



**Attachment OPS to the  
Memorandum of Understanding LIGO-M970077-00  
between the German/British Collaboration (GEO 600) for the  
Detection of Gravitational Waves (GEO600)  
and the  
Laser Interferometer Gravitational Wave Observatory (LIGO)  
For The Period  
August 15, 2007 - August 14, 2008**

This Attachment OPS to the Memorandum of Understanding LIGO-M970077-00 defines the role of the German/British Collaboration (GEO 600) for the Detection of Gravitational Waves (GEO600) 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, 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. 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, 2007 - August 14, 2008, the members of GEO600 will participate in the initial LIGO detector research program in the following areas:

### **a. Detector Commissioning**

Up to October 2007 the GEO600 will take science data during the nights and weekends, while during daytime commissioning and characterization work takes place. The commissioning efforts are focused on reducing and stabilizing the glitchrate of the instrument on the one hand and to improve the sensitivity on the other hand. Currently the sensitivity of GEO600 is limited in a range from 100 to 600 Hz by an unknown noise source. It is intended to make strong efforts to find and eliminate this noise, which is suspected to originate from scattered light. However, it is not clear how likely this noise source can be found before October 2007.

### **b. Detector Characterization**

As we prepare to enter and perform astrowatch mode we will continue to look for detector and environmental channels that, in combination with the veto methods

already established, allow the glitch rate to be kept to a minimum, particularly for glitches with power in the most sensitive region of the spectrum.  
Over the astrowatch period we will maintain summary pages, calibration, noise projections and general detector performance.

c. Detector Operations

Starting in October the GEO detector will be operated in astrowatch mode in order to provide data and cover the period when the 4km LIGO instruments and VIRGO are shut down for installation and commissioning of enhanced LIGO and VIRGO+, respectively. It is expected that an average science time duty cycle of larger than 75% will be achieved during this period.

In parallel we will start to evaluate the potential benefit of using continuously injected squeezed light in GEO600. The application of squeezing will allow to significantly reduce shot noise contribution and to improve the sensitivity. A detailed proposal for the realization of squeezed light application in GEO600 will be prepared, including: Estimated increase of super nova detection probability Estimated downtime of the GEO600 detector for installation and commissioning of the corresponding subsystem

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 GEO600 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

GEO600 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**



Karsten Danzmann  
**Principal Investigator(s)  
GEO600**



David Reitze  
**LSC Spokesperson**