The LIGO Laboratory Charter

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Mission and Responsibilities

In order to assure the full scientific exploitation of LIGO, it is necessary to provide for the operation and coordination of the LIGO program and for the advocacy and execution of the science. For these reasons, following the guidance of the National Science Foundation (NSF), we establish a LIGO Laboratory to accomplish the first purpose. A LIGO Scientific Collaboration is separately formed to realize the latter purpose.

The LIGO Laboratory will:

- operate the scientific facilities at the observatory sites in Hanford, Washington and in Livingston Parish, Louisiana
- assure the scientific vitality of these detector facilities
- provide the capability for acquisition of the data, and for system modeling and data analysis
- operate LIGO research and test facilities at the observatory sites and on the MIT and Caltech campuses

- support engineering design and fabrication of detector upgrades and of new detector systems
- carry out research and development in support of the future LIGO program
- support the LIGO Scientific Collaboration in its exploitation of the scientific capabilities
- review and coordinate new LIGO research initiatives
- support public education and outreach in areas related to LIGO science and technology
- assure a safe and comfortable working environment for LIGO staff and visitors
- support the educational mission of the participating universities

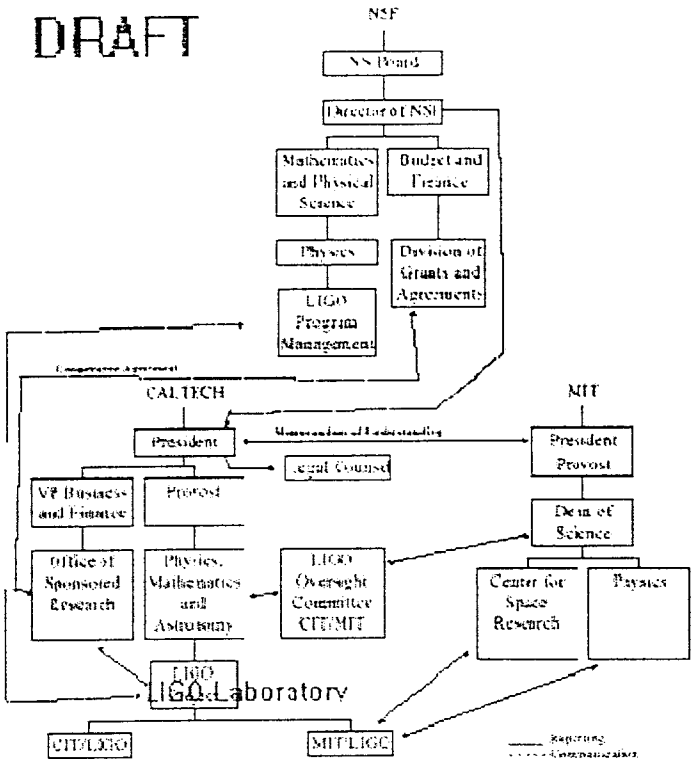
National Science Foundation Cooperative Agreement

The LIGO Laboratory operates under a Cooperative Agreement between the US National Science Foundation (NSF) and the California Institute of Technology (Caltech). The Agreement defines the obligations of Caltech and MIT in carrying out the mission of the Laboratory.

Institutional Roles and Responsibilities

Hierarchy

The LIGO Laboratory reporting and oversight is defined in the organizational hierarchy shown in the figure.



NSF

NSF is responsible for providing funding, general oversight, monitoring, and evaluation to help assure Laboratory performance in accordance with approved workplans. NSF will strive to obtain funding consistent with the Target Funding Levels set forth in the Cooperative Agreement. The actual funding available for LIGO will be negotiated with the Laboratory on the basis of the Annual LIGO Work Plan which, upon approval by NSF, will constitute the official operating plan for the year. Within the framework of the annual operating plan, NSF will undertake to provide the funding in a timely fashion and to provide the necessary document reviews and approvals as indicated in the Work Plan.

NSF Program Manager

Within the NSF, the LIGO Program Manager is responsible for scientific, technical, cost and schedule review and agency guidance. Review of progress and programmatic review of annual work plans is the responsibility of the LIGO Program Manager. Direct communication between the LIGO Program Manager and the LIGO Laboratory is the method by which this review and guidance will be accomplished. Performance of work under the Cooperative Agreement is subject to the general guidance and monitoring of the NSF Program Manager for LIGO. This NSF involvement includes the following:

- provision of advice;
- review and, where required by the Agreement, approval of required subcontracts, reports, and plans submitted by Caltech;
- assessment of progress by the NSF Program Manager and external reviewers.

