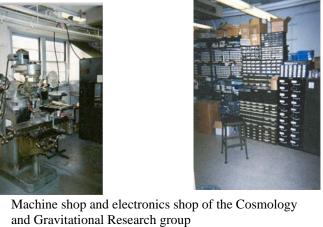
## **COSMOLOGY AND GRAVITATIONAL RESEARCH GROUP BETWEEN 1965 -- 2007**









D. Kingston Owens

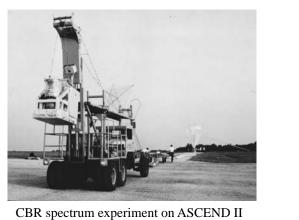
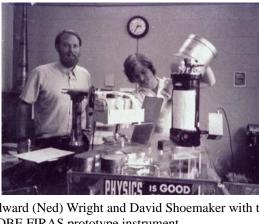
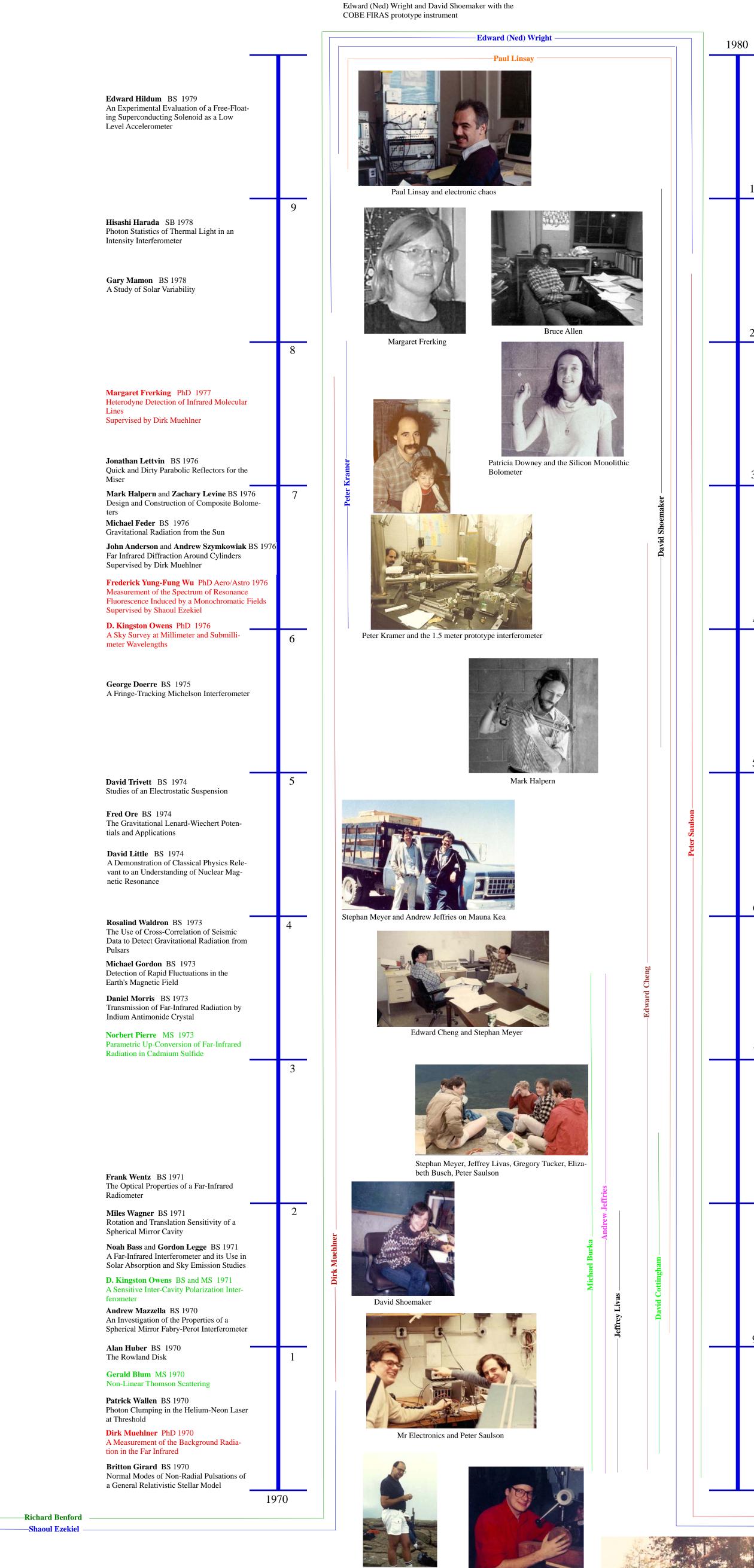


