Ohio State Home to the APS Division of Particles and Fields 2000 Meeting

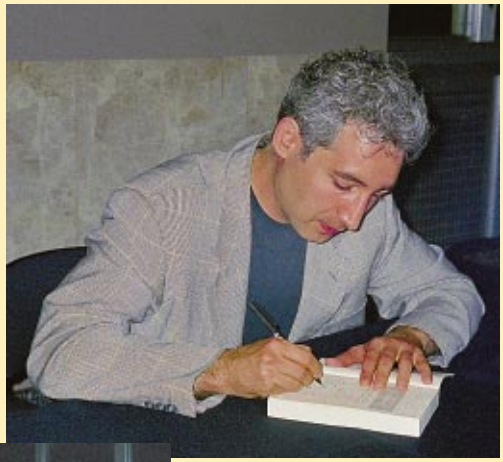
The Ohio State Department of Physics hosted about 450 physicists from around the world in August for the American Physical Society's Division of Particles and Fields annual meeting. Discussion sessions naturally centered on elementary particle physics. Topics included the latest results from the highest energy accelerators such as the discovery of the tau neutrino at Fermilab in Batavia, Ill. Other conference sessions offered researchers the latest information from the immense neutrino detector Super-Kamiokande in Kamioka, Japan, and the most recent balloon data on the structure of the universe. This four-day conference was organized by Ohio State physics faculty Stuart Raby and Steve Pinske, with help from Ohio State's Department of Conferences and Institutes. The week was highlighted by the free public talk given by Dr. Brian Greene, renowned physicist and author of the popular book *The Elegant Universe.* (More about Dr. Greene's talk can be found below.) More information about the conference can be found at www.dpf2000.org.

Dr. Brian Greene wowed 'em at DPF 2000

On a warm Friday night in August—in competition with the Ohio State Fair and other summer activities—1,500 people converged on Mershon Auditorium to hear a free talk by renowned physicist and Columbia University professor Dr. Brian Greene, part of the DPF 2000.

Green discussed "Space and Time Since Einstein," using animated, colorful computer graphics to explain complicated concepts from the theory of relativity to the new string theory. Called "the new Carl Sagan" by some, and recently featured in *Newsweek*, on television, and in the movies, Greene proved that people are interested in knowing more about concepts that fascinate physicists every day.

Greene's book *The Elegant Universe* was a finalist for the Pulitzer Prize in General Nonfiction. Following his talk, more than 100 stood patiently in line while he chatted briefly and signed copies of his book.



Brian Greene signed copies of his book for more than 100 people who waited patiently after his talk.

Peter McLarnan (center), 13, a fourth-generation Buckeye fan, waits in line with his father, Tim, at Greene's book signing.

This image was designed to publicize the DPF 2000. (Design by Margo Garcia-Hunter, Digital Media Creation Services/UTS.)

Introductions matter: An excerpt by Professor Stuart Raby

Dr. Stuart Raby, a friend of Greene's and the Ohio State connection that brought Greene to campus, offered an introduction that included an explanation of current research for the lay audience in attendance. An excerpt follows:

On behalf of the organizing committee for DPF 2000 and the Department of Physics of The Ohio State University, I would like to welcome all of you to this public lecture.

I know that some of you have seen Dr. Greene before on TV. He appeared on *The Charlie Rose Show*, *The News Hour with Jim Lehrer*, *The Century with Peter Jennings*, a CNN profile with Jeff Greenfield, an hour special on *Nightline in Primetime*, and the *Conan O'Brien Show*. You may have seen him in the movie *Frequency* where he played himself and expressed some of the ideas he will talk about tonight. Some of you have even read his book *The Elegant Universe* which has been on the *N.Y. Times* bestseller list for four months. However, most of you, if not all of you, are simply here because of an overwhelming curiosity about nature and the world around you. And you are hoping this talk tonight might give you some insight into the deep questions you have. Well, you are among friends. If you look around you, you will find here in the audience more than 400 physicists, representing 14 countries from around the world. They are here attending a conference on elementary particle physics under the auspices of the American Physical Society. They all have a deep desire to understand the world around them and the focus of their research is the most elementary particles of nature and the interactions of these particles; together these are regarded as "the building blocks of nature."

One mode of research in this field uses high-energy accelerators as microscopes focusing on the shortest distances.

In March 2001, a high-energy accelerator, the "Tevatron," will begin operating at the Fermi National Laboratory—Fermilab. For a few short years, it will be the highest energy machine in the world . . . With this machine physicists will be searching for the Higgs particle—what Nobel Laureate Leon Lederman called the "God Particle."