NSF Division of Grants and Agreements

The NSF Division of Grants and Agreements is responsible for Cooperative Agreement matters between the NSF and Caltech. Formal communications related to contracts and required Cooperative Agreement designated approvals will be accomplished by the Division of Grants and Agreements and the Caltech Office of Sponsored Research. Annual funding increments and contractual obligations flow from the Division of Grants and Agreements (DGA), National Science Foundation (NSF) to Caltech, under the Cooperative Agreement. Excluding certain contractual arrangements, all subcontracts in excess of $100,000 issued by Caltech are subject to approval by DGA/NSF.

Caltech

Caltech is accountable, as the awardee, for the performance of the LIGO Laboratory, as described in the LIGO Annual Work Plan. Caltech is responsible for staffing the Laboratory, providing institutional support and ensuring adequate oversight of the execution and performance of the program. Caltech's Office of Sponsored Research is responsible for matters between Caltech and NSF that pertain to the administration of the terms and conditions of the Cooperative Agreement and will accomplish this through formal communications with the NSF Division of Grants and Agreements. Legal review and matters related to real property and property management will be the responsibility of the Caltech Legal Counsel reporting to the President and the Caltech Treasurer, respectively.

MIT

The LIGO Laboratory encompasses a joint effort of Caltech and MIT. The MIT roles and responsibilities are defined through a Memorandum of Understanding and subcontract with Caltech, with details defined in an attachment and updated as necessary. The MIT subcontract is subject to NSF approval. The MIT administration shares responsibility with the Caltech administration for overall oversight of the execution and performance of the LIGO program through representatives on the LIGO Oversight Committee. The MIT administration is also responsible for oversight, staffing and support of the MIT LIGO Group and for insuring that it successfully meets its institutional commitments. It is the policy of the LIGO Laboratory to have a fully integrated MIT participation with institutional boundaries minimized.

Caltech Reporting

LIGO activities at Caltech, like other research programs directed by physics faculty, are part of the Division of Physics, Mathematics and Astronomy (PMA) through which academic appointments and educational matters are administered. The Division also provides administrative and logistical support to LIGO and oversight of the Caltech effort on LIGO.

MIT Reporting

At MIT, academic appointments and educational aspects of LIGO are administered through the Department of Physics; research activities are supported through the Center for Space Research. The Department of Physics and the Center for Space Research provide oversight of the MIT effort on LIGO and they report to the President of MIT through the Dean of Science.

Oversight Committee

The presidents of Caltech and MIT have established a LIGO Oversight Committee, chaired by a member appointed by the Caltech President and composed of two members from each institution appointed by their respective presidents after mutual consultation. The Oversight Committee reports to the presidents through the Chair of Physics, Mathematics and Astronomy at Caltech and the Dean of Science at MIT. It will regularly provide review of LIGO program status and progress as required.

Director and Deputy Director

The LIGO Laboratory Director is appointed by the Caltech President in consultation with the MIT President and with the approval of NSF. The Director performs his responsibilities in close association with the LIGO Laboratory Deputy Director, who is appointed by the Director with the approval of the Presidents and the NSF. Other key personnel in the LIGO Laboratory, as defined in the Cooperative Agreement, are appointed by Caltech and MIT with the approval of NSF. The LIGO Laboratory Director, in association with the Deputy Director, reports progress on a quarterly basis to the LIGO Oversight Committee.

Organization of the LIGO Laboratory

The organization of the LIGO Laboratory is shown in the figure. It is a functional organization and has a flat hierarchy.

