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# THE LSC AND ITS ROLE

LIGO PAC Meeting @ MIT

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## LIGO Scientific Collaboration Member Institutions

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University of Adelaide ACIGA  
Australian National University ACIGA  
California State Dominquez Hills  
Caltech LIGO  
Caltech Experimental Gravitation CEGG  
Caltech Theory CART  
University of Cardiff GEO  
Carleton College  
Cornell University  
University of Florida @ Gainesville  
Glasgow University GEO  
Goddard Space Flight Center  
University of Hannover GEO  
India-IUCAA  
IAP Nizhny Novgorod  
Iowa State University  
Joint Institute of Laboratory Astrophysics  
LIGO Livingston LIGOLA  
LIGO Hanford LIGOWA

Louisiana State University  
Louisiana Tech University  
MIT LIGO  
Max Planck (Garching) GEO  
Max Planck (Potsdam) GEO  
University of Michigan  
Moscow State University  
NAOJ - TAMA  
Northwestern University  
University of Oregon  
Pennsylvania State University  
Salish Kootenai College  
Southern University  
Stanford University  
University of Texas @ Brownsville  
University of Western Australia ACIGA  
University of Wisconsin @ Milwaukee  
Washington State University @ Pullman, WA



# LSC Membership and Function

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- Recommended by Barish and McDaniel Committee
- Founded in 1997, now includes 37 research groups with ~ 380 members
- Membership and roles determined by MOU between Project and Institution
- MOU updated yearly and posted
- Agreement by LSC

## LSC functions

- Determine the scientific needs of the project
- Set priorities for the research and development
- Present the scientific case for the program
- Carry out the scientific and technical research program
- Carry out the data analysis and validate the scientific results
- Establish the long term needs of the field



# Additional LSC roles during operations

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- Maximize scientific returns in the operations of LIGO Laboratory facilities
- Determine the relative distribution of observing and development time
- Set priorities for improvements to the LIGO facilities.
- Actively participate in operations and provide scientific guidance at the sites.



# Mechanisms

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- LSC White Paper on Detector Research and Development
  - describes near term program and goals
  - areas of research for long range program
  - iterated as new results become available
  - second iteration
- LSC Data Analysis White Paper
  - algorithm development for astrophysical sources
  - techniques for detector characterization
  - validation and test of software
  - long range goals for software and hardware
  - second iteration



# Mechanisms

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- Publications and presentations policy  
assure integrity of scientific and technical results  
provide recognition of individual and institutional contributions
- Proposal driven data analysis  
formation of groups to make specific analysis proposals  
proposals posted and open to the entire collaboration  
proposals reviewed by LSC executive committee



# ORGANIZATION

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- **LSC working committees**

- Technical development committees*

- Suspensions and isolation systems - control of stochastic forces  
David Shoemaker MIT
- Optics - reduction in sensing noise / thermal noise / thermal control  
David Reitze University of Florida
- Lasers - reduction in sensing noise  
Benno Willke University of Hannover GEO
- Interferometer configurations - detector control and response  
Ken Strain University of Glasgow GEO

*Set priorities for the advanced LIGO research program*

*Begin to establish directions for the more distant basic research*



# ORGANIZATION

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## *Software, Hardware and data analysis committees*

- Astrophysical sources and signatures  
Bruce Allen University of Wisconsin @ Milwaukee  
Barry Barish LIGO lab liaison

*Recent development : incorporation of source modelers as ancillary members of ASIS without MOU commitment to the Laboratory but also no data rights*

- Detector characterization and modelling  
Keith Riles University of Michigan  
Daniel Sigg LIGO lab liaison

*The committee has taken on the planning for scientific support during LIGO data runs. Proposal has been made to associate run shifts with authorship on LIGO publications. Collaboration service functions described in MOU.*

*Group plays key role in developing real time monitors and event triggers for the data analysis.*





# ORGANIZATION

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- Software coordination committee and change control board  
Alan Wiseman Data analysis and software coordinator  
University of Wisconsin @ Milwaukee

*Responsible for second iteration of LSC Data Analysis White Paper  
Organization of the Mock Data challenges*

- Computing resources coordination committee  
Albert Lazzarini , Chair Caltech

*Developing a LSC unified approach to grid computing and the organization  
of Collaboration wide proposals for new computing initiatives*



# GOVERNANCE and OPERATIONS

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- LSC meetings in March and August  
LSC Council meeting (membership, governance.....)
- Executive committee meetings monthly  
Spokesperson, data and software Coordinator, committee chairs,  
Director and Deputy Director of the LIGO Laboratory
- Working committees meet monthly or more frequently



## Astrophysical source upper limit groups

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- Combined groups of experimenters and theorists
- Develop data analysis proposals

*Purpose:*

- Test the LIGO Data Analysis System
- Set scientifically useful upper limits using engineering data
- Publish first astrophysically interesting results from LIGO

*Groups:*

**Burst sources :** Sam Finn Penn State, Peter Saulson Syracuse

**Inspiral sources:** Pat Brady Univ of Wisc., Gabi Gonzalez LSU

**Periodic sources:** Stuart Anderson Caltech, Michael Zucker MIT

**Stochastic backgrd.:** Joe Romano, UT Brownsville, Peter Fritschel MIT

*On going analysis of E7 data , preparation for S1*

*Report to the entire collaboration by telephone monthly and at LSC meetings*