1 Introduction

The LIGO Research Community (LRC) held its first meeting at the Aspen Center for Physics on 17 January 1996. At the meeting we initiated a several month study to identify how LIGO’s completion will affect the research environment in gravitational physics and recommend, to LIGO and the NSF, policies to be adopted now (on, e.g., data availability, proposals for new or enhanced interferometer, scheduling of interferometer time, research internships at LIGO facilities, etc.) in order to make the most of the opportunities presented.

This report describes the LRC — its aims and goals, membership and officers, and how to join — and also the LRC study program “Defining A Research Environment: LIGO and the Gravitational Physics Research Community” — what it involves and how to participate. I urge everyone with an interest in gravitational wave research to read especially §3 and contribute to the study their thoughts and concerns regarding the impact that LIGO will have on the future shape of the gravitational physics research environment.

2 What is the LIGO Research Community?
2.1 Aims and Goals

The LRC Charter identifies the principal aims and goals of the LIGO Research Community:

- To provide an organized channel for the interchange of information between the LIGO management and those individuals who utilize the scientific opportunities afforded by LIGO; and
- To serve as an advocacy body for the study of gravitational waves and related physics and astronomy.

Within the research community, the LRC exists to facilitate exchange between those who build the hardware to detect, those who develop the data analysis tools and techniques to recognize, and those who explore the theory of gravitational waves and their sources. In its relationship with LIGO, the LRC’s role is to allow two-way communication between the LIGO management and the broader research community about design decisions now and scientific program decisions in the future, to insure that LIGO functions as part of an international gravitational research community, and to nurture a body of people who care enough about LIGO that they would insist on it living up to its goals and promises, and protest vigorously if it doesn’t.

In short, the LRC is the voice of the research community with a professional or personal interest in LIGO operations or related science.

2.2 What is the relationship of the LRC to LIGO?

The LRC is an independent organization of individuals with a common interest in the science, technology or operation of LIGO. It is not an arm of the LIGO project and is not affiliated with LIGO, though it gratefully acknowledges the administrative support of the LIGO project.

2.3 Members

At the close of the election of the first LRC executive committee there were 175 members of the LIGO Research Community representing 19 countries (see table [1] for details).
Table 1: LIGO Research Community Demographics as of 6 November. Of the 95 US members, 12 are part of the LIGO research effort.

| Country       | Number | Country   | Number |
|---------------|--------|-----------|--------|
| Australia     | 1      | Brazil    | 3      |
| Canada        | 4      | Denmark   | 1      |
| Germany       | 13     | Greece    | 1      |
| India         | 6      | Ireland   | 1      |
| Italy         | 7      | Japan     | 14     |
| Mexico        | 2      | Netherlands | 4    |
| Poland        | 2      | Russia    | 3      |
| South Africa  | 2      | Spain     | 1      |
| Taiwan        | 1      | United Kingdom | 14 |
| United States | 95     |           |        |

2.4 Officers

The LRC is governed by an executive committee, composed of seven members elected by and from its membership for three-year terms. The executive committee elects from its voting members the LRC Chair. The 95-96 executive committee consists of

- Bruce Allen (University of Wisconsin, Milwaukee; early universe cosmology, gravitational wave data analysis),
- Joan Centrella (Drexel University; sources of gravitational radiation, numerical relativity and astrophysics)
- Sam Finn\(^1\) (Northwestern University; general relativistic astrophysics, gravitational wave data analysis, gravitational wave astronomy)
- Eric Gustafson (Stanford University; laser systems, experimental gravitational wave detection)
- Bill Hamilton (Louisiana State University, Baton Rouge; experimental gravitational wave detection)

\(^1\)LIGO Research Community Chair
• David Shoemaker (Massachusetts Institute of Technology and LIGO Project; experimental gravitational wave detection)
• Harry Ward (University of Glasgow and GEO 600 Project; experimental gravitational wave detection).

In addition to the seven elected members of the executive committee, the LIGO principal investigator is a non-voting, ex officio member of the executive committee, and the Executive Committee Secretary (currently Syd Meshkov) is appointed by the chairperson to aid the committee’s work.

To contact the Executive Committee with questions or comments, send e-mail to lrc_excomm@holmes.astro.nwu.edu.

2.5 How to Join

The LIGO Research Community is an organization of individuals and membership is open to any individual, irrespective of other affiliations. To join the LRC, send an e-mail message to lrc@ligo.caltech.edu indicating your desire to become a member.

Membership entitles you to vote for, run for and hold LRC offices. Membership must be renewed yearly via an e-mail note to lrc@ligo.caltech.edu. You are entitled to vote in an LRC election if you have joined or renewed your membership between the end of the last election and the close of nominations for the current election.

Since the LRC is an organization of individuals, there are no institutional members. The LRC may form liaisons with other groups pursuing common goals, and members of other groups may become members of the LRC; however, groups cannot themselves become LRC members.

3 Defining a Research Environment: LIGO and the Gravitational Physics Research Community
3.1 Introduction

The construction of LIGO and VIRGO — gravitational wave detectors whose ultimate sensitivity virtually insures a steady rate of detections — has had a profound effect on the research environment in gravitational physics and astrophysics, creating new research opportunities and giving new relevance to old lines of research. Many of us — both “theoretical” and “experimental” physicists — have redirected our research programs to take advantage of these new opportunities. As the detectors come on-line — as data begins to flow and as interferometer enhancements and entirely new interferometers are developed — our research environment will evolve even more extensively. What will be the nature of the research environment that we will find ourselves working in five or ten years from now?