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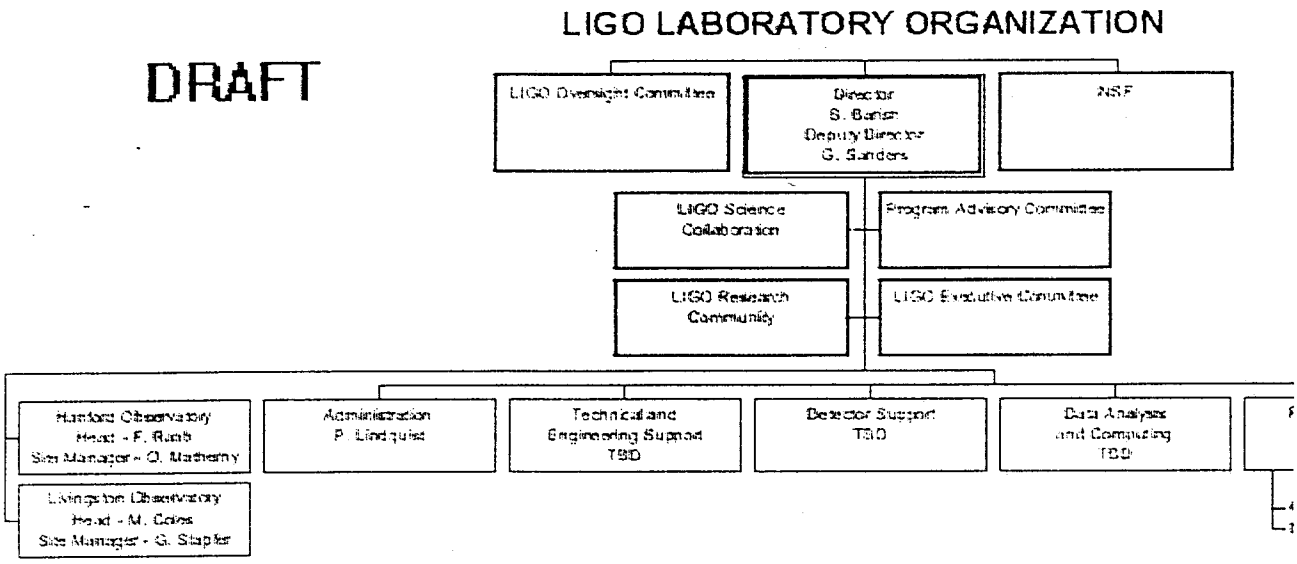

Directorate

The LIGO Laboratory Directorate consists of the Director and the Deputy Director. Although each has different well-defined primary responsibilities, the overall Laboratory direction is fully shared and either can speak for the Laboratory. Both the Director and the Deputy Director are fully informed on all major decisions and will be mutually involved in the decision making as appropriate. The LIGO Laboratory Director has overall responsibility for the LIGO Laboratory. The Director's primary responsibility is to ensure the development and implementation of the LIGO Laboratory program in a timely and cost effective manner with the goal of detecting gravitational waves and carrying out a program of gravitational wave astronomy. The Deputy Director is primarily responsible for executing the LIGO program and for organizing and directing the Laboratory team composed of Caltech and MIT staff. The Director is the principal point for communication and interaction with NSF, through its LIGO Program Manager. The Director is also responsible for maintaining interactions and collaboration with the scientific community (both national and international).

LIGO Scientific Collaboration

The LIGO Scientific Collaboration (LSC) will carry out the LIGO research and development program, develop priorities, and enable participation by collaborating groups. It will be organized as a separate entity distinct from the LIGO Laboratory. Through its Spokesperson, the LSC will communicate with the Laboratory through the Laboratory Directorate.

LIGO Research Community

The LIGO Research Community (LRC) consists of all scientists interested in the scientific opportunities offered by LIGO. Membership in the LRC is open to all interested parties and, unlike, the LIGO Scientific Collaboration, requires no formal research commitment and responsibilities. The LRC communicates through its elected Chair with the Laboratory Directorate.

LIGO Program Advisory Committee

The LIGO Program Advisory Committee (PAC) is the principal source of advice to LIGO on scientific policy, technical choices, support of the scientific community and organizational matters. It

provides peer review of scientific and technical proposals for the scientific use of LIGO.

The Committee meets several times per year and will be asked for advice through a written charge provided by the LIGO Laboratory Director. The Committee's advice will be used by the Directorate in making decisions. The National Science Foundation is expected to request that LIGO use the Program Advisory Committee to review proposals to the NSF for R&D and LIGO science proposals.

The Committee is appointed for an initial term of three years after which new members will be appointed with staggered terms to assure renewal of the Committee and continuity.

LIGO Laboratory Executive Committee

The Executive Committee is the principal management body used by the Laboratory Directorate to review Laboratory program execution and status and to develop the basis for management decisions. The Executive Committee will meet regularly and be chaired by the Director, in association with the Deputy Director. It will consist of the managers of each of the LIGO Laboratory functional groups.