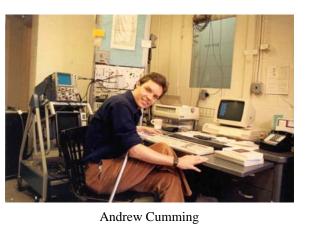


Image: Note of the section of the s	the launch field. It has excel-	
Dirk Muehlner and the CBR anisotropy experiment  Rainer	1965 The second	Edwin Jacobs BS 1965 Design and Construction of a Tilt Meter Richard Sramek BS 1965 An Interferometric Linear Strain Seismometer
2 <math><image/> <image/> 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </math>	Views of reel release	Thomas McDonough BS 1966 Analysis of a Theory of Jupiter's Decametric Radio Emissions Thomas Seddon BS 1966 An Optical Gas Cell as an Interferometric Path Length Modulator
to separate payload and balloon $\int \int $	T T T T T T T T T T T T T T T T T T T	Jearl Walker Jr BS 1967 Change in Magnetization on Ferrimagnetic Resonance Absorption: Preliminary Work on the Einstein de Haas Effect Michael Wandzilak BS 1967 Studies in Electrical Suspensions Philip Chapman ScD Aero/Astro 1967 Theoretical Foundations of Gravitational Experiments in Space co-supervised Walter Wrigley, Felix Villars
With the second seco	8	Eric Sweetman BS 1968 Observation of Metastable Helium in an Atomic Beam Peter Van Sickle BS 1968 Optical Mixing in Quartz: a Preliminary Study Michael Blitch MS 1968 The Feasibility of a Gravitational Clock to Test the General Theory of Relativity Shaoul Ezekiel PhD Aero/Astro 1968 A Molecular Beam Primary Reference for Long Term Laser Frequenct Stabilization
Shaoul Ezekiel (Ziggy) and reference experiment	the Iodine laser frequency	Richard Johnson BS 1968 Investigation of the Einstein de Haas Effect Using Ferrimagnetic Resonance Absorption Terrance Jach BS 1969 Laser-Saturated Iodine Absorption at 5145A
Figure 1    Figure 2		



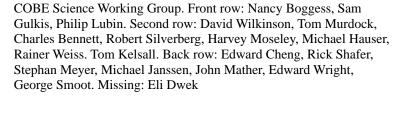






Lyman Page

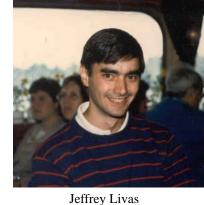
Michael Burka



David Shoemaker MS 1980

Laser

Power



Clifford Avey BS 1980 Time Dependencies of Gravitational Lens Phenomena

A Fourier Transform Spectrometer for Milli meter and Submillimeter Wavelengths Patricia Downey PhD 1980 The Low Temperature Conductivity of Ion Implanted Silicon and its Application in a Cryogenic Far-IR Monolithic Bolometer Bruce Allen BS 1980 An Intensity Interferometer for the Cosmic Background Radiation Bruce Straub BS 1980 \_Topics on the Harmonic Oscillator

