



SCHOOL OF
SCIENCE & ENGINEERING

Dear friends,

There have been some remarkable changes in the Tulane department of physics since Katrina. I hope you enjoy reading about these developments in the attached newsletter. My thanks to Professors Wayne Reed and Ulli Diebold, as well as Laura Linhardt, for working on this newsletter.

If you have any comments or questions about Tulane physics, I hope you'll contact me. Also I hope you will drop by the physics office if you are in New Orleans. You may also be interested in our website listed below.

Jim McGuire

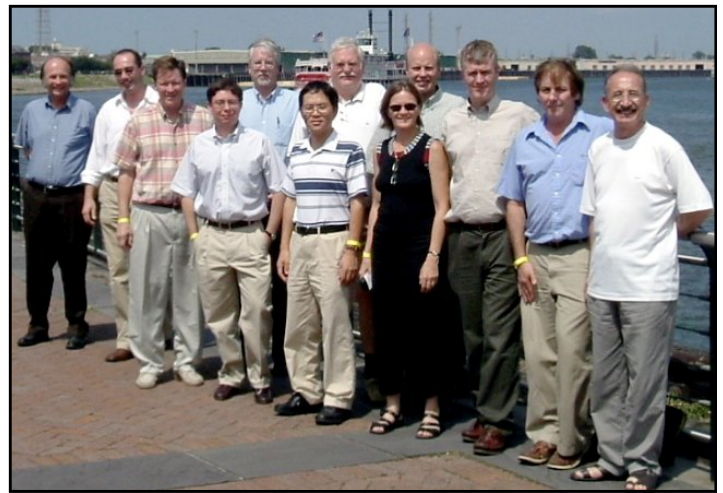
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Tulane Physics Newsletter

The Tulane Physics Department: A Post-Katrina Success Story

Along with most other New Orleans residents, the members of the Tulane Physics faculty were flung far and wide in the wake of Hurricane Katrina. Remarkably, all faculty members have returned, even though many could have taken positions elsewhere. Most had an unexpectedly rewarding sojourn during this 'forced sabbatical', and most have returned to Tulane fortified and with ambitious plans. This newly strengthened state of the Tulane Physics department is one of many silver linings in the otherwise very dark cloud of Katrina.

The following non-exhaustive list of Physics Department Post-Katrina facts and highlights shows how this department is one of the leaders in building the new Tulane. Combining Physics department strengths and potential with Tulane Administration support and resources will help the School of Science and Engineering meet and surpass the ambitious goals of its Strategic Plan.



A pre-Katrina group picture at the Riverwalk during the Department's annual retreat (from left to right: Perdew, Shakov, McGuire, Kaplan, Hancock, Mao, Tipler, Diebold, Wiedfeldt, McLaren, Reed, Pathak)

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A Few Highlights

- Ulrike Diebold was invested in the Yahoo! Founder Chair in Science and Engineering.
- Jim McGuire has been Chair of the Division of Atomic, Molecular and Optical Physics of the American Physical Society since 2005.
- John Perdew's publications have been cited over 40,000 times as of May 1, 2007, making him one of the most cited physicists in the world. He also won the School of Science and Engineering First Annual Outstanding Researcher Award, 2007.
- Wayne Reed and his research group founded the Tulane Center for Polymer Reaction Monitoring and Characterization (PolyRMC, <http://www.polyrmc.tulane.edu/>) in summer 2007, and was named an Innovator of the Year by New Orleans City Business.
- Fred Wietfeldt led the effort that made the first observation of radiative neutron decay at the NIST Center for Neutron Research. This work was published in Nature (Vol 444, p. 1059) and was a research highlight on the National Science Foundation home page in January 2007.
- More Physics Dept. news is available at <http://www.physics.tulane.edu/PhysicsHomeNews.shtml>

New Programs

Materials was chosen as one of the three major scientific areas in the School of Science and engineering (SSE) strategic plan. The majority of Physics faculty have research programs that overlap in some way with Materials. The Physics Department is the sole department currently in the Division of Physical and Materials Science, and is poised to take on a pivotal role in this central area. Professor McGuire has been particularly involved in SSE planning for the strategic plan.

