



**Attachment ACF to the  
Memorandum of Understanding LIGO-M050280-00  
between the Australian Consortium for Interferometric Gravitational  
Astronomy (ACIGA)  
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-M050280-00 defines the role of the Australian Consortium for Interferometric Gravitational Astronomy (ACIGA) 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 ACIGA will participate in the ADCDG in the following areas:

### **a. Interferometer Configurations**

- \* Continue analysis of a control system for power recycled FP interferometer with a variable reflectivity signal recycling mirror (VRM).
- \* Commence experimental investigation of a suspended VRM suitable for use with AdvLIGO.
- \* Continue investigation of the use of digitally interferometry (DI) as a tool to aid lock acquisition of sub configurations and of the full PRFPMI with SR by: - Carrying out a definitive multiplexing experiment to understand the degree of isolation

between optics that can be achieved

- investigating ways to reduce the minimum pathlength separation needed for DI to allow it to be applied to systems employing small Schnupp asymmetries

\* Demonstrate a new speed configuration, invented by McKenzie, based on polarization. This first demo will be done only with a simple Michelson modified by inserting polarization optics and mirrors in the output.

b. Squeezed Light Generation

\* The ANU is part of the team (ANU, MIT, AEI, LHO) proposing to install and test a squeezer on the LHO 4K after the end of S6. ANU is responsible for breadboarding the squeezer based on our ring configuration.

Requirements:

1. prepare and complete preliminary design review
2. design and build a reliable squeezer delivering locked squeezing on the order of 6 dB from 100 Hz, without employing quantum noise locking.

In addition we plan to:

\* Explore the limitations on squeezing with the current travelling wave doubly resonant system and optimize performance.

\* Design and build a 3rd generation squeezer with the goal to achieve more than 6 dB across the LIGO band.

c. Other Contributions

**Standard Quantum Limit:**

in sufficient funding.

### 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 ACIGA group members while on LIGO research assignment at any LIGO Laboratory site.

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- b. Access to LIGO data through established LSC channels in support of this work.

*Not Applicable*

### 4. Coordination and Reporting

ACIGA 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.

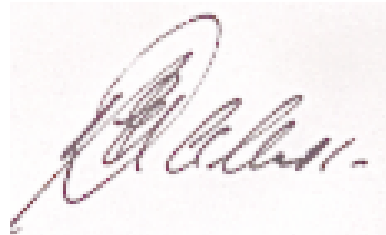
This Attachment will be updated at least annually with a plan of activities for the succeeding one-year period. These documents will be due one month before the close of the period of performance under this Attachment.

## 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**



David Ernest McClelland  
**Principal Investigator(s)**  
**ACIGA**



David Reitze  
**LSC Spokesperson**