THE LSC AND ITS ROLE

NSF/ LIGO Review

Rainer Weiss

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LIGO Scientific Collaboration Member Institutions

University of Adelaide ACIGA

Australian National University ACIGA

Balearic Islands University

California State Dominquez Hills

Caltech LIGO

Caltech Experimental Gravitation CEGG

Caltech Theory CART

University of Cardiff GEO

Carleton College

Cornell University

Fermi National Laboratory

University of Florida @ Gainesville

Glasgow University GEO

NASA-Goddard Spaceflight Center

University of Hannover GEO

Hobart – Williams University

India-IUCAA

IAP Nizhny Novgorod

IUCCA India

Iowa State University

Joint Institute of Laboratory Astrophysics

Salish Kootenai College

LIGO Livingston LIGOLA

LIGO Hanford   LIGOWA

Loyola New Orleans

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

Southeastern Louisiana University

Southern University

Stanford University

Syracuse University

University of Texas@Brownsville

Washington State University@ Pullman

University of Western Australia ACIGA

University of Wisconsin@Milwaukee

LIGO Scientific Collaboration

LSC Membership and Function

- Recommended by Barish and McDaniel Committee
- Founded in 1997, now: 39 institutions ,44 research groups with 442 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

LIGO Scientific Collaboration

Additional LSC roles during operations

- 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.

- LSC has become integrated into:
- Detector commissioning
- Detector operation and scientific guidance at the sites
- Advanced detector research and development
- Data analysis
- Software validation

Reports and examples of activities in the breakout session presentations

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Mechanisms

- **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

- **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

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ORGANIZATION

- **LCS working committees**

Technical development committees

Suspensions and isolations systems - control of stochastic forces

David Shoemaker MIT

Optics -reduction in sensing noise

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

Work has led to advanced LIGO planning, groups are integral to the research and development **(Advanced LIGO)**

ORGANIZATION

Software and data analysis committees

Astrophysical sources and signatures

      Bruce Allen University of Wisconsin @ Milwaukee

      Barry Barish   LIGO lab liaison

Detector characterization and modelling   (detector commissioning)

      Keith Riles   University of Michigan

      Daniel Sigg   LIGO lab liaison

Software coordination committee and change control board

      Alan Wiseman Data analysis and software coordinator

                  University of Wisconsin @ Milwaukee

LIGO Lab/LSC Computing Resources

      Albert Lazzarini Caltech

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GOVERNANCE and OPERATIONS

- **LSC meetings in March and August**

  LSC Council meeting (membership, governance…..)

- **Executive committee meetings monthly**

  Spokesperson, data and software Coordinator, committee chairs, Director and Manager of LIGO project

- **Working committees meet monthly or more frequently**

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Astrophysical source upper limit groups

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

Purpose:

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

Groups: (Data Analysis)

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

Inspiral sources: Pat Brady, Univ of Wisconsin, Gabriela Gonzalez, LSU

Periodic sources: Maria A Papa , AEI , Michael Landre, LIGO Hanford

Stochastic background: Joe Romano, UT Brownsville, Peter Fritschel, MIT

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Mock Data Challenges

- Test and validation of the LDAS pipeline
- Joint Laboratory and LSC function

Accomplished

8/2000: Data conditioning and pre-processing common to all searches
    Sam Finn *chair* Caltech, UTB, ANU

1/2001: Binary inspiral template search using MPI

    Pat Brady *chair* Caltech,UWM, UTB

Planned

3/2001: Use of relational databases to store/access/mine LIGO event data

9/2001:Use of archival system to store/access LIGO raw frame data

 >5/2001: Test algorithms for all major types of searches

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