LIGO Visitors Program

The LIGO Laboratory operates an NSF-supported Visitors Program intended to provide research opportunities for scientific visitors to the campuses and Observatory sites. Supported visits are expected to be of significant duration and are proposed as research projects to the Laboratory Directorate for review and subsequent support.

Science Education Program

As a national facility based upon an exciting scientific research mission, LIGO can provide a focus for educational programs in science. A Science Education Program will reach beyond the traditional university role of educating undergraduate and graduate students to reaching K-12 grade level students. A Science Education Program Manager will develop and lead programs in educational outreach to the general public, in on-site educational programs at the Observatory sites, as well as the university campuses, and in supporting program development consistent with other NSF educational initiatives.

Industrial Liaision Program

An Industrial Liaison Program will supplement the extensive industrial participation in LIGO construction. LIGO development of enabling technologies promises to provide new capabilities of interest to industry. These include advanced laser and optical technology, and new capabilities in vibration and acoustic isolation. An Industrial Liaision Program Manager will lead direct efforts to inform, collaborate and cooperate with industrial partners.

LIGO Laboratory Functional Groups

Each LIGO Laboratory functional group reports to the Directorate and is led by a Group Leader and a Deputy Group Leader. These positions serve as line management for the respective group. Each group is represented on the Laboratory Executive Committee. Staff assignment to a functional group represents the principal assignment for each staff member. It is expected, however, that scientific and

technical staff will participate significantly in activities of other functional groups.

Hanford Observatory - Livingston Observatory

The Hanford Observatory and the Livingston Observatory are organized as separate functional groups within the LIGO Laboratory. Each is responsible for the effective operation of the facilities and scientific programs at the respective Observatory site. Each Observatory is led by a scientist who serves as the Head of the Observatory. In addition, each group includes a Site Manager who is responsible for the technical and operational effectiveness of the site facilities and staff. The Site Manager serves as the lead Environment, Safety and Health Officer for the Observatory site, reporting to the Head. The staff at each Observatory is structured to support operations, maintenance and the scientific program. The staff is sufficient to assure adequate local human resources for all normal operations including scientific and technical expertise at the site. Each Observatory will work with LIGO staff from the Caltech and MIT groups in executing enhancements, upgrades and new capabilities and in carrying out the scientific program.

Administration

The Administration Group is responsible for program planning support, for all business operations including budgeting, funds management, cost accounting, procurement, property management, personnel actions and effort reporting, for document and records management, for environment, safety and health programs, and for management of Laboratory Policies and Procedures. The Administration Group prepares Laboratory Proposals to the NSF and coordinates all formal communications with the NSF through the Caltech Office of Sponsored Research. The Administration Group provides administrative assistant and secretarial support to the LIGO Laboratory.

Technical and Engineering Support

The Technical and Engineering Support Group is responsible for all engineering design and analysis and design drafting for LIGO scientific programs, facilities, research and development tasks. Members of this group team with LIGO staff and collaborators to support all activities requiring mechanical, optical and electrical engineering. Configuration management, quality assurance and technical standards are provided by this group.

Detector Support

The Detector Support Group is responsible for assuring and improving the performance of the LIGO detector systems used in gravitational wave research. The group supports detector operations and data collection at the Observatory sites, conducts detector research and development with the goal of improving detector system performance and sensitivity, and provides scientific leadership in specifying and introducing detector improvements and upgrades, in association with the staff at the Observatory sites.

Data Analysis and Computing

The Data Analysis and Computing Group is responsible for the hardware and software systems for LIGO modeling and simulation and for data analysis. The primary responsibility for all software standards and software engineering used in LIGO research is carried by this group. Systems for

general computing are implemented and supported in this group.

Research Facilities

Test and research facilities at the universities and Observatory sites not normally used for gravitational wave research are managed by the Research Facilities Group. These include test interferometers at the campuses, as well as special setups used for optics, laser and noise research, metrology and materials research. The group is responsible for the readiness and availability of the research facilities, and for supporting the research and test activities carried out by LIGO Laboratory and collaborator investigators using these facilities. This includes calibration, procedures documentation and training of investigators.

Advanced Research and Development

The Advanced Research and Development Group leads the execution of the R&D program to define future LIGO detector upgrades and to new detectors. The program of this group is primarily supported by NSF Advanced R&D funding which is distinct from Laboratory Operations funding.

