



# The View from NSF

LSC Meeting – March 2004

**Beverly K. Berger**

- Overview
- Budget for FY 2004, prospects for FY 2005
- Other news

Changes at NSF:

Acting NSF Director, Arden Bement

Asst. Dir. for MPS, Michael Turner

G040037-00-0



# Gravitational Physics Program

- Research related to gravitational waves
- Experiments to test gravitational theories
- Experiments to test particle physics and string theory via equivalence principle violations and deviations from  $1/r^2$
- Theoretical research in classical and quantum gravity

Beverly Berger, Program Director, Gravitational Physics

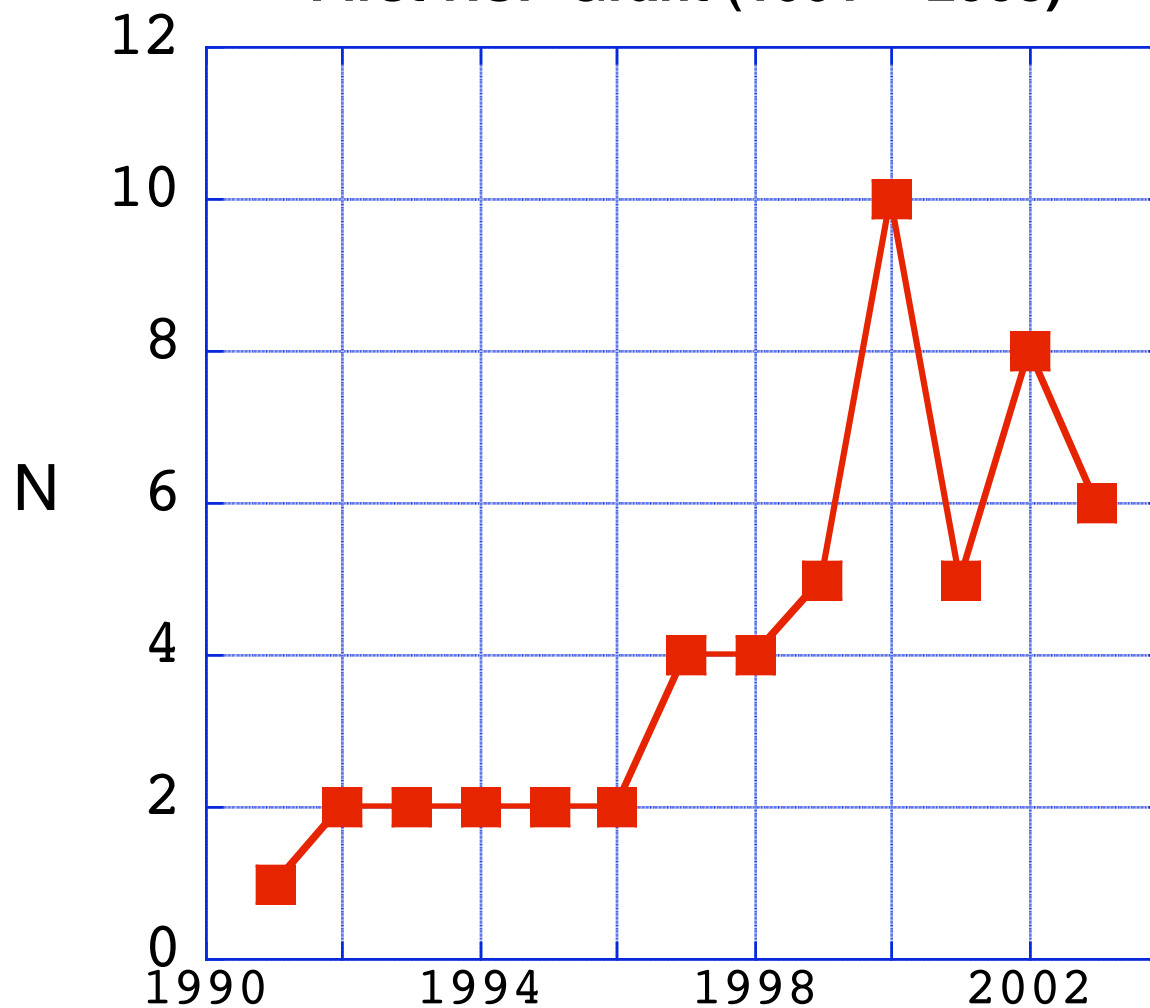
Tom Lucatorto, Program Director, LIGO

Joe Dehmer, Division Director, Physics



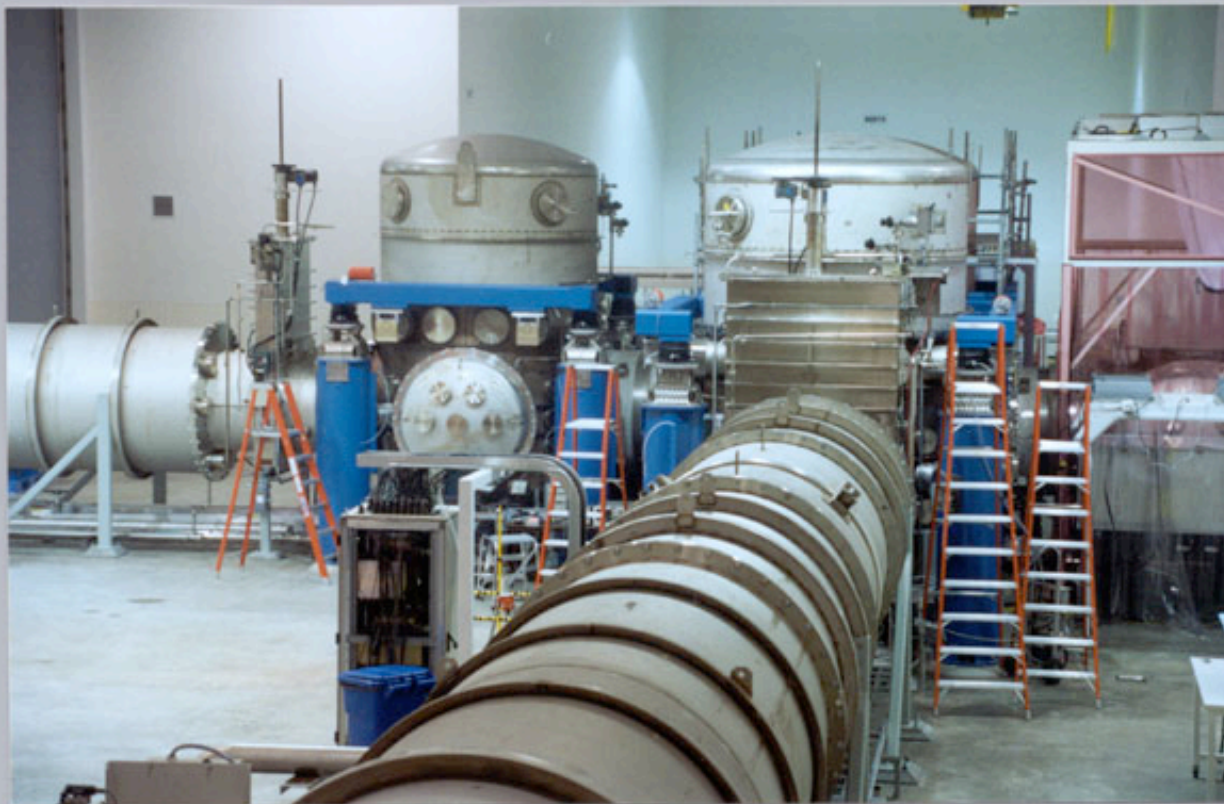
# Growth of the program

First NSF Grant (1991 – 2003)