Accelerators are not the only tools used to study elementary particles. In fact, some of the most exciting new results are coming from underground laboratories. For example, approximately one kilometer below the surface in Kamioka, Japan, there sits a tank holding 50,000 tons of purified water, surrounded by sensitive detectors of light. This detector is known as Super-Kamiokande. This immense instrument is used to detect one of the most ethereal particles of nature known as the neutrino. The neutrino is so weakly interacting that it can pass through astronomical distances of matter without ever hitting anything. Yet, so many of these neutrinos are produced in the processes that heat the sun, that by their interactions in the waters of Super-Kamiokande we are now able to "see" the sun by the neutrinos alone. Recently this experiment has proven that neutrinos have mass. This is extremely exciting, since it is the first evidence for new phenomena that cannot be described by the standard theory of particle physics.

It is believed that in addition to the Higgs, much more new and exciting phenomena will be discovered when the Tevatron and other high-energy accelerators begin operations.

In 2005, the accelerator called the LHC at the European physics laboratory called CERN in Geneva, Switzerland, will take over the title of the highest energy machine in the world. And it will retain this title for the foreseeable future.

By the way, the acronym CERN stands for the Center for European Research Nucleare; however, it is now known as the European Laboratory for Particle Physics—(h)ELPP. This is no joke, as we can say that we do need help, since Congress keeps cutting funds for this kind of research.

Did you know that research scientists at CERN created the World Wide Web as a tool for scientists within large experimental groups to communicate with one another? Did you know that the detector technology used in the study of elementary particles is now being adapted to medical research and diagnostics for X-rays, MRIs, and CT scans? Moreover, accelerator technology used to probe the shortest distances has been used for cancer therapy as well as biological and chemical research.

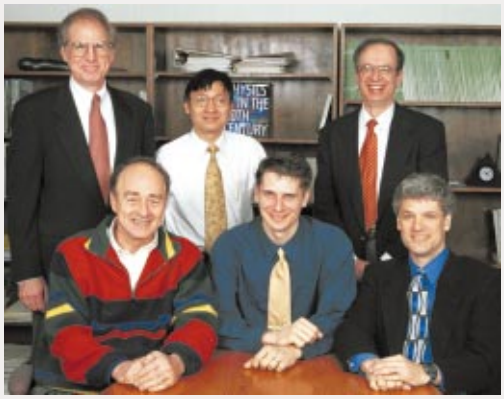
The high-energy machines at Fermilab and CERN are built as discovery machines, built to find what is predicted by theories—or to find what was not yet dreamed of. But keep in mind that the byproducts of this research benefit the mind, the soul, and even the economy.

Physics faculty named as fellows

The American Physical Society and the Institute of Electrical and Electronics Engineers recognized five members of Ohio State's Department of Physics for their contributions to physics research.

Four faculty—**Jason Ho, Robert Perry, Eric Herbst, and Alan Van Heuvelen**, all professors of physics—were named fellows in the American Physical Society (APS).

Len Brillson, professor of physics and electrical engineering and a scholar at Ohio State's Center for Materials Research, has been recognized as a fellow in the Institute of Electrical and Electronics Engineers (IEEE).



(Seated, from left): Alan Van Heuvelen, APS Fellow; Maarten Rutgers, winner of the NSF Young Career Award; Robert Perry, APS Fellow; (standing, from left): Leonard Brillson, IEEE Fellow; Jason Ho, APS Fellow; and Eric Herbst, APS Fellow. Not pictured: NSF Young Career Award recipient Yong Baek Kim.

Jason Ho earned his naming as an APS fellow for his work in superfluids—fluids exhibiting quantum phenomena on a macroscopic scale. Superfluid helium and superconductors are classic examples of this kind of phenomena where materials flow without loss of energy, unlike ordinary fluids such as water. In particular, Ho was the first to study the properties of the so-called spin-1/2 Bose gas, which was finally discovered at the University of Colorado in 1999 and showed many properties he had envisioned. For the last two years, he has focused his efforts on the newly discovered Bose-Einstein condensation in atomic gases, and created a subfield within this area called "spinor Bose condensate," which is now a subject of international conferences. Ho also was named a fellow of the John Simon Memorial Foundation in April 1999.

Robert Perry helped develop a new model of atomic forces that may solve a long-standing problem in particle physics. That problem began in the 1970s, when physicist Richard Feynman described protons as very complicated structures made up of many particles including quarks and gluons. Perry's work, while consistent with Feynman's universally accepted model, provides a more intuitive few-body picture of protons and other particles that interact with what physicists call the "strong force." While the equations that describe the fundamental theory of the strong interaction remain unsolved, Perry has made it easier for theorists to use successful quark models to approximate low-energy solutions to these equations.

