The Saga of a Departmental Transformation

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Brief History

- In the early 90's, the Department of Physics had a total of 6 physics majors, 5 faculty and a graduation rate of one physics major every two years. Research was virtually nonexistent.
- The Department had received poor reviews from the Academic Program Review committee and UW-System had recommended phasing out the UW-L Physics Program due to low graduation rates.

The Department was on the verge of becoming ***extinct***!

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Fall 2011

- There were 151 majors, 10 faculty and 27 graduating physics majors in the 2011-2012 academic year.
- 41 Freshman entered UW-L as physics majors

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Factors Contributing to Success

- Curricular Reforms
- Undergraduate Research
- Recruitment/Retention
- Assessment
- Strategic Plan

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Key Ingredients for Curricular Reforms

1) Department is the Critical Unit

Any Curricular Reform has to be initiated at the Department Level.

Key Ingredients for Curricular Reforms

2) Faculty Buy-in

One person can develop the ideas and carry out the activities but you need the support of a large fraction of the department to sustain it.

"A key characteristic of a thriving department is the active involvement of a substantial majority of the faculty"

R.C. Hillborn, R.H. Howes,and K.S. Krane, Strategic Programs for Innovations in Undergraduate Physics: Project Report, AAPT, 2003

Key Ingredients for Curricular Reforms

3) Do not reinvent the wheel

Look at other successful programs and learn from them.

What ever you are planning to accomplish chances are someone has already done it.

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Key Ingredients for Curricular Reforms

4) Develop Collaborations

You need to develop partnerships with other departments on campus.

Develop ties with other programs at other institutions

5) Target New Faculty for Curricular Reform

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Key Ingredients for Curricular Reforms

6) Recognize Scholarship of Teaching

Department has to recognize and value the development of course material.

7) Target Both Majors and Non-majors

Curricular reform should not be limited to your majors only.

Departments depend heavily on service and general education courses for survival.

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Key Ingredients for Curricular Reforms

8) Constantly Monitor your Curriculum

To sustain the success and to improve the quality of your program you need to incorporate assessment in your curricular reform.

9) Work with your Administrators

10) All Reforms are Local

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Curricular Reform in the Major

One of the important additions in attracting new physics majors was the introduction of a set of emphasis programs that could be packaged along with course and career information.

Physics major with:

a) Astronomy emphasis
b) Computational physics emphasis
c) Optics emphasis
d) Business concentration
e) Biomedical concentration
f) Physics Education

1) Student interest
2) Faculty expertise
3) Employment opportunities

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Dual Degree Program

- Physics-Engineering Dual Degree

This is a collaborative program between UW-L and four engineering colleges (UW-Madison, Milwaukee, Platteville and U. Minnesota). The students spend three years at UW-L studying physics and then transfer to an engineering college for two years. The student receives a B.S. degree in physics (along with a math minor) from UW-L and a B.S. degree in engineering from the engineering college.

- Physics-Physical Therapy Dual Degree

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Undergraduate Research

One of the major facts that leads to high student satisfaction with our program is a strong set of research experiences for the undergraduate physics majors.

A key ingredient of any thriving program is a successful undergraduate research program

Part of the Curriculum
Incentive to Students
Incentive to Faculty

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Incentive for Faculty

- Teaching Credit for involving Undergraduate Students in Research
- Reduced Teaching Load for new Faculty
- Humane Teaching Assignments for new Faculty
- Bring new Faculty in one month early

Seminar for Credit

This was designed to provide a meeting place for the majors and faculty. Students must attend all seminars and either present a seminar or write a report on one of them at the end of the semester.

- Speakers from various fields
- Showcase undergraduate research
- Talks on research topics, careers, and engineering programs
- Physics Club-SPS events
- Distinguished Lecture Series in Physics

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The Annual Distinguished Lecture Series in Physics

2000 DLS speaker:
1997 Nobel Laureate
William D. Phillips

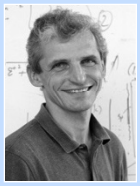
2001 DLS speaker:
1997 Nobel Laureate
Steven Chu

2002 DLS speaker:
1996 Nobel Laureate
Douglas D. Osheroff

2003 DLS speaker:
1996 Nobel Laureate
Robert Richardson

2004 DLS speaker:
1993 Nobel Laureate
Joseph H. Taylor

2005 DLS speaker:
1998 Nobel Laureate
Horst L. Stormer



2006 DLS speaker:
2001 Nobel Laureate
Wolfgang Ketterle

2007 DLS speaker:
2001 Nobel Laureate
Eric Cornell

2008 DLS speaker:
2004 Nobel Laureate
Frank Wilczek

2009 DLS speaker:
2002 Nobel Laureate
Riccardo Giacconi

2010 DLS speaker:
2003 Nobel Laureate
Anthony Leggett

2011 DLS speaker:
2005 Nobel Laureate
Theodor W. Hansch

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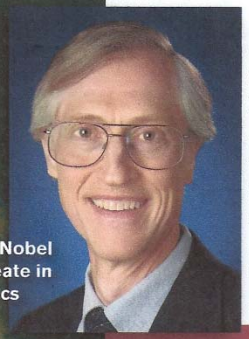
UNIVERSITY of WISCONSIN
LA CROSSE

