

**Attachment OPS to the  
Memorandum of Understanding (LIGO-M050370-00-M)  
between the  
Columbia Experimental Gravity Group (GEC0)  
and the  
Laser Interferometer Gravitational Wave Observatory (LIGO)  
August 15, 2005**

This Attachment OPS to the Memorandum of Understanding LIGO-M050370-00-M defines the role of the Columbia Experimental Gravity Group (GEC0) as a Member of the LIGO Scientific Collaboration (LSC) in the areas of detector commissioning, detector characterization, and operations in support of the initial LIGO interferometers. The period of performance for the activities in this Attachment is from August 15, 2005 to August 15, 2006.

1. 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. During the period August 15, 2005 to August 15, 2006, the members of GEC0 Group will participate in the initial LIGO detector research program in the following areas:
  - a) *Commissioning effort:*
    - Commissioning and testing support for the S5 timing upgrade
    - Contribution in the detector stability and sensitivity improvements.
    - Participation in calibration studies
  - b) *Diagnostic and detector characterization projects:*
    - Timing studies, including monitoring software/hardware improvement/maintenance
    - Spectrum consistency/stationarity studies, including monitoring software improvement/maintenance
    - DMT infrastructure development and maintenance: (SPI and WebView)
    - Implement needed new ideas (dependent of available manpower and LIGO lab priorities)
  - c) *LIGO Operation:*
    - Participate in scientific shifts during science runs
    - Work with operators to make the control room tools developed by GEC0 members more and more useful
    - Listen and act on the ideas/request of operators to develop new tools (dependent of available manpower and LIGO lab priorities)

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 GEC0 group members while on LIGO research assignment at any LIGO Laboratory site,
  - b) Access to LIGO data through established LSC channels in support of this work.
4. Coordination and Reporting – GEC0 Group will perform this research within the structures established by the LIGO Laboratory and the LSC where appropriate. In particular activities described in Item 2a) will be carried out in coordination with the LIGO Laboratory Commissioning Leader, Item 2b) will be carried out within the Detector Characterization Working Group of the LSC, and Item 2c) will be carried out in coordination with the LHO {or LLO} Site Head. 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.

5. 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.

Approved:

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Barry Barish  
LIGO Laboratory Director

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Szabolcs Márka  
GEC0 Principal Investigator

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Peter Saulson  
LSC Spokesperson

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Keith Riles  
LSC Detector Characterization Leader

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Peter Fritschel  
LIGO Lab Commissioning Leader