



**Attachment OPS to the  
Memorandum of Understanding LIGO-M950059-00  
between the Experimental Relativity Group of the Louisiana State  
University (LSUERG)  
and the  
Laser Interferometer Gravitational Wave Observatory (LIGO)  
For The Period  
August 15, 2008 - August 14, 2009**

This Attachment OPS to the Memorandum of Understanding LIGO-M950059-00 defines the role of the Experimental Relativity Group of the Louisiana State University (LSUERG) as a Member of the LIGO Scientific Collaboration (LSC) in the areas of detector commissioning, detector characterization, and operations support in the initial LIGO interferometers. The period of performance for the activities in this Attachment is from August 15, 2008 - August 14, 2009.

## **1. Collaboration**

Together, the LIGO Laboratory and the LIGO Scientific Collaboration (LSC) are responsible for implementing and exploiting the initial LIGO detector through its science data runs. LSC groups are encouraged to contribute to the commissioning, characterization, and operation of the LIGO detectors, as members of working groups established by the LIGO Laboratory and the LSC.

## **2. Participation**

During the period August 15, 2008 - August 14, 2009, the members of LSUERG will participate in the initial LIGO detector research program in the following areas:

### **a. Detector Commissioning**

Shyang Wen, Rupal Amin, Jeff Kissel, Jake Slutsky and Sarah Caudill (graduate students); Myungkee Sung, Romain Gouaty (postdocs); Joe Giaime, Warren Johnson and Gabriela Gonzalez (faculty) will continue to be involved in the commissioning, calibration and detector characterization activities. Cristina Torres (a CIT postdoc collaborating with the LSU group) will also work on detector characterization activities.

We expect two more graduate students to be involved in the 08-09 cycle: Tobin Fricke (an advanced graduate student transferring to LSU), and Ryan DeRosa (a new incoming graduate student). We hope to hire a new postdoc to be involved primarily with detector characterization activities.

- Shyang Wen will finish documenting the progress achieved by HEPI work, producing a technical paper and finishing his thesis.

- Jeff Kissel will document commissioning work done on active seismic isolation for HAM chambers, and help the remaining commissioning of HAM ISI.
- Rupal Amin will be involved in the modeling and commissioning of the Thermal Compensation System for the Enhanced LIGO detectors.
- Tobin Fricke will continue contributing to the commissioning of the Output Mode Cleaner and the DC readout for Enhanced LIGO.
- Jeff Kissel and Gabriela Gonzalez will be involved in the noise hunting, and specifically noise budgeting for the Enhanced LIGO detectors.
- Jeff Kissel will be involved with the ASC diagnosing and tuning of the Enhanced L1 detector.

b. Detector Characterization

- Gabriela Gonzalez will lead the LSC Detector Characterization working group.
- Gabriela Gonzalez will work with Keith Riles on incorporating S5 data quality flags in the database as they are defined; and she will insert S6 flags.
- Gabriela Gonzalez, Jeff Kissel, Jacob Slutsky, Sarah Caudill will work with the glitch group characterizing S5 and S6 transients, and identifying new data quality flags as needed.
- Gabriela Gonzalez, Jeff Kissel will develop tools to monitor large excursions from a stationarity background of the data for extended period of time ("glitchy segments").
- Jacob Slutsky, Jeff Kissel will monitor large triggers generated in the online inspiral search indicating instrument or environmental causes not identified by online flags.
- Romain Gouaty, Sarah Caudill, Gabriela Gonzalez will follow up candidates resulting from the S5 CBC searches and report on any instrumental or environmental causes that may have produced any false alarms and can be better vetoed in the future.
- Sarah Caudill, Cristina Torres (from CIT), Myungkee Sung, Warren Johnson and Gabriela Gonzalez will finish their commitment to searches for DQ flags suggested by entries in the S5 elog entries.
- Gabriela Gonzalez, Jeff Kissel, and Myungkee Sung will work on S5 and S6 detectors' calibration, including work on models, measurements done at LLO, generation of calibration coefficients, and production and review of time domain calibration.
- Gabriela Gonzalez and Cristina Torres (CIT) will use Cristina's tracksearch algorithms to monitor artifacts of relatively long duration (minutes) and narrow frequency bands.

c. Detector Operations

LSU group members will fill in science monitor shifts as needed.

d. Other Contributions

*Not Applicable*

### 3. 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. 2, as indicated below.

- a. Research accommodations for LSUERG group members while on LIGO research assignment at any LIGO Laboratory site.

LSU personnel working on commissioning will require desk space at the Livingston Observatory.

- b. Access to LIGO data through established LSC channels in support of this work.

*Not Applicable*

#### **4. Coordination and Reporting**

LSUERG will perform research within the structures established by the LIGO Laboratory and the LSC where appropriate.

In particular, with reference to activities described above:

**2a** will be carried out in coordination with the LIGO Laboratory Commissioning Leader.

**2b** will be carried out within the Detector Characterization Working Group of the LSC.

**2c** will be carried out in coordination with the LHO or LLO Site Head.

This includes keeping the Group leaders informed of activities and plans, reporting to the group at meetings and telecons, and through technical documents submitted to the LIGO Document Control Center.

In addition, an annual report will be submitted with the update to this Attachment, giving a summary status on research by topic as indicated in Item No. 2, 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.

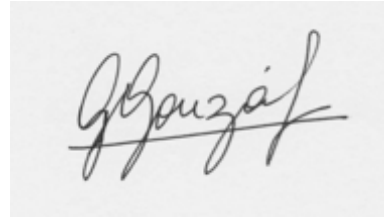
This Attachment will be updated at least annually with a plan of activities for the succeeding one-year period. These documents will be due one month before the close of the period of performance under this Attachment.

#### **5. Computer Code**

All computer code delivered to the LSC under this Attachment must be developed in consultation with the LSC Data Analysis Software Working Group (DASWG) and archived, documented and reviewed as determined by that group.



Jay Marx  
**LIGO Laboratory Director**



Gabriela Gonzalez  
**Principal Investigator(s)**  
**LSUERG**



David Reitze  
**LSC Spokesperson**