 15, 1998 to February 15, 1999, the LIGO Laboratory will share, as requested and appropriate, LIGO data of relevance to the research topics in Item No. 8 above.

10. The research effort pursuant to this Attachment B will be coordinated by Robin Stebbins and Syd Meshkov on behalf of JILAGG and the 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) Provide accommodations for JILAGG investigators while on LIGO research assignment at Caltech, and/or LIGO sites.

Approved:

Barry Barish  
Barry Barish  
LIGO Laboratory Director

Robin Stebbins  
Robin Stebbins  
JILAGG Principal Investigator

4-19-00  
Date

17 MAR. 2000  
Date