Jeffrey Livas BS 1981 An Amplitude Noise Reduction System for a

Marc Fischer BS 1981 Emissivity Dependence of Photon Noise

Christopher Lozinski BS 1982 An Active Seismic Isolation System

Lynne Deutsch MS 1983 Design and Construction of Interference Filters for the Far Infrared

Mark Halpern PhD 1983 Measurement of the Anisotropy of the Cosmic Background Radiation at Millimeter Wavelengths

Andrew Jeffries PhD 1983 Angular and Spatial Distortions of the Cosmic Background Radiation

James Hordern Jr BS 1984 The Transfer Functions of Fabry-Perot Interferometers and Their Application to One Proposed Gravitational Wave Detection

Scheme

tions

Martin Offutt BS 1985 Vibrational Quality of Sapphire Rods in Modes of Flexure Supervised by Peter Saulson Seth Finkelstein BS 1985 An Investigation into the Fluctuation-Dissipation Theorem Gregory Tucker BS 1985

High Frequency Vacuum Pressure Fluctua-Daniel Zachary BS 1985 Force Displacement Physics for a Finned 6 Plate Capacitor System

Robert Kusner BS 1986 The Temperature and Electric Field Dependence of Variable Range Hopping in Ion Implanted Silicon Supervised by Stephan Meyer

Daniel Dewey PhD 1986 A Search for Astronomical Gravitational Radiation with an Interferometric Broad Band Antenna

Paul Kwiat BS 1987 Characterization of Brewster Angle Electrooptic modulators for LIGO John Evans BS 1987 Output Intensity Fluctuations of a Continu-

ous-Wave Nd-YAG Laser Supervisor Andrew Jeffries Jeffrey Livas PhD 1987 Upper Limits for Gravitational Radiation

from Some Astrophysical Sources Andrew Cumming PhD 1988

A Study of the Dynamics of an Electronic Oscillator Circuit with Three Competing Frequencies Supervised by Paul Linsay

Daniel J. Connelly BS 1988 A Magnetic Suspension for Vibration Isola-Heather Patrick BS 1988

tion

Reduction of Amplitude Fluctuations in a Laser Diode Pumped Nd: YAG Ring Laser Supervised by Andrew Jeffries Ron Dagostino BS 1989 Development of a Velocity Sensor for a Fourier Transform Spectrometer

Supervised by Stephen Meyer Lyman Page PhD 1989 A Measurement of the Cosmic Microwave Background Radiation Anisotropy Supervised by Stephan Meyer Tae Hong Joo PhD EE 1989 Detection Statistics for Multichannel Data

John Mruz Jr BS 1989 Coupling of Single-Mode Optical Fibers at 1.064 Microns Using Graded Index Lenses Supervised by Andrew Jeffries