Environment, Safety and Health Protection

ES&H is a line management responsibility. The LIGO Laboratory Deputy Director is primarily responsible for ES&H programs throughout LIGO. At each Observatory site, the Site Manager serves as the primary manager responsible for ES&H programs.

Objectives

The LIGO ES&H program has the following specific objectives:

- to prevent personnel injury or loss of life;
- to prevent any environmental contamination;
- to prevent damage to equipment caused by accidents;
- to comply with all federal, state and local laws, rules and regulations.

Responsibilities

The LIGO ES&H program is the responsibility of the Deputy Director. The Deputy Director has responsibility to insure that LIGO staff members and collaborators identify specific ES&H issues and risks, and establish appropriate safeguards and procedures for addressing those risks.

Environmental Protection

The LIGO Laboratory shall follow standards and practices which fully support the NSF environmental protection policies and requirements. The Laboratory will initiate activities necessary to ensure compliance with the Resource Conservation and Recovery Act (RCRA) and the National Environmental Policy Act (NEPA).

Safety and Health Protection

Caltech has an established Safety Office, responsible for the Institute's overall safety and health program, and LIGO management will implement the applicable health and safety program elements as outlined in the Caltech Safety Manual. The Caltech Safety Office policies will be applicable to the Observatory sites, supplemented by additional policies developed by LIGO staff in consultation with the Caltech Safety Office. For work performed at MIT, the safety and health protection measures adopted by MIT will similarly apply.

An order of precedence for resolving safety issues has been adopted by the LIGO Laboratory. Order of precedence shall be as follows:

- Design for Minimum Risk: The primary means for mitigation of risk shall be to eliminate the hazard through design.
- Incorporate Safety Devices: Fixed, automatic or other protective devices shall be used in conjunction with the design features to attain an acceptable level of risk. Provisions shall be made for periodic functional checks as applicable.
- Provide Warning Devices: When neither design nor safety items can effectively eliminate or reduce hazards, devices shall be used to detect the condition, and to produce an adequate warning to alert personnel of a hazard. Devices may include audible or visual alarms, permanent signs or movable placards.
- Procedures and Training: Where it is impractical to substantially eliminate or reduce the hazard or where the condition of the hazard indicates additional emphasis, special operating procedures and training shall be used.

Employee Training

Laboratory employees will be provided with procedures, training and information to ensure their safety. Briefings and presentations will be made to managers and supervisors to communicate ES&H policies and procedures.

Contractors, Collaborators and Visitors

Contractors and visitors to the LIGO operational sites will be informed of ES&H rules and procedures applicable to the specific area. Hosts will be responsible for the safety of visitors.

Documentation

The LIGO Laboratory shall provide hazard assessments, safety analyses and evaluations as required. Specific procedures and training documents will be prepared and released.

Governmental Code Requirements

The LIGO Laboratory, including its contractors, will comply with applicable US Federal Codes, laws and regulations, industrial codes and state rules, regulations and codes. The Administration Group, together with the Deputy Director, will be responsible for clarifying compliance requirements and the resolution of safety issues.

Procurements and Subcontracts

Policy

LIGO procurements occur at both Caltech (including the Caltech-managed Observatory sites) and MIT . These are processed according to the procedures established by the Purchasing Department at the host institution and approved by the Office of Naval Research under OMB requirements.

All LIGO facilities and equipment procurements will be processed and administered by the Caltech or MIT Purchasing Department depending upon the institution originating the procurement, assisted by the LIGO Laboratory staff.

Major procurements involving substantive efforts (subcontracts valued in excess of $100,000) will be submitted to NSF for approval or concurrence, in accordance with the Cooperative Agreement. Subcontract technical and programmatic management is performed by LIGO Laboratory staff. All procurements and subcontracts will be subject to the terms and conditions of the Cooperative Agreement and the requirements of land sale and lease documents pertaining to the LIGO Observatory sites.

Responsibilities

The LIGO Deputy Director is responsible for ensuring that all aspects of LIGO facilities and equipment procurement are managed and planned successfully. A written acquisition plan will support the procurement approach for major procurements in excess of $500,000. The Deputy Director, in association with the Director, shall approve all major subcontracts. Procurement for the LIGO Laboratory is supported by the Administration Group which is responsible for preparing, facilitating and administering the procurement documentation associated with major LIGO procurements. Subcontracts and procurements will be initiated by the cognizant technical Task Leaders. Working closely with the Administration Group, the Task Leaders will be responsible that all procured components, items, services and construction are produced and delivered as required to support the LIGO Laboratory objectives. The Task Leaders will also provide technical direction and oversight of these contracts and procurements.