Distinguished Lecture Series in PHYSICS

September 13-14, 2012



2006 Nobel Laureate in Physics

John C. Mather, Ph.D.,

is a Senior Astrophysicist at NASA's Goddard Space Flight Center (GSFC) in Greenbelt, Md., where he specializes in infrared astronomy and cosmology. He received his bachelor's degree in physics at Swarthmore College and his Ph.D. in physics at the University of California at Berkeley.

As a National Research Council (NRC) postdoctoral fellow at the Goddard Institute for Space Studies (New York City), he led the proposal efforts for the Cosmic Background Explorer (74-76), and came to GSFC to be the Study Scientist (76-88), Project Scientist (88-98), and the Principal Investigator for the Far IR Absolute Spectrophotometer (FIRAS) on COBE. He and his team showed that the cosmic microwave background radiation has a blackbody spectrum within 50 parts per million, confirming the Big Bang theory to extraordinary accuracy.

The COBE team also discovered the cosmic anisotropy (hot and cold spots in the background radiation), now believed to be the primordial seeds that led to the structure of the universe today. It was these findings that led to Mather receiving the Nobel Prize in 2006.

Mather now serves as Senior Project Scientist (95-present) for the James Webb Space Telescope, the successor to the great Hubble Space Telescope.

Schedule of Events

Thursday, September 13, 2012
PUBLIC LECTURE

4:30 p.m. Reception
Skogen Auditorium A Room 1400
Centennial Hall | *Refreshments served*

5 p.m. **History of the Universe from the Beginning to End**

The history of the universe in a nutshell, from the Big Bang to now, and on to the future – John Mather will tell the story of how we got here, how the Universe began with a Big Bang, how it could have produced an Earth where sentient beings can live, and how those beings are discovering their history. Mather was Project Scientist for NASA's Cosmic Background Explorer (COBE) satellite, which measured the spectrum (the color) of the heat radiation from the Big Bang, discovered hot and cold spots in that radiation, and hunted for the first objects that formed after the great explosion. He will explain Einstein's biggest mistake, how Edwin Hubble discovered the expansion of the universe, how the COBE mission was built, and how the COBE data support the Big Bang theory. He will also show NASA's plans for the next great telescope in space, the James Webb Space Telescope. It will look even farther back in time than the Hubble Space Telescope, and will peer inside the dusty cocoons where stars and planets are being born today. It is capable of examining Earth-like planets around other stars using the transit technique, and future missions may find signs of life.

Friday, September 14, 2012
PHYSICS SEMINAR

3 p.m. Reception
Skogen Auditorium A Room 1400
Centennial Hall | *Refreshments served*

3:20 p.m. **Engineering Challenges and Scientific Capabilities of the James Webb Space Telescope**

The James Webb Space Telescope (JWST) is planned for launch in 2018 as the successor to the Hubble Space Telescope (HST). It extends the scientific discoveries of the HST into the infrared band, covering 0.6 to 28 μm, with extraordinary sensitivity to reach far closer to the Big Bang, to look inside dust clouds where stars and planets are forming today, and to observe exoplanetary atmospheres through the transit technique. The 6.5 m telescope mirror is made of 18 beryllium hexagons, all of which are now polished, gold-coated, and tested. Using algorithms developed for the Hubble repair, the JWST will be focused after launch to achieve diffraction-limited performance at 2 μm. The telescope is protected by a 5-layer deployable sunshield the size of a tennis court to enable it to cool to about 40 K and to reduce its thermal emissions. I will outline the new concepts and technologies needed for the mission and the scientific observations that are likely with the new observatory.

Co-sponsored by
University of Wisconsin-La Crosse Foundation Inc.
Department of Physics
College of Science and Health
Wettstein's

For further information about the lecture contact:

www.uwlax.edu/physics

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Recruitment Tools

- High school Recruitment
- Campus Close-Ups
- Department Tours
- Physics Demos/Laser Shows
- Freshmen Scholarships

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Assessment
Overview

- A 3-member assessment committee is responsible for the oversight of the department's assessment activities.

