

Attachment OPT to the
Memorandum of Understanding (LIGO-M 060057 -00-M)
between the
Embry-Riddle Gravitational Wave Astrophysics Group (ERGWAG)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO)
August 15, 2006

This Attachment OPT to the Memorandum of Understanding LIGO-M 060057 -00-M defines the role of the **Embry-Riddle Gravitational Wave Astrophysics Group** as a Member of the LIGO Scientific Collaboration (LSC) and a member of the Optics Development Group (ODG). The period of performance for the activities in this Attachment is from August 15, 2006 to August 15, 2007.

1. Optics Development Group - The Optics Development Group (ODG) is the scientific collaboration for defining and developing instruments in optics 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, 2006 to August 15, 2007, the members of **ERGWAG** will participate in ODG in the following areas:

a) Optics Characterization

As part of the LIGO coatings research effort, ERGWAG will perform measurements of mechanical loss in coatings under consideration for Advanced LIGO. These measurements allow us to make estimates of the thermal noise contribution from core optic coatings which currently dominate the projected noise spectrum of Advanced LIGO at mid-frequencies in the region of lowest noise. The work will be performed in coordination with the LIGO Laboratory.

ERGWAG will also make measurements to enable us to estimate the thermorefractive noise contribution from Advanced LIGO optical coatings -- a potentially significant source of noise in Advanced LIGO. Estimates of the strength of this noise source depend on the index of refraction variation of the high-index coating material with temperature (dn/dT). This quantity is not well known, even for the baseline high-index coating material. By measuring the reflectivity changes of test-coatings at particular wavelengths as the coatings are heated, an estimate of dn/dT for the high-index material can be obtained.

b) Other Contributions

Not Applicable

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 **ERGWAG** 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.
 - c) Not Applicable

4. Coordination and Reporting -

ERGWAG 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 Optics 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.

5. 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.

Approved:




Jay Marx
LIGO Laboratory Director

Andri M. Gretarsson

Principal Investigator

Embry-Riddle Gravitational Wave Astrophysic



Peter Saulson
LSC Spokesperson

**Andri M.
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