



**Attachment ACF to the
Memorandum of Understanding LIGO-M050292-00
between the Caltech Relativity Group (CaRT)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO)
For The Period
August 15, 2007 - August 14, 2008**

This Attachment ACF to the Memorandum of Understanding LIGO-M050292-00 defines the role of the Caltech Relativity Group (CaRT) 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, 2007 - August 14, 2008.

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, 2007 - August 14, 2008, the members of CaRT will participate in the ADCDG in the following areas:

a. Interferometer Configurations

1. Interferometers with multiple carriers

Yanbei Chen, Chao Li and Sam Waldman [LIGO-Caltech & CaRT], in collaboration with scientists at the AEI and LIGO-Caltech, will extend past and on-going work on "local readout schemes" and "double optical springs", and will search for multi-carrier configurations that may improve the sensitivity/controllability of Advanced LIGO interferometers.

2. Optimization of Beam Shape for Reducing Thermal Noise

Yanbei Chen, with Mihail Bondarescu (former Caltech grad student) and Oleg Kogan (non-LSC Caltech grad student) will analyze the practicality of a LIGO arm

cavity that uses the conical mirrors which support their beam shape that minimizes coating thermal noise. In particular, they will study susceptibility to thermal distortions, tilt instabilities, and parametric instabilities involving elastic modes of the mirrors.

b. Squeezed Light Generation

Not Applicable

c. Other Contributions

1. Testing quantum theory for macroscopic systems using future LIGO interferometers

Yanbei Chen, Chao Li, Mike Boyle, Yasushi Mino, and Sam Waldman [LIGO-Caltech & CaRT], in collaboration with scientists at the AEI and LIGO-Caltech, will continue the project, described in previous MOUs, on the feasibility of performing macroscopic-quantum-mechanics experiments using LIGO interferometers.

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 CaRT 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

CaRT 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



Kip S. Thorne
**Principal Investigator(s)
CaRT**



David Reitze
LSC Spokesperson