



**Attachment ACF 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, 2008 - August 14, 2009**

This Attachment ACF 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), and a member of the Advanced Detector Configurations Development Group (ADCDG). The period of performance for the activities described in this Attachment is from August 15, 2008 - August 14, 2009.

## **1. Collaboration**

The Advanced Detector Configurations Development Group (ADCDG) is the scientific collaboration for defining and developing entirely new advanced interferometers. It is expected that this development group will pursue research in dual recycling, resonant sideband extraction, Sagnac interferometers, systems with non-transmitting optics, and other advanced configurations. MOU Attachment ACF defines the role and responsibilities of workgroups participating in this development group.

## **2. Participation**

During the period August 15, 2008 - August 14, 2009, the members of GEO600 will participate in the ADCDG in the following areas:

### **a. Interferometer Configurations**

At Glasgow experiments with the diffractively-coupled, suspended optical cavity shall conclude, and the results shall be disseminated. A design study into an experimental test of radiation pressure, currently underway, shall be completed. The outcome shall determine the design of a controls test in a radiation-pressure dominated cavity, as a precursor to low-noise experiments in Hannover.

### **b. Squeezed Light Generation**

In Birmingham, work will continue to coordinate the GEO Simulation group and to model optical configurations for second generation detectors, focusing on im-

proving the detectors' performance after the initial installation. This includes continuing the development of FINESSE, in particular towards implementing radiation pressure effects. Experimental work will be started on initial proof of principle demonstrations of displacement noise free interferometry. Birmingham contributes to future GEO upgrades, especially with investigations of control systems for the injection of squeezed vacuum.

In Hannover a squeezed light source for a high-frequency upgrade of GEO600 will be commissioned. The experimental work on Kerr media in laser interferometers will be continued. High-reflection mirrors with single coating layers will be experimentally characterized as cavity couplers.

In Hannover and Golm theoretical and modelling work will continue. Simulations and calculations will be related to the development of Advanced LIGO and the prototype facility in Hannover. Considerations of potential QND schemes for 3rd generation detectors will be continued.

c. Other Contributions

At Hannover, with input from Glasgow, a low-noise interferometer prototype facility shall be constructed and commissioned: during the period of this attachment work shall focus on vacuum system commissioning and detailed design and procurement of the isolation system.

### 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 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 Advanced Detector Configurations Development Group of the LSC.

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**