

**Attachment OPT to the  
Memorandum of Understanding (LIGO-M950059-00-M)  
between the  
Experimental Relativity Group of the Louisiana State University (LSUERG)  
and the  
Laser Interferometer Gravitational Wave Observatory (LIGO)  
August 15, 2005**

This Attachment OPT to the Memorandum of Understanding LIGO-M950059-00-M defines the role of the Louisiana State University Experimental Relativity Group (LSUERG) as a Member of the LIGO Scientific Collaboration (LSC) and a member of the Optics Development Group (ODG). The period of performance for the activities in this Attachment is from August 15, 2005 to August 15, 2006.

1. Optics Development Group – The Optics Development Group (ODG) is the scientific collaboration for defining and developing improvements in optics for use in advanced subsystems for the initial LIGO interferometers or in entirely new advanced interferometers. MOU Attachments define the roles and responsibilities of groups in this development group.
2. During the period August 15, 2005 to August 15, 2006, the members of LSUERG Group will participate in ODG in the following areas:

a) Seismic Isolation and Suspension:

Joe Giaime and Shyang Wen will work to enhance performance of the external hydraulic actuator seismic isolation system (HEPI) at LLO, using signal paths that connect it with the main length and angle control systems to reallocate control authority. Also, enhancements that employ resonant gain at suspension resonances will be tried. Gabriela González will continue to help the LLO staff in the commissioning of the ASC (Alignment Sensing and Control) wavefront sensor and optical lever control systems.

b) Detector Characterization

Myungkee Sung will produce time-dependent calibration factors for the final version of the S4 calibration. He also intends to produce the same coefficients on-line (or within a day) during the upcoming S5 run. Gabriela Gonzalez, in collaboration with Mike Landry and Brian O'Reilly, is producing the models to generate the reference functions for the final S4 calibration. She is also working on the documentation of the S4 calibration.

Gabriela Gonzalez and Myungkee Sung will produce data quality flags associated with calibration and loop gain fluctuations for S5.

Gabriela Gonzalez and Jacob Slutsky will work on veto strategies for the various inspiral

searches, developing new detector diagnostic triggers as needed for these vetoes.

c) Engineering Run and Science Runs

González will keep lock statistics for the science runs. González will work on calibration runs of the LLO detector during S4 and S5 (there are usually three calibration runs, before the run, in the middle of the run and after the end of the run). Gabriela González and Joe Giaime will act as contact persons to fill the shifts required of LSU.

d) Chief Scientist at LIGO Livingston Joseph Giaime will continue as the Chief Scientist at LIGO Livingston.

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,
  - b) Access to LIGO data in support through established LSC channels in support of this work.
4. Coordination and Reporting – LSUERG Group will perform this research within the structures established by the LIGO Laboratory and the LSC where appropriate. In particular activities described in Item 2 will be carried out within the Optics Development Working Group of the LSC. Coordination will include 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 on-year period. These documents will be due one month before the close of the period of performance under this Attachment.

Approved:

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Barry Barish  
LIGO Laboratory Director

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Joseph A. Giaime  
LSUERG Principal Investigator

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Peter Saulson  
LSC Spokesperson

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David Reitze  
ODG Leader