Engineering Physics. Realizing the need for Engineering alternatives for Tulane's undergraduate after the closure of several departments, the Physics Department immediately stepped in to create an Engineering Physics program. This development was strongly encouraged and supported by the Dean of SSE and the Tulane Administration in general. Professor Lev Kaplan, with aid and approval of the entire Physics faculty succeeded in crafting a modern Engineering Physics program, drawing on the best features of nationwide efforts in this area.

3 + 2 Engineering Program. While Engineering Physics will allow a complete undergraduate engineering education in Physics, in addition to the still existing programs in Biomedical, and Chemical and Biomolecular Engineering, the 3+2 program, whose creation is still a work in progress, offers Tulane undergraduates the chance to spend three years at Tulane and two years at a partner institution (Duke and Vanderbilt), leading to a dual major in Physics and any of the Engineering disciplines no longer available at Tulane.

Graduate Program in Materials Science. Taking on its role as the first department in Physical and Materials Science, this program is being planned, and Professor Mao is heading up the effort.

Grants and Contracts

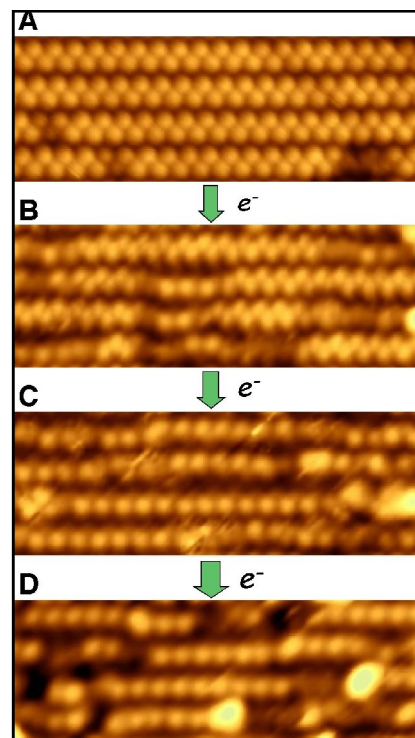
The tally of external grant support for the Physics Department is currently over \$4.5 million dollars, most of it in new grants awarded or renewed since Katrina. Professors Diebold, Kaplan, Mao, Perdew, Reed, and Wietfeldt have all obtained continuing or first time NSF support since Katrina.

Several faculty members are currently preparing collaborative proposals to various agencies, both with other Tulane faculty, and with faculty from other universities.

Other non-Traditional Forms of Support

It should be noted that beyond the traditional measures of grants and contracts the Physics Department has garnered many resources that contribute as much to the research and teaching missions as government grants, yet which aren't normally tracked. Some of these include:

- Professors Perdew and Reed had visiting professors, postdocs, and students paid entirely by outside organizations, such as the Chinese, Hungarian, and Spanish national science foundations, and private corporations.
- Professors McGuire and Reed obtained over \$100k in unrestricted gifts from outside sources.
- Many faculty members received full travel stipends to give invited lectures in the US and abroad.
- Professor Diebold's Yahoo Founders Chair carries an endowment to support her research
- Professor Reed brought in \$410k in grant matching funds and instrumentation from industrial sponsors.



Scanning Tunneling Microscopy Images of an electron beam damaged TiO₂ surface (O. Dulub et al. Science 317 (2007) 1052)

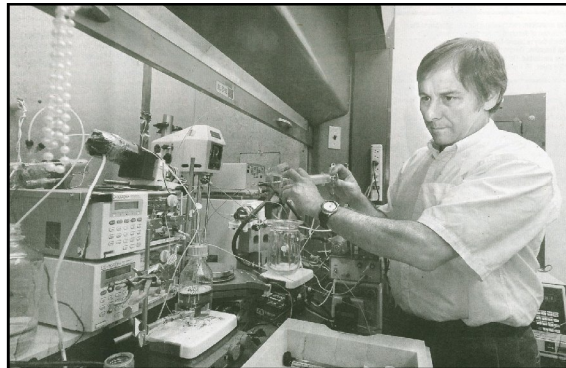
New courses in Physics

The Physics faculty has continued with new pedagogical innovations, including:

Computational Physics and Engineering (Kaplan).
Ways of Knowing (McGuire, with Math and Humanities faculty)

New TIDES courses include:

Introduction to Exciting Areas in Materials Science (Mao)
TIDE-121, Art Meets Physics (Shakov)
TIDE-135, Modern Applications of Quantum Systems (Uskov)



Dr. Reed with his prototype invention for which he was named the 2007 New Orleans' Innovator of the Year.