Co-supervised by Alan Oppenheim

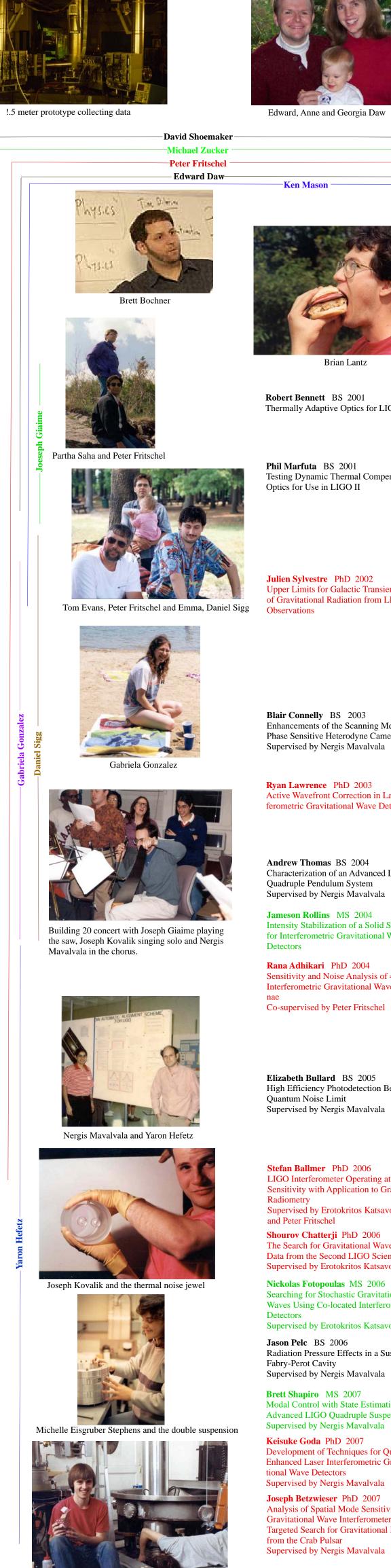


The COBE payload

Supervised by Stephan Meyer

Jeffrey Livas David Shoemaker and Daniel Dewey with completed 1.5 meter prototype

<b>Brian Lantz</b> PhD 1999 Quantum Limited Optical Phase Detection in a High Power Suspended Interferometer	
<b>Peter Csatorday</b> MS 1999 LIGO Photodiode Characterization and Measurement of the Prestabilized Laser Intensity Noise	
<b>Brett Bochner</b> PhD 1998 Modeling the Performance of Interferomet- ric Gravitational Wave Detectors with Real- istically Imperfect Optics	9
Sarah Veatch BS 1998 VLF Magnetic Field Correlation Measure- ments Between LIGO Sites	
<b>Partha Saha</b> PhD 1997 Noise Analysis of a Suspended High Power Michelson Interferometer	8
<b>Nergis Mavalvala</b> PhD 1997 Alignment Issues in Laser Interferometric Gravitational Wave Detectors	
<b>Casey Ann Inman</b> PhD 1996 A Measurement of the Cosmic Background Radiation (CMBR) Anisotropy at the Half Degree Angular Scale Supervised by Stephan Meyer	7
<b>Joseph Giaime</b> PhD 1995 Studies of Laser Interferometer Design and a Vibration Isolation System for Interferomet- ric Gravitational Wave Detectors	6
<b>Jason Puchalla</b> PhD 1995 Measuring Cosmic Microwave Background Radiation Anisotropy on Medium Angular Scales Supervised Stephan Meyer	
	5
William Barnes PhD 1994 A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer	5
A Model of Galactic Dust and Gas from FIRAS	5
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994	4
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994	4
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994 A Study of Thermal Noise Brian Lantz BS 1992 Frequency Shifting of Laser Light Using Single Sideband Modulation and Carrier Suppression Peter Fritschel PhD 1992 Techniques for Laser Interferometer Gravi-	4
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994 A Study of Thermal Noise Brian Lantz BS 1992 Frequency Shifting of Laser Light Using Single Sideband Modulation and Carrier Suppression Peter Fritschel PhD 1992 Techniques for Laser Interferometer Gravi- tational Wave Detectors Eri Izawa BS 1992 The Behavior of a LIGO Proportioned Cylindrical Mirror	4
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994 A Study of Thermal Noise Brian Lantz BS 1992 Frequency Shifting of Laser Light Using Single Sideband Modulation and Carrier Supression Peter Fritschel PhD 1992 Techniques for Laser Interferometer Gravi- tational Wave Detectors Eri Izawa BS 1992 The Behavior of a LIGO Proportioned Cylindrical Mirror Supervised by David Shoemaker Yaser Abdel Rehem BS 1991 Small Angle Scattering from Rough Sur- faces Meng Yong Goh PhD 1991 Radiometric Stability of the Far Infrared Absolute Spectrophotometer (FIRAS) Supervised by Stephan Meyer Michelle Eisgruber Stephens PhD 1991	4
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994 A Study of Thermal Noise Study of Thermal Noise Brian Lantz BS 1992 Frequency Shifting of Laser Light Using Single Sideband Modulation and Carrier Suppression Peter Fritschel PhD 1992 Techniques for Laser Interferometer Gravi- tational Wave Detectors Eri Izawa BS 1992 The Behavior of a LIGO Proportioned Cylindrical Mirror Supervised by David Shoemaker Vaser Abdel Rehem BS 1991 Small Angle Scattering from Rough Sur- faces Meng Yong Goh PhD 1991 Radiometric Stability of the Far Infrared Absolute Spectrophotometer (FIRAS) Supervised by Stephan Meyer Michelle Eisgruber Stephens PhD 1991 Issues in the Detection of Gravitational Radiation	4
A Model of Galactic Dust and Gas from FIRAS Supervised by Stephan Meyer Joseph Kovalik PhD 1994 A Study of Thermal Noise Study of Thermal Noise Brian Lantz BS 1992 Frequency Shifting of Laser Light Using Single Sideband Modulation and Carrier Suppression Peter Fritschel PhD 1992 Techniques for Laser Interferometer Gravi- tational Wave Detectors Eri Izawa BS 1992 The Behavior of a LIGO Proportioned Cylindrical Mirror Supervised by David Shoemaker Yaser Abdel Rehem BS 1991 Small Angle Scattering from Rough Sur- faces Meng Yong Goh PhD 1991 Radiometric Stability of the Far Infrared Absolute Spectrophotometer (FIRAS) Supervised by Stephan Meyer Michelle Eisgruber Stephens PhD 1991 Issues in the Detection of Gravitational	4