# Gravitational Wave Research



LIGO



# Gravitational Wave Research



LIGO Scientific Collaboration



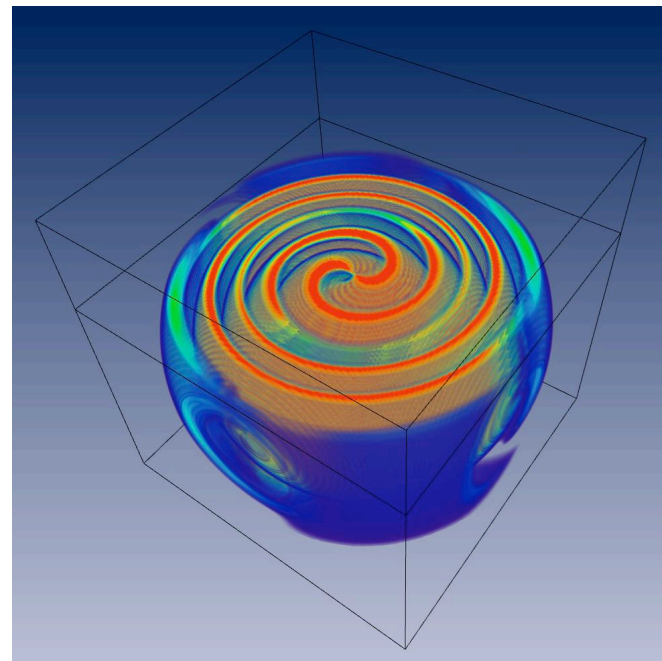
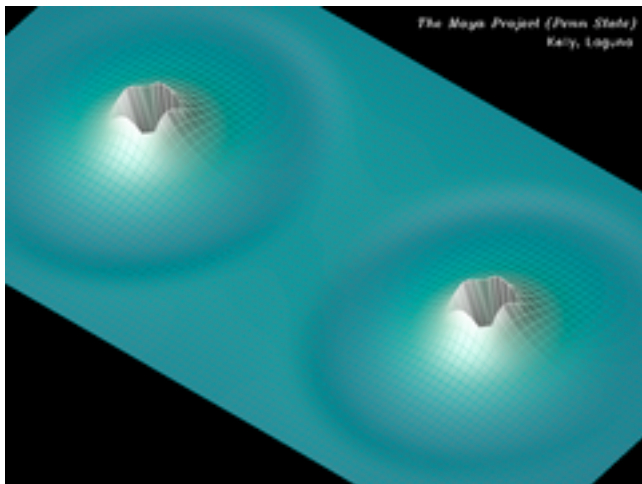
# Gravitational Wave Research



ALLEGRO



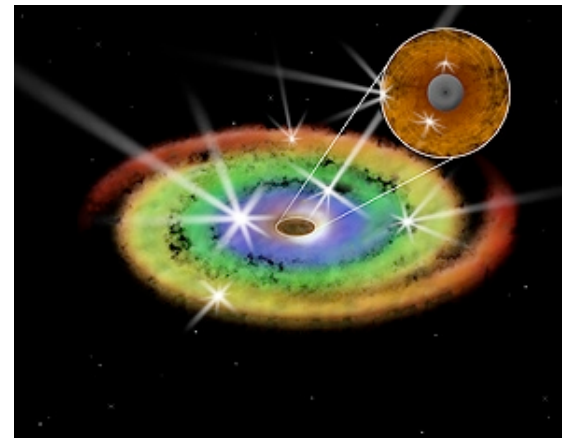
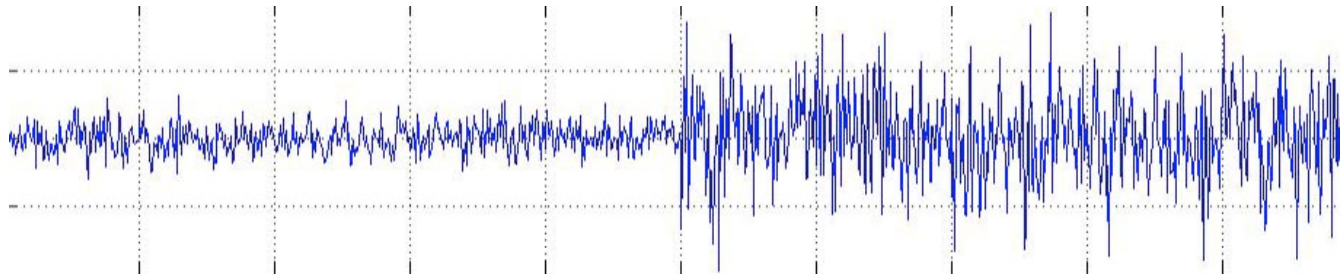
# Gravitational Wave Research



Source Simulations



# Gravitational Wave Research



Center for Gravitational Wave Physics





## HR 4664 passed in FY 2003

- Does not provide funds for NSF; Does provide the authority to obligate funds for specified NSF activities.
- Authorizes increases to NSF of between 13% and 15% for each of next 5 fiscal years.
- Policy objectives include balancing the Nation's research portfolio (among which are cited the physical sciences, geoscience, and engineering), establishing and maintaining cooperative international relationships, and increasing overall workforce skills.
- Requires the creation of a prioritized list of Major Research Equipment and Facilities Construction (MREFC) projects to be updated each time the NSB approves a new project to be funded by the MREFC account.