- All department members participate in the assessment effort at the course level.
  - An annual meeting dedicated to assessment is required by our bylaws.
  - Results of assessment are discussed. Action Item(s) identified for the following year

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Program Goals

- Understand basic and advanced concepts of classical and modern physics.
- Understand and be able to use high-level mathematics to solve physics problems.
- Compete successfully for graduate schools and/or jobs, and perform well therein.
- Design and conduct experiments, to make careful and accurate measurements using many different kinds of equipment and to correctly analyze and interpret experimental data
- Use symbolic and numerical computer software to solve physics problems, and to acquire, plot, and analyze data.
- Effectively communicate (oral and written) using conventional scientific style.

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Assessment

Capstone Course

- Major Field Test in Physics (ETS)
- Presentation of material in a paper from the primary literature, to an audience of Physics faculty & students
- Short write-up ("Ask a Physicist" newspaper-column style) of a physics topic chosen by the students
- Fermi Questions (process & estimation skills emphasized) Test
- Math Skills Test designed by faculty in our department

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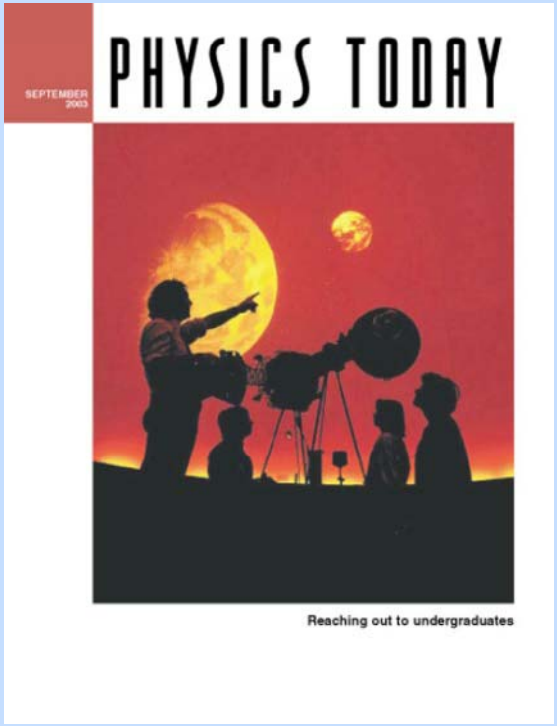
Recognition

- Selected by the National Task Force On Undergraduate Physics Education (NTFUP)



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Recognition

- Listed in the Top Ten of The AIP Statistical Research Center, Enrollments and Degrees Annual Report
- UW System Regents Teaching ***Excellence*** Award

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Bachelor's-Only Departments Averaging 10 or More Physics Bachelor's Degrees Per Year, Classes 2008 through 2010.

	Annual Average		Annual Average
US Naval Academy (MD)	31	Gustavus Adolphus Coll (MN)	13
SUNY College, Geneseo (NY)	26	Saint Johns U (MN)	13
U of Wisconsin, La Crosse	23	Saint Olaf College (MN)	13
Western Washington U (WA)	22	The College of New Jersey	13
Harvard Mudd College (CA)	21	U of Wisconsin, Platteville	13
Loyola U, Chicago (IL)	21	Cal State Poly U, Pomona	12
Bethel U (MN)	19	Illinois Wesleyan U	12
Carleton College (MN)	19	Lawrence U (WI)	12
Reed College (OR)	19	Taylor U (IN)	12
US Air Force Academy (CO)	19	Weber State U (UT)	12
Murray State U (KY)	18	Whitworth College (WA)	12
Grinnell College (IA)	17	Amherst College (MA)	11
Illinois State U	17	Beloit College (WI)	11
James Madison U (VA)	17	Brigham Young U, Idaho	11
Cal Poly St U, San Luis Obispo	16	Colgate U (NY)	11
Colby College (ME)	16	College of Charleston (SC)	11
Middlebury College (VT)	16	Gettysburg College (PA)	11
US Military Academy (NY)	16	Ithaca College (NY)	11
U of Wisconsin, Eau Claire	16	Kalamazoo College (MI)	11
Williams College (MA)	15	Kutztown U (PA)	11
U of Wisconsin, River Falls	15	Oberlin College (OH)	11
Allegheny College (PA)	14	Truman State U (MO)	11
Bowdoin College (ME)	14	U of Saint Thomas (MN)	11
Rochester Inst of Tech (NY)	14	Bucknell U (PA)	10
Rowan U (NJ)	14	Colorado College (CO)	10
Angelo State U (TX)	13	Dickinson College (PA)	10
Fordham U (NY)	13	Lewis & Clark College (OR)	10
Furman U (SC)	13	SUNY College, Oneonta	10

Note: List includes only those departments that offered a bachelor's as their highest physics degree in 2010 and contributed degree data for all 3 years.

http://www.aip.org/statistics

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The UW La Crosse Physics Department receiving the 2004 UW System Regents Teaching ***Excellence*** Award From Governor Jim Doyle

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