



**Attachment OPS to the  
Memorandum of Understanding LIGO-M070064-00  
between the Eotvos University (EOTVOS)  
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-M070064-00 defines the role of the Eotvos University (EOTVOS) 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 EOTVOS will participate in the initial LIGO detector research program in the following areas:

### **a. Detector Commissioning**

First prepare and later station student(s) at an observatory for extended periods (months) to help the commissioning effort.

During the past year we have identified Gabor Gelencser and Gabor Szeifert as potential (and well prepared) candidates for this job. Following intensive preparations during the fall (and perhaps into the spring) semester they are available for stationing at an observatory for about 4 months each (staying and working together).

### **b. Detector Characterization**

In our 2007 MoU EGRG volunteered for mapping the significance of crosstalk between the gravitational wave channel (DARM-ERR) and the neighboring channels

within the same DAQ unit at the 960 Hz frequency range. Development and testing of a code based on narrow-band filtering gravitational wave channel data and cross-correlating the flow with timing signal has already started and in progress. The cross-correlation studies are proposed to be carried out so as to map the time-dependence of crosstalk between the different channels. Currently, in the testing phase, simulated data is being used. Query to use real S5 LIGO data is being proposed. In case of having results for the time dependence of the crosstalk and finding any interesting features or trends, elogs of the S5 LIGO run will be carefully checked to find possible source event candidates. Depending on the results, EGRG later might decide to develop a specialized DMT monitor to automatize this investigation for the long term.

c. Detector Operations

Prepare students and postdocs and later participate in scientific shifts during science runs.

Peter Raffai (in his 3rd year of graduate studies) is ready and available for this purpose.

d. Other Contributions

PEM system enhancement for Advanced LIGO (and potentially for eLIGO):

The highest priority task is to finalize the infrasonic microphone design. As the prototype is nearly ready, we plan to start testing already in July and have a final conceptual design by the end of August (if the current design delivers the required sensitivity).

Parallel to this, we are developing the DAQ interface to LIGO (D/A converters). This is planned for August-September. Initially we plan to deploy these devices in Hannover, preferably with a working Infrasonic Microphone prototype (should it not be ready by then, we will use simulated data to test the interface to LIGO).

In September-October we plan to complete multiple prototypes of the infrasonic microphones and distribute them to the community for testing (including the complete interface). Obviously the PDR document will be part of this distribution.

During the few month testing period, we will review the current PEM system of LIGO and decide which components can be integrated into our new PEM platform.

By special request, we will also develop and (if feasible) build a prototype LOW NOISE WIDE BAND MAGNETIC FIELD SENSOR as a potential substitute for the MGCH-2 sensor proposed to the collaboration.

### 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 EOTVOS 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.

*Not Applicable*

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

EOTVOS 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.

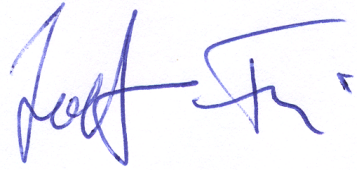
This Attachment will be updated at least annually with a plan of activities for the succeeding one-year period. These documents will be due one month before the close of the period of performance under this Attachment.

#### **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**



Zsolt Frei  
**Principal Investigator(s)**  
**EOTVOS**



David Reitze  
**LSC Spokesperson**