



**Attachment DAT to the  
Memorandum of Understanding LIGO-M050370-00  
between the Columbia Experimental Gravity Group (GEC0)  
and the  
Laser Interferometer Gravitational Wave Observatory (LIGO)  
For The Period  
August 15, 2007 - August 14, 2008**

This Attachment DAT to the Memorandum of Understanding LIGO-M050370-00 defines the role of the Columbia Experimental Gravity Group (GEC0) as a Member of the LIGO Scientific Collaboration (LSC). In particular, it addresses data analysis activities in support of the initial LIGO interferometers. The period of performance for the activities in this Attachment is from August 15, 2007 - August 14, 2008.

## **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. The LSC has organized the data analysis effort into search groups which coordinate analysis, review, and publication on behalf of the collaboration. LSC groups are encouraged to participate in one or more of these groups.

MOU Attachment DAT defines the contributions of each participating group to the data analysis development groups.

## **2. Participation**

During the period August 15, 2007 - August 14, 2008, the members of GEC0 will participate in the analysis of initial LIGO data in the following areas:

a. Binary Inspirals

*Not Applicable*

b. Bursts

GEC0 will continue to concentrate on and spearhead scientifically intriguing astrophysical trigger based analyses. Marka will continue the coordination of the work of the ExTrig group.

GEC0 (Kalmus, Matone and Khan) will advance publications on S5 SGR searches.

GEC0 will advise Raffai on the search looking for GWs in S5 data from GRBs lasting for a second to a minute time scale.

GEC0 (Rollins) will search for the gravitational wave signatures associated with the best characterized optical supernovae triggers.

GEC0 is interested in relatively close by GRBs events. We will search for gravitational wave signatures associated with the most promising GRB triggers. GEC0 will keep an eye on received astrophysical triggers and start a specialized offline search for exceptionally close-by or remarkably energetic cosmic events. Depending on the nature of the astrophysical event we will use existing analysis code or will develop specialized new analysis.

GEC0 is searching for gravitational waves associated with ultra high neutrino events provided by the IceCube experiment. Although the source and nature of these events might be fairly uncertain, the energy associated with them makes plausible that their source is a cataclysmic cosmic event capable of generating GWs with unprecedented strength. It is definitely an interesting scientific issue to tackle. A publication with detailed analysis results on surrogate LIGO-VIRGO and IceCube data is the next milestone. This is to pave the way for joint analysis of real data.

A specialized search code for repeating point source emitters on the sky is under development, with the goal of finding potential positions on the celestial sphere with an abundance of low strength events. The project is ongoing targeting significant sensitivity improvements, including population model based motivation.

Another algorithm under development aims to reconstruct a self similar signal buried in different noise streams. If succeeds, the algorithm should be capable of reconstructing the relatively weak waveform. That would be highly advantageous for extracting astrophysical information from possible detections.

c. Stochastic

*Not Applicable*

d. Continuous

*Not Applicable*

e. 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 GEC0 group members while on LIGO research assignment at any LIGO Laboratory site.

*Not Applicable*

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

(This includes data and computing infrastructure.)

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

GECo 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 within the LSC Inspiral Search Group.

**2b** will be carried out within the LSC Burst Search Group.

**2c** will be carried out within the LSC Stochastic Search Group.

**2d** will be carried out within the LSC Continuous Waves search Group.

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**



Szabolcs Marka  
**Principal Investigator(s)**  
**GEC**



David Reitze  
**LSC Spokesperson**