

**Attachment Number D to the
Memorandum of Understanding (LIGO-M970077-00-M)
between the
German/British Collaboration for the Detection of Gravitational Waves (GEO
600)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory
February 15, 2000**

This Attachment to the Memorandum of Understanding LIGO-M970077-00-M covers the role of GEO 600 as a Charter 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 in this Attachment is from February 15, 2000 to August 15, 2000. This period may be modified by agreement to a revision of this Attachment.

1. LIGO Scientific Collaboration - The LIGO Scientific Collaboration is organized as a separate organization from the LIGO Laboratory. It includes scientists from the LIGO Laboratory, and those from collaborating institutions, and has its own leadership and governance. The Collaboration will ensure equal scientific opportunity for individual participants and institutions. It will organize the research, publications, and all other scientific activities. The Collaboration will report to the Laboratory Directorate for final approval of its research program, technical work, observational physics publications, and talks announcing new observations and physics results. This will be done through regular reports to the Directorate and its PAC.
2. Charter Membership - An initial period for formation of the Charter group of institutions in the LIGO Scientific Collaboration commenced on March 1, 1997 and ended following the first full meeting of the Collaboration at which the Collaboration Council assumed its role.

Following the charter period proposals will be evaluated through the Collaboration Council. With Collaboration approval, an MOU with the LIGO Laboratory, including Attachments defining specific work, will be required for any participating institutions.

3. This document is an agreement between the German/British Collaboration for the Detection of Gravitational Waves (GEO 600) and the LIGO Laboratory concerning the activities of GEO 600 as a Collaborating Institution in the LIGO Scientific Collaboration (LSC) and in the Advanced Detector Configurations Development Group (ADCDG), and as indicated in Item No. 8 below.
4. Advanced Detector Configurations Development Group - The Advanced Detector Configurations Development Group (ADCDG) is the scientific collaboration for defining and develop-

ing 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. A specific Attachment will define the roles and responsibilities of groups in this development group. Members of this group will normally be authors on publications reporting the work of the group and will normally be eligible to participate in data runs and science beyond the LIGO I data run.

5. Report of Progress - GEO 600 will provide a status report on its activities in support of LIGO every six months. The report will consist of: a) a summary status on research by topic as indicated Item No. 8 below 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, b) updated List of Collaborators, and c) a plan of activities for the succeeding six-monthly period. The report will be due one month before the close of the period of performance under the Attachment in question.

The coordinates of GEO 600 members are included in the Attachment Z to the Memorandum of Understanding LIGO-M970077-00-M.

6. Term of Membership - The Membership will be renewed every six months upon evidence of satisfactory performance of agreed upon duties.
7. For the GEO 600 personnel, who will participate in the ADCDG activities in Item No. 8 below, see the attached GEO LSC Contribution for LSC Period 02-15, 2000 through 08-15-2000.
8. The GEO 600 group will continue investigations of Advanced Interferometer Configurations, relevant to Enhanced/Advanced LIGO Interferometers, as follows:

a) System under development for GEO 600

1. The GEO 600 concept is a dual-recycled interferometer, using four-pass delay lines in its 600m arms

2. Signal recycling (power recycling is considered standard for all current detectors) is a unique feature of GEO 600, but one that could find future application in other detectors

3. Resonant Sideband Extraction, also being investigated, has many configurational similarities with signal recycling. It is being considered by several groups as a promising future configuration.

b) Planned research

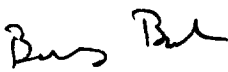
Current and future activities at Garching (30m prototype), Glasgow (10m prototype), and Hannover (GEO site) will include.

1. Studies of the dual recycling system (Garching), with further investigation of system per-

formance limits. Including, at the appropriate time, completion of the 12 degree of freedom auto-alignment system.

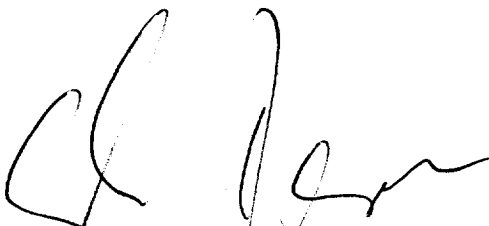
2. Initial stages of signal recycling experiments at Glasgow. The 10m prototype will be prepared for experiments with re-combined output beams.
9. During the period February 15, 2000 to August 15, 2000, the LIGO Laboratory will share, as requested and appropriate, the LIGO data of relevance to the planned research in Item No. 8, b) above.
10. The research effort pursuant to this Attachment D will be coordinated by Kenneth Strain and Syd Meshkov on behalf of GEO 600 and the LIGO Laboratory, respectively.
11. 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. 8, as indicated below. These resources will be in addition to the coordination effort and data to be made available per Item No. 9 above.
 - a) Provide accommodations for GEO 600 investigators while on LIGO research assignment at Caltech, and/or at LIGO sites.