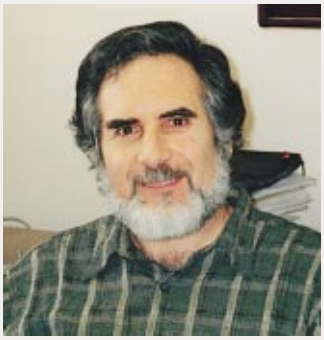
Eric Herbst was recognized for his work in astrochemistry. He searches interstellar objects for molecules that offer clues to the physical conditions in their part of the universe, such as dust particles, interstellar gas, and the nebulae surrounding young, low-mass stars. Over billions of years, these cold and diffuse objects collapse to form stars and planetary systems, but in the interim, they may show astronomers how molecules are formed in space—how single atoms coalesce to form more than a hundred different complex organic molecules present in galaxies today.

Alan Van Heuvelen is part of a growing field within physics research—physics education research. His work gets to the root of students' conceptual understanding of physics and to their problem-solving skills. He offers workshops around the world for physics professors who want to employ his teaching techniques. His new multimedia CD, active learning materials, and laboratory learning system help make students more active participants in their learning. He is now working with others in science, math, and engineering departments at Ohio State to introduce graduate and undergraduate student fellows into grade school classrooms in the Columbus Public Schools.

Len Brillson, a new IEEE fellow, leads an interdisciplinary research effort in electronic materials. He conducts atomic-scale electronic and chemical studies of materials interfaces, in particular the semiconductors that are at the heart of next-generation electronic technologies for computers, communications, and displays. Brillson formerly directed the Materials Research Laboratory, one of several major research departments in Xerox Corp.'s Corporate Research Division, and he shares that management experience through regular lectures at scientific meetings. He often discusses the changing roles of researchers in industry, exploring the different ways engineers and physicists approach problem solving and finding news ways for each to complement the other's skills. Besides teaching and research at Ohio State, Brillson has provided leadership in several scientific societies, including roles as editor, trustee, and former governing board member of the American Institute of Physics. He is also a fellow of the American Physical Society.

The American Physical Society elects as fellows "only such members who have contributed to the advancement of physics by independent, original research or who have rendered some other special service to the cause of the sciences." Each year, a maximum of only 0.5 percent of all APS members may be elected fellows.

The Institute of Electrical and Electronics Engineers provides recognition to individuals whose "contributions to the art and science of electro- and information technologies worldwide have improved the quality of daily life." In any one year, no more than 0.1 percent of IEEE members may receive this honor.



Stuart Raby

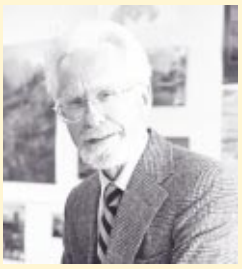
Stuart Raby wins Humboldt Research Award

Stuart Raby received a Humboldt Research Award for Senior U.S. Scientists in November 1999. The award, which amounts to DM 100,000, recognizes his past accomplishments in research and teaching and entitles him to stay for a period of up to nine months at a research institute of his choice in Germany. Dr. Raby will use the award money to pay his expenses while visiting the Universitat Bonn from September 1, 2000 through February 28, 2001. The award is sponsored by Argonne National Laboratories Materials Science Division.

William Palmer wins Rosalene Sedgwick Award for service

The Rosalene Sedgwick Award is presented by the College of Arts and Sciences to faculty who have provided exemplary service to undergraduates in one or more of the following ways: as faculty advisor; as a participant in a program of course management or curricular development; as a participant in recruitment, accommodation, or retention of undergraduates; as a model for the implementation of diversity considerations; as someone who directly affected the quality of the academic experience for undergraduate students. The Department of Physics was proud to nominate Professor William Palmer, and even more proud when he was awarded the Twentieth Annual Faculty Service Award in April 2000.

Letters of support for Palmer's nomination stated that he "transformed the place of the undergraduate major in physics and set a highly visible example of how an undergraduate emphasis could simultaneously advance the university's goals of increased national visibility and prestige."



William Palmer

Bill was described as "savvy" in his ability to make the university part of the national research agenda—and the NSF funding of Ohio State's Physics Research Experience for Undergraduates was the result of his efforts. Physics majors are offered the "attention, ambience, and sense of community of a small private college, together with all the opportunities of a major research university." Strong connections to high school science teachers forged the Central Ohio Physics Alliance that provides a great benefit to teachers students and schools, as well as a resource for recruiting talented undergraduates to Ohio State.

The department and the university are better places thanks to Bill's efforts. (For a more detailed look at his accomplishments, please see "A Date with Destiny" on page 13.)

