

**Attachment LAS to the
Memorandum of Understanding (LIGO-M970077-00-M)
between the
German/British Collaboration (GEO 600) for the
Detection of Gravitational Waves
and the
Laser Interferometer Gravitational Wave Observatory (LIGO)
August 15, 2005**

This Attachment LAS to the Memorandum of Understanding LIGO-M970077-00-M defines the role of the German/British Collaboration (GEO 600) as a Member of the LIGO Scientific Collaboration (LSC) and a member of the Lasers Development Group (LDG). The period of performance for the activities in this Attachment is from August 15, 2005 to August 15, 2006.

1. Lasers Development Group - The Lasers Development Group (LDG) is the scientific collaboration for defining and developing future high power lasers for use in advanced subsystems for the initial LIGO interferometers or in entirely new advanced interferometers. MOU Attachments define the roles and responsibilities of groups in this development group.
2. During the period August 15, 2005 to August 15, 2006, the members of the GEO 600 Group will participate in LDG in the following areas:

Laser development

The GEO600 group is taking the leading role in the Advanced LIGO pre-stabilized laser system (PSL) development. This includes overseeing the laser development at the Laser Zentrum Hannover (LZH) as well as the development of the power and frequency stabilization feed-back control loops. In addition the GEO600 group will continue the investigations of cross-coupling between the different stabilization loops of the GEO600 PSL and long-term test of this system at the GEO site.

(i) Work on the development of the Advanced LIGO laser system will continue at the LZH. During this MOU period the free-running noise and the spatial beam profile of a 200W laboratory prototype system will be measured. Based on the results an AdvLIGO pre-modecleaner will be designed. Stabilization experiments of this system will continue toward a pre-stabilized laser system that comes close to the requirements for AdvLIGO. Based on the results of the 200W laser characterization PSL systems simulation will start with the goal to define requirements for sensors, actuators and the filters for the final control loop design.

(ii) One of the main challenges for the AdLIGO PSL will be the power stabilization. Experiments at the 10W level will continue to analyze and reduce the excess noise sources between in-loop and out-of-loop measurements. To distinguish between electronic noise and optical noise a quiet current source will be used to drive the transimpedance amplifiers to test

their noise performance at 10Hz under a strong DC current load.

(iii) Coordination of the Lasers Working Group of the LSC

Faculty:	Danzmann (10%), Willke (30%)
Grad. Students:	Heurs(90%), Seyfert (90%)
Engineers:	Weidner (50%), zur Mühlen (50%)

The research effort pursuant to this Attachment A will be coordinated by Benno Willke (GEO 600) and the leader(s) of the LDG.

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 GEO 600 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 – GEO 600 Group 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 Lasers Development Working Group of the LSC. 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.

Approved:



Jay Marx
LIGO Laboratory Director

Benno Willke
GEO 600 Principal Investigator



Peter Saulson
LSC Spokesperson

Benno Wilke
LDG Leader