Nelson Christensen and Michelle Eisgruber Stephens





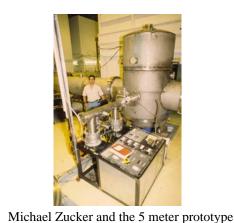
Richard Benford at the proposed Cherryfield, Maine LIGO site

1990

Concept for LIGO at the Cherryfield, Maine site











MIT LIGO Research group 2005. Front row: David Shoemaker, Nergis Mavalvala, Keith Bayer. Second row: Marie Woods, Laura Cadonati, Keisuke Goda, Ken Mason, Gregg Harry, Joseph Betzwieser. Third row: Rainer Weiss, David Ottaway, Julien Sylvestre, Peter Fritschel, Stefan Ballmer, Michael Zucker, Richard Mittleman. Back row: Erotokritos Katsavounidis, Ryan Lawrence, Myron MacInnis, Jameson Rollins



Caltech LIGO Group 2002. Outermost ring begin front: David Beckett, Phil Lindquist, Hareem Tariq, Steve Vass, Yoichi Aso, Phil Ehrens, Isaac Salzman, Eric Black, Thomas Frey, Ken Libbrecht, Ed Jasnow, Riccardo DeSalvo, Virginio Sannibale, Hiro Yamamoto, Cindy Akutagawa, Cleveland Mak, Bill Tyler, Garilynn Billingsley, Kent Blackburn, Ruth Brambila, Eric McWhorter, Ash Khan, Philip Charlton, Florence Kaufman, Sander Liu, Ken Mailand, Hongyu Ding, Jay Heefner, Bill Kells, Don Webber, Biplab Bhawal, Dan Kozak, Kip Thorne, Dennis Coyne, Mike Fine. Second ring begin front: Mary Lei, Irena Petrac, Robert Taylor, Lee Cardenas, Melody Araya, Helena Armandula, Janeen Romie, Todd Etzel, ?, Erika D'Ambrosio, Sydney Meshkov, Gary Sanders, Albert Lazzarini, Irene Baldon, Stuart Anderson, Massimo Tinto, Al Wilson, Maria Barnes, Ed Maros, Phoung Hoang, Fred Mann, Charles King, Barry Barish. Third ring begin front: Jim Covington, Dennis Ugolini, Linda Turner, Flavio Nocera, Rich Abbott, Ryan Tischler,

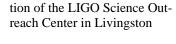
Rita Torres, Ben Abbott.