Professor Bunny Clark, Distinguished University Professor, receives 2000 Distinguished Service Award

Bunny Clark was presented with the 2000 Distinguished Service Award—during a committee meeting, of course. As he presented Dr. Clark with her award, President Kirwan described her service to the university, mentioning her work as chair of last year's Selective Investment committee. "Bunny exemplifies service to the Department of Physics and the entire university," he said. After his departure, Dr. Clark was characteristically modest. Holding her award up for everyone to see, she said, "We got another one for physics!"

Her reputation for hard work and excellence goes well beyond the department. The May 11, 2000 issue of *onCampus* stated: There is perhaps no one more in demand to serve on important university-wide committees than Clark. Universally admired for her intelligence, integrity, and level-headed leadership, Clark has served on major search committees at all levels, including those that nominated the president of the university and the dean of her college. As a Distinguished University Professor, she is a member of the President's and Provost's Advisory Committee. She also was a member of the Accreditation Steering Committee when Ohio State underwent its last accreditation. Current activities include membership on the Committee to Evaluate Central Administrators and the Special University Marketing Task Force. She has been a member and chair of the Selective Investments Committee and won the University Distinguished Affirmative Action Award. She is a fellow of the American Physical Society and the American Association for the Advancement of Science. She has provided leadership to the American Physical Society and served as chair for the Division of Nuclear Physics. In addition, she is an award-winning researcher and an effective advocate and mentor for women in science. A member of the Ohio State family since 1969, first as a research associate and scientist, then as a faculty member, Clark earned her Ph.D. at Wayne State University and her B.S. and M.S. at Kansas State University.

Bunny Clark

Linn Van Woerkom

Professor Linn D. Van Woerkom wins Distinguished Teaching Award

The positive evaluations from non-physics majors who take Van Woerkom's sequence of first-year physics courses primarily attended by students in health care-related fields demonstrate his ability to develop the course series into a "dynamic vehicle for learning," according to a nominator. His students praise his accessibility—especially during office hours, when the room typically is filled to capacity with students and the instructor sharing information. Van Woerkom uses computer presentations and live demonstrations to show both the high-tech and hands-on nature of physics. His service also is extensive. He is an active participant in the Honors program, speaks at primary and secondary schools, develops curricula, and modifies classroom demonstrations. In addition, he maintains an active program of research in the field of short-pulse lasers. An Ohio State faculty member since 1992, he earned his bachelor's, master's, and doctoral degrees in physics from the University of Southern California.

Richard A. Noll, laboratory supervisor and "creator of cool physics demonstrations" wins University Distinguished Staff Award

Dick Noll and his wife, Deborah, enjoy lunch at the Faculty Club during the Distinguished Staff Awards presentation.

Whether demonstrating electricity and magnetism to fourth-grade students or devising inexpensive timers for an undergraduate physics course, Richard A. Noll, laboratory supervisor for physics, shares a deep love of science with the community and with the university. Noll has proven to be an exceptional innovator in creating experiments for courses that accessibly demonstrate physics concepts. More than 35 percent of Ohio State graduates have used Noll's lab demonstrations during the last 25 years. "He is, in my view, one of the major reasons that our department was given the 1999 Distinguished Teaching Award," wrote a nominator. "His contributions to the educational mission of the physics department are profound." Noll also gives of his time to perform science demonstrations regularly in elementary and middle schools, for the Physics Open House, and at the Science Olympiad. "His off-duty 'Mr. Science' demonstrations in local schools and libraries have made him a real hero for thousands of central Ohio kids," wrote a nominator.

Professor Art Epstein receives Technology Partnerships Alliance Award

Art Epstein

Arthur Epstein, Distinguished University Professor of physics and chemistry and director of the Center for Materials Research, won one of the first-ever technology transfer awards.

According to an article in the February 26, 2000 issue of *onCampus*, Ohio State created the Technology Partnerships Alliance to strengthen university partnerships with business and the public sector and to fortify the community's technology enterprise infrastructure.

"These awards honor organizations and individuals who know that innovation cannot be left to chance—that it must be pursued systematically, fostered and nurtured through a culture that celebrates change, sustained by incentives that reward research excellence, and enhanced by partnerships that reflect the value of collaboration," President Kirwan said.

Epstein spent 12 years in research and research management at Xerox Corp. before joining Ohio State. In his 14 years at the university, his research program has garnered more than $12 million in grants and industry contracts and he has more than 30 inventions. Most of the resulting patents have been licensed. His light-emitting polymer portfolio has been licensed to a Fortune 500 company and is the basis of commercial initiatives. One of his best-known inventions is the world's first plastic magnet.