Approved:



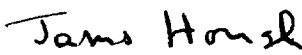
Barry Barish
LIGO Laboratory Director
6-12-00

Date



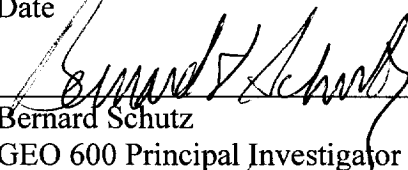
Karsten Danzmann
GEO 600 Principal Investigator
20.3.00

Date



James Hough
GEO 600 Principal Investigator
18/03/00

Date



Bernard Schutz
GEO 600 Principal Investigator
24/03/00

Date

GEO LSC Contribution
for LSC Period 02-15-2000 through 08-15-2000

GEO LSC contribution						16/2/00
name	position	attachment A	attachment B	attachment C	attachment D	total (for attachment Z)
Hannover/Garching						
Danzmann, Karsten	faculty	10%	10%	10%	10%	40%
Aufmuth, Peter	faculty	30%	20%			50%
Weidner, Andreas	engineer	50%	10%	20%	20%	100%
Rüdiger, Albrecht	equiv. faculty		10%		30%	40%
Quetschke, Volker	grad. student			100%		100%
Willke, Benno	post doc	80%		20%		100%
Haupt, Klaus	engineer	30%	20%	20%		70%
Winkler, Walter	equiv. faculty	50%			10%	60%
Schilling, Roland	equiv. faculty				20%	20%
Lueck, Harald	post doc	50%	30%		20%	100%
Mossavi, Kasem	post doc	100%				100%
Freise, Andreas	grad. student	40%			60%	100%
Kloevekorn, Patrick	post doc	50%	50%			100%
Grass, Walter	engineer	100%				100%
Kirchner, Michele	grad. student			100%		100%
Kawabe, Keita	post doc				100%	100%
Kötter, Karsten	grad. student	30%			50%	80%
Leonhardt, Volker	grad. student			50%		50%
Gossler, Stefan	grad. student	100%				100%
Grote, Hartmut	grad. student	100%				100%
zur Mühlen, Heiko	engineer	50%		50%		100%
Glasgow						
Hough, James	faculty	45%	40%		5%	90%
Newton, Gavin	faculty	100%				100%
Robertson, Norna	faculty	50%	50%			100%
Strain, Ken	faculty	40%	10%		50%	100%
Ward, Harry	faculty	70%	30%			100%
Cagnoli, Geppo	post doc	50%	50%			100%
Casey, Morag	post doc	100%				100%
McNamara, Paul	post doc	40%			20%	60%
Plissi, Mike	post doc	70%	30%			100%
Robertson, David	post doc	80%				80%
Rowan, Sheila	post doc	10%	15%			25%
Torrie, Calum	post doc	70%	30%			100%
Barr, Bryan	grad. student	10%			90%	100%
Clubley, David	grad. student	20%		20%		40%
Crooks, David	grad. student	20%	80%			100%
McIntosh, Stephen	grad. student	20%	80%			100%
Palmer, David	grad. student	25%	25%			50%
Sneddon, Peter	grad. student	20%	80%			100%
Craig, Colin	engineer	20%	80%			100%
Latta, Allan	engineer	100%				100%
Cardiff						
B.S. Sathyaprakash	faculty	80%				80%
R. Balasubramanian	post doc	100%				100%
D. Churches	post doc	100%				100%
I. Taylor	post doc	100%				100%
Potsdam						
Chassande-mottin, Eric	post doc	100%				100%
Cutler, Curt	equiv faculty	30%				30%
Owen, Ben	post doc	50%				50%
Papa, Marialessandra	equiv faculty	100%				100%
Schutz, Bernard	equiv faculty	30%				30%
Sintes-olives, Alicia	post doc	100%				100%
Vecchio, Alberto	equiv faculty	75%				75%
Williams, Peter	post doc	60%				60%
sum		2755%	750%	390%	485%	4380%