Rainer Weiss and Peter Saulson in 1999







LIGO Livingston site vacuum chambers

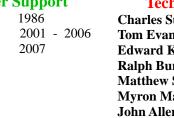




Ken Mason —	2000				6
Firan Lantz    Robert Bennett  BS 2001    Thermally Adaptive Optics for LIGO II	1			N s F n	MIT L MIT L Suke G Rainer ner, M younid
<b>Phil Marfuta</b> BS 2001 Testing Dynamic Thermal Compensation of Optics for Use in LIGO II				v	Junio
_	2				
<b>Julien Sylvestre</b> PhD 2002 Upper Limits for Galactic Transient Sources of Gravitational Radiation from LIGO First Observations					
_	3				Calte quist mas moto
<b>Blair Connelly</b> BS 2003 Enhancements of the Scanning Methods of a Phase Sensitive Heterodyne Camera Supervised by Nergis Mavalvala			avounidis		burn Sand Bhay Mary Janeo Lazz
<b>Ryan Lawrence</b> PhD 2003 Active Wavefront Correction in Laser Inter- ferometric Gravitational Wave Detectors			Erotokritos Katsavounidis		Maro Jim ( Rita
Andrew Thomas BS 2004 Characterization of an Advanced LIGO Quadruple Pendulum System Supervised by Nergis Mavalvala	4				
Jameson Rollins MS 2004 Intensity Stabilization of a Solid State Laser for Interferometric Gravitational Wave Detectors			e		
Rana Adhikari PhD 2004 Sensitivity and Noise Analysis of 4km Laser Interferometric Gravitational Wave Anten- nae Co-supervised by Peter Fritschel	5	tleman	Nergis Mavalvala	cin	
_		Richard Mittleman			
Elizabeth Bullard BS 2005 High Efficiency Photodetection Below the Quantum Noise Limit Supervised by Nergis Mavalvala				Gregg Harry	
<b>Stefan Ballmer</b> PhD 2006 LIGO Interferometer Operating at Design — Sensitivity with Application to Gravitational	6				Eugeniy Mikhailov
Radiometry Supervised by Erotokritos Katsavounidis and Peter Fritschel <b>Shourov Chatterji</b> PhD 2006 The Search for Gravitational Wave Bursts in Data from the Second LIGO Science Run					Eugeniy
Supervised by Erotokritos Katsavounidis Nickolas Fotopoulas MS 2006 Searching for Stochastic Gravitational Waves Using Co-located Interferometric Detectors					David Ottaway
Supervised by Erotokritos Katsavounidis Jason Pelc BS 2006 Radiation Pressure Effects in a Suspended Fabry-Perot Cavity Supervised by Nergis Mavalvala	7			Barsotti —	Ŭ
<b>Brett Shapiro</b> MS 2007 Modal Control with State Estimation for Advanced LIGO Quadruple Suspensions Supervised by Nergis Mavalvala				Lisa	ans
Keisuke Goda PhD 2007 Development of Techniques for Quantum Enhanced Laser Interferometric Gravita- tional Wave Detectors Supervised by Nergis Mavalvala					
Joseph Betzwieser PhD 2007 Analysis of Spatial Mode Sensitivity of a Gravitational Wave Interferometer and a Targeted Search for Gravitational Radiation	8	<b>↓</b> ↓ ↓ ↓	, ↑ ↑ ↑ ↑	₩₩ ₩	₩



**Susan Merullo** 1988 - 1995 **Keith Bayer** 2001 - 2006 Jennifer Holder 1998 - 2001 Fred Donovan 2007



**Technical Support Charles Summers** 1966 - 1968 Tom Evans 1986 Edward Kruzel 1994 - 1998 **Ralph Burgess** 1995 - 2003 **Matthew Smith** 1997 - 2000 
 Myron MacInnis
 1998

 John Allen
 2003 - 2006
Robert Laliberte 2006



LIGO beam tube