- How, and to who, does an experimental group propose to develop new instrumentation for use in the LIGO facility? How does a group gain the necessary expertise to develop a new instrument, or a modification of an existing one? What infrastructure can be counted on, and what facilities must be part of the proposal (e.g., who owns the laser light? who owns the vacuum chambers? who owns the mirrors and test masses?)

- How does a theorist gain access to data, or contribute to data analysis? If LIGO is counting on the non-LIGO research community to develop and contribute data analysis tools, how are those tools vetted?

- How are the operating priorities of the several LIGO interferometers set: *i.e.*, what fraction of the operating time is devoted to engineering vs. two or three interferometer coincidence “science runs?”

- What steps must be taken to insure that LIGO operates as a constructive part of an international community of gravitational wave detectors (*e.g.*, common data formats and standards, cooperative agreements for data exchange with VIRGO, *etc.*)?

- What support does the NSF need to provide the research community so that the most is made of the opportunities LIGO provides?

There are many possible futures, but the research environment that we find ourselves in five or ten years from now will arise from the actions we take
and the decisions we make today. Now we have the opportunity to identify the kind of research environment we want and work to make it happen. To that end, the LRC has begun a several month study to

- Identify how an operating LIGO will affect our research environment,
- Decide what we want the research environment to look like, and
- Recommend, to LIGO and the NSF, what steps should be taken to create that environment

The first part of this program was initiated at Aspen with the formation of three Issue Identification Groups, which are described in more detail below. Through the end of March these groups will canvas the research community with the goal of identifying how our research environment will be transformed by the initiation of LIGO/VIRGO operations\(^2\). By the middle of April these groups will report to the executive committee, identifying and discussing those issues highlighted by the research community.

In response to the IIG reports, the executive committee will create several policy study committees to address the most pressing issues. These committees will be announced at the next general membership meeting of the LRC, which will take place at the May meeting of the American Physical Society (Indianapolis, Indiana, 2-5 May 1996). Each committee will be charged with canvassing the research community and reporting back to the executive committee with recommendations that reflect the combined judgment of the committee members and the research community. Using these reports as a basis, the executive committee will prepare a report for the National Science Foundation and the LIGO project that recommends policies to be adopted now — by ourselves, the LIGO project, and the National Science Foundation — to insure that the best is made of the new opportunities that await us.

The three Issue Identification Groups are

- Sources, data and analysis,
- Hardware development, installation and operations, and
- People.

\(^2\)One need not be a member of the LRC to contribute to this study.
The focus of each group is discussed in more detail below. The group chairs are responsible for selecting a small set of members from research community volunteers to assist in canvassing the membership and preparing the list of issues.

Contributions to each group are critical to the success of this program. One need not be a member of the LRC in order to contribute to this study, and we hope that all who are interested or involved in gravitational physics research will contribute their thoughts on how the operation of the LIGO and VIRGO detectors will change the gravitational physics research environment. All contributions will appear in the final IIG reports. Each IIG has a dedicated e-mail address (provided below) where you are encouraged to send contributions or volunteer as a working group member.

3.2 Sources, Data and Analysis

- Chair: Joan Centrella.
- E-Mail: lrc_sda@holmes.astro.nwu.edu

The focus of this group is data issues, data analysis issues, or source calculation issues. Example issues include

- Data access: should data be made generally available immediately, never, after a period of proprietary access by the experimental team responsible for the instruments, or by proposal? What are the consequences of each possibility?

- Computational needs: Can the computational needs of the data analysis task be met without dedicated supercomputer facilities? If not, how are these facilities provided for?

- Cooperation with other facilities: How tightly should LIGO’s data format and policies be coupled with those of VIRGO and other detector facilities?

3.3 Hardware Development, Installation and Operations

- Chair: Eric Gustafson.
• E-Mail: lrc\_hardware@holmes.astro.nwu.edu

The focus of this group is issues related to the operation of installed interferometers and the development of enhancements and advanced instrumentation. Example issues include

• Hardware proposals: how does a research group propose an instrumentation enhancement or a new interferometer, \textit{i.e.}, who does one propose to? how is a proposal reviewed? how is a proposal funded? what must a proposal contain? what infrastructure is provided by LIGO, and what must be included in a proposal?

• Operations: how is interferometer time scheduled, \textit{i.e.}, how are the demands of engineering balanced against double and triple coincidence “science” runs?

• How does a non-LIGO experimental team develop the expertise necessary to develop an interferometer enhancement or propose a new detector?

3.4 People

• Chair: Harry Ward

• E-Mail: lrc\_people@holmes.astro.nwu.edu

The focus of this group is both “human resource” and inter-organizational issues. Examples include

• Visitors Program: how are long-term visits to LIGO facilities, \textit{e.g.}, for the purpose of acquiring expertise to take back to one’s home institution, proposed for/funded?

• LIGO staff liaisons: how do LIGO “data product users” correspond with instrument teams to understand the data stream? How do experimenters at other institutions work with LIGO staff in order that their instruments integrate properly in the LIGO facilities?

• What should be the relationship between the LRC and other organizations? Between the LIGO and other detector projects?
4 Conclusion

The LIGO Research Community (LRC) is an independent organization of researchers interested in the scientific opportunities created by the construction and operation of the Laser Interferometer Gravitational-wave Observatory (LIGO). Membership is open to all interested individuals, irrespective of any other affiliations (including affiliation with the LIGO project, VIRGO or other gravitational-wave detector projects). The LRC is engaged in a study project designed to identify the ways that an operating LIGO will affect the research environment in gravitational physics, decide what we want that environment to look like, and recommend (to LIGO and the NSF) the steps to be taken now to develop that environment in the future. Contributions from LRC members and from the broader gravitational physics research community are actively solicited.