

Physics Matters

1996-97
Department of Physics



Physics alumnus Tom Matula shows off his physics skills by trying to stay balanced in microgravity. See "Alumni Achievements and News," page 5.

Physics Welcomes Three New Faculty Members

Susan Dexheimer

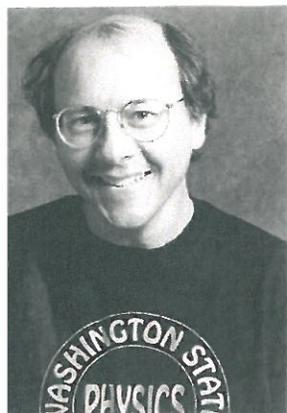
Susan Dexheimer's current research interests involve the application of femtosecond laser spectroscopy to study ultrafast dynamics in condensed matter and biological systems. Her research is aimed at understanding the underlying physics of ultrafast processes such as carrier dynamics in semiconductors and electron transfer processes in photosynthetic systems. Her work includes both the development of new spectroscopic techniques as well as their application to systems of scientific and technological interest.

Sue received her undergraduate and graduate training in physics at the Massachusetts Institute of Technology and the University of California, Berkeley. She began her work in femtosecond laser spectroscopy as a University of California President's Postdoctoral Fellow

under the direction of Charles V. Shank at Lawrence Berkeley National Laboratory, and continued her work in this field as a Director's Fellow at Los Alamos National Laboratory. Her graduate research involved the application of solid-state spectroscopic techniques to study the electronic structure of photosynthetic electron transfer centers and related model systems. As a post-doctoral fellow, she developed and applied femtosecond laser spectroscopic methods to study fast electronic and vibrational dynamics in novel electronic materials.

See Faculty page 2.

Greetings from the Chair



Michael Miller, Chair
Department of Physics

Following the tradition of those winters you knew and loved as students, this has been a miserable winter in Pullman. We had snow on the ground before Thanksgiving, and it just got deeper and deeper as the season wore on. As I write this, it has melted, and Pullman has turned the corner into spring.

The department's research effort continues to grow, with more than \$2.3 million in grant and contract expenditures in the last fiscal year. Interestingly, mirroring a nationwide trend, we are doing this with fewer graduate students and more postdocs. Our physics major program is still small but spectacular, with a number

of truly exceptional students (as you can see from the President's Honor Roll lists which we print with every issue). In late-breaking news, we were just informed that two of our majors, A.C. Binner and Nate Hicks, were awarded Goldwater Scholarships for the next academic year. These two guys were the two allowed applicants from WSU and were selected in a nationwide competition with many hundreds of schools. Taken together with Julia Plummer's Goldwater Scholarship last year, physics majors have claimed three of the last four awarded to WSU!

In the last academic year we awarded three bachelor's degrees, eight master's degrees, and four doctorates in physics. Our service course enrollments continue to increase; however, the faculty seems to agree that high school preparation appears less and less adequate with each passing year.

We have added some wonderful people to the physics staff. Shirley Kanzler, Dave Repp, and Mary Guenther work in the main office, and Missy Lee works in the Shock Dynamics Center. We are extremely excited about our three new faculty, Sue Dexheimer, William Toruellas, and Kelvin Lynn. Thumbnail profiles of each appear elsewhere in this edition of *Physics Matters*.

After many years of dedicated service, Wiley Wilson has decided to retire. Wiley, who has kept our instructional labs up and running since 1969, will be "hitting the road" in his RV. We will miss him.

This past January Al Butler passed away. Al was a role model for physics instructors for more than 30 years. I do hope we learned his lessons.

The department joins me in wishing you all the best.

A handwritten signature in cursive that reads "Mike".

Michael Miller



Wiley Wilson

Faculty from page 1.

Sue is currently constructing a state-of-the-art femtosecond laser system at WSU that will allow spectroscopic measurements with a time resolution of ~10 femtoseconds. These laser pulses are short compared to the time scale for internal vibrational motion in molecules and solids, allowing the dynamics of phonons to be



Susan Dexheimer