Approach

Procurement policies and procedures, embodied in the Caltech Purchasing Policy and Procedure Manual, will be utilized for all facilities and equipment procurement actions originating at Caltech. This manual establishes compliance with NSF and Federal Acquisition Regulations, and ensures the use of competitive procurement techniques and small disadvantaged business subcontracting to the maximum extent. All major procurements which require NSF concurrence will be identified and scheduled in the annual Work Plan. Similarly, LIGO Laboratory procurements originating at MIT may be placed using corresponding policies and procedures at MIT. Both Caltech and MIT have procurement systems approved by the Office of Naval Research under OMB requirements.

NSF Reporting and Reviews

Quarterly Reports

Three LIGO Laboratory Quarterly Reports will be prepared and submitted to NSF annually for the first three quarters of each fiscal year. This report is prepared in accordance with the Cooperative Agreement and shall consist of a summary of work accomplished during the reporting period including major scientific and technical accomplishments, and a status of action items affecting LIGO/NSF responsibilities. This report shall also include management information such as changes to personnel, financial status report and other financial information including actual or anticipated underruns or overruns, and any other action requiring NSF or other Federal Agency notification.

Annual Report

An Annual Report will be prepared and submitted to NSF, in lieu of a fourth Quarterly Report, containing a summary of overall progress, including results to date, and a comparison of actual accomplishments with the proposed goals of the period; indication of any current problems or favorable or unusual developments; and a summary of work to be performed during the succeeding year;'and any other pertinent information.

Annual Work Plan

Each year, through the Caltech Office of Sponsored Research, the LIGO Laboratory shall negotiate and submit an annual Work Plan and funding request to the NSF on October 1 for the December 1 annual award date. This Plan shall discuss scientific and program achievements and compare achievements with the projected goals in the currently approved Work Plan. It will summarize the proposed goals for construction, R&D, science and collaborative programs for the program year for which funds are sought. Significant staffing changes, and an organization chart and description of the LIGO organization in the new program year will be presented, together with an explanation of any changes. The Plan shall include a statement of the LIGO annual calendar including proposed dates for meetings of the LIGO Oversight Committee, Program Advisory Committee, scientific workshops and reviews. The Plan shall include an acquisition plan for all procurements in excess of $100K, including the proposed date of submission to NSF and the type of procurement.

Other Reporting

The Caltech Office of Federal Financial Activities submits to NSF a quarterly reconciliation report against the Letter of Credit covering all NSF sponsored grants at Caltech, including LIGO. This report identifies the incurred expenditures for the quarter, cumulative expenditures effective at the close of the quarter, and the available balance against the allocation for the LIGO Laboratory.

Caltech will submit for approval by NSF all collaborative Memoranda of Understanding.

LIGO Oversight Committee

The LIGO Oversight Committee will hold regular meetings to review progress and to resolve institutional issues. Special meetings may be held to resolve particular issues which must be resolved before the next scheduled meeting.

LIGO Program Advisory Committee

NSF shall be informed of all meetings of the PAC, invited to attend, and shall receive copies of relevant reports. The charge and membership of this Committee will require the concurrence of the NSF Program Manager.

NSF Site Visits/Visiting Committee

The NSF may conduct periodic site visits to review LIGO activities.

The NSF may convene a Visiting Committee to conduct periodic reviews of the LIGO Laboratory, covering technical and management issues. NSF shall provide the Laboratory with a copy of the charge to the Visiting Committee prior to the review, with adequate time to agree on the agenda and to prepare the necessary presentation material.

Workshops

The LIGO Laboratory will sponsor or participate in workshops on specific topics relevant to the development of gravitational-wave interferometers. The frequency of such workshops and the topics they address will be determined in consultation with interested outside scientists, such as LIGO Research Community, the LIGO Scientific Collaboration and the other international groups pursuing laser interferometer gravitational-wave detection.

Technical Reports

To enhance the participation of the general scientific community in gravitational wave research, the LIGO project will continue the publication of research results in refereed journals, and will make unpublished internal technical reports available to the general scientific community on request. A written LIGO Publication Policy will govern this process.

Last modified on March 6, 1997

Please send comments on this draft to Gary Sanders at sanders@ligo.caltech.edu

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