Majors and increase in enrollments in upper level courses

There are currently 37 declared Physics majors in the undergraduate division. This is above the usual pre-Katrina average, which typically hovered around 30. We expect this number to increase even more dramatically as the Engineering Physics and 3+2 programs come online.

Another important indicator of growth in Physics is the enrollment in the upper level (200-600) courses. Modern Physics 235 has a record enrollment at 24, and Mathematical Physics 301/601 has a record 21 students.

Ph.D.s earned Post Katrina

- Joe Hooper received his PhD in 2006, and found a research staff position at Naval Research lab. (Mao)
- Pascal Enohnyaket received his Ph.D. in 2007. His long range plan is to establish a university-based polymer research center in his native Cameroon. The Cameroonian government and the U.N. have already promised funds for this. (Reed)
- Lucian Constantin received his Ph.D. in 2005 and went on to a postdoctoral position at Donostia International Physics Center, Spain. (Perdew)
- Espen Sagvolden received his Ph.D. in 2006 and went on to a postdoctoral position in Theoretical Chemistry, University of Karlsruhe, Germany (Perdew)

Outreach Post-Katrina

Over the last few months, a team of Physics faculty (Shakov, Diebold, Schuler, Wietfeldt, Mao) have developed an "Introduction to Physics Pedagogy" course that offers Tulane undergraduate students an opportunity to learn the basics of physics pedagogy while providing a valuable and much needed service to the community by assisting teachers at New Orleans schools in teaching science. This semester (Fall 2007) is the first time the course is being offered, and this course is one of very few public service courses offered by Tulane's science departments. The Tulane students will be working with Lusher Elementary School (4th and 5th grades). In the future, if proven successful, the program will be extended to include more local schools. The support comes from the Physics Dept. and Tulane Center for Public Service (including a \$5,000 course development grant, one of four awarded university-wide last spring).

Publications, conferences, etc.

Since Katrina Physics department faculty have published over 60 peer reviewed articles and book chapters. These include an article in Science by Diebold, another in Nature by Wietfeldt, and another in Reports on Progress in Physics by Tipler. Physics faculty had many publications in Physical Review Letters.

Physics Department faculty collectively gave scores of invited and contributed talks at major congresses, focused symposia, workshops, and summer schools, and were invited as individuals to dozens of universities, national institutes, and industries. Tipler was interviewed by several newspapers and institutes.

Empowerment of Professors of Practice and Research Faculty

The Physics Department fully recognizes and respects the academic and intellectual capital brought to our department by our Professors of Practice and Research Professors. As such, these faculty members are invited to participate and add their ideas at faculty meetings, are asked to organize departmental efforts in their areas, and are encouraged to develop as fully as possible their pedagogy or research. The Professors of Practice have a tremendous responsibility in presenting the highest quality courses consistent with a private university proud of its teaching prowess, while the Research Professors are expected to contribute as full stature scientists at the forefront of their specialties.

New and renewed collaborations, the continuing fruits of the Katrina Diaspora

Faculty engendered new collaborations and renewed old ones. New and recently strengthened collaborations are with Harvard, Max Planck Institut (Dresden), Rutgers, Princeton, The Autonomous University of Mexico, UNO, U. Massachusetts (Amherst), U. Illinois (Carbondale), U. Wisconsin (Milwaukee), Stanford, Los Alamos National Labs, Argonne National Labs, Penn. State, Carnegie Mellon, U. Akron, Texas A&M, and Rice.

Patents and related activity

Professors Alina Alb and Reed submitted a provisional patent application in Sept. 2006, and full application in Sept. 2007. The first commercial prototype resulting from two earlier Reed patents was donated by Varian Inc. to the Physics Dept. in August 2006, and another now commercially available instrument based on other Reed patents was donated to Physics by Brookhaven Instruments Corporation in January 2006.

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