# Budget FY 2003

(\$M)

	NSF	MPS	PHY	Gravity
FY2002	4789	922	195.9	38.5
FY2003	5310	1041	224.5	44.5
$\Delta$	10.9%	12.9%	14.6%	15.6%



# Budget FY 2004

(\$M)

	NSF	MPS	PHY	Gravity
FY2003	5369	1041	224.5	44.47
FY2004	5578	1092	227.7	43.93
$\Delta$	3.9%	4.9%	1.4%	-1.2%

Some PHY reserves are not yet allocated.



## Gravity in Detail for FY 2003

(\$M)

	PHY GP	LIGO Lab	LSC + Other (Core PI)
FY2003	38.47	28.00	10.47
FY2004	44.47	33.00	11.47
$\Delta$	15.6%	17.8%	9.6%

Other NSF programs funded GW research in FY 2003:

Center for Gravitational Wave Physics (PFC)

4 GW source simulation projects (ITR) (2 new)

3 Grid research for LIGO data (ITR) (1 new)

1 new MRI for LSC



## Gravity in Detail for FY 2003

(\$M)

	PHY GP	LIGO Lab	LSC + Other (Core PI)
FY2003	44.47	33.00	11.47
FY2004	43.93	33.00	10.93
$\Delta$	-1.2%	0%	-4.7%

Some PHY reserves are not yet allocated.



## FY 2005 - Status

(\$M)

	NSF	MPS	PHY
FY2004	5578	1092	227.7
President's request FY2005	5745	1116	235.8
$\Delta$	3.0%	2.2%	3.6%

- For the latest information see NSF Office of Legislative and Public Affairs: <http://www.nsf.gov/od/lpa> and AIP Science Policy News: <http://www.aip.org/enws/fyi>.
- HR 4664 passed in FY03 authorizes much larger increases.



## Update for other programs of possible interest

- ITR program is in its final year. Ongoing discussions related to possible future Computer Infrastructure program.
- Physics Division had started program in Physics at the Information Frontier. This program has been put on (temporary?) hold due to lack of funds.
- International Division (INT) supports travel to foster **NEW** collaborations.



# LIGO Video Production Starts

- **Producer: Thomas Lucas Productions**
  - “Realm of the Black Hole” (NOVA)
  - “Runaway Universe” (NOVA and NSF)
  - “Voyage to the Milky Way” (PBS)
  - “Voyage to the Planets” (BBC - part of series “The Planets”)
- **Primary version ~ 25 minutes. Modularized to allow other versions and purposes**
- **Intended purposes**
  - Outreach: visitors to the sites; general public; students and teachers in high schools and colleges
  - Congressional staff
  - Media
  - Modules as source for broadcasters





## Connecting Quarks with the Cosmos (Turner report)

Finding: “More than ever before, astronomical discoveries are driving the frontiers of physics, and more than ever before our knowledge of physics is driving understanding of the universe and its contents.”

Recommendation: “The agencies [DOE, NASA, NSF] proceed with an advanced technology program to develop instruments capable of detecting gravitational waves from the early universe.”

OSTP has formed a joint DOE, NASA, NSF working group to foster the recommended collaboration including ground-based and space-based GW wave detectors and GW source simulation. A public report on areas of collaboration and priorities will be available soon.



## NASA/NSF Cooperation on GW Source Simulation

- Task group report has been made available to both agencies (<http://astrogravs.gsfs.nasa.gov>).
- Committee to advise NASA and NSF on collaboration made strong statements on need for increased support for GW source simulation
- NASA and NSF have agreed to cooperate in this area. Time scales and formats for cooperative programs are not yet known.
- Awareness of the need to support GW source simulation has percolated through the government.



## From the FY 2005 President's Request:

"Initiate focus on the emerging areas of **Physics of the Universe with an increase of \$9.0 million** to support observational and theoretical efforts to understand the nature of dark energy and dark matter; **expand support of numerical relativity** and theoretical cosmology, neutrino physics, and cosmic microwave background radiation; and support research and development of the Atacama Cosmology Telescope."

See <http://www.nsf.gov/bfa/bud/fy2005/toc.htm> in the Mathematical and Physical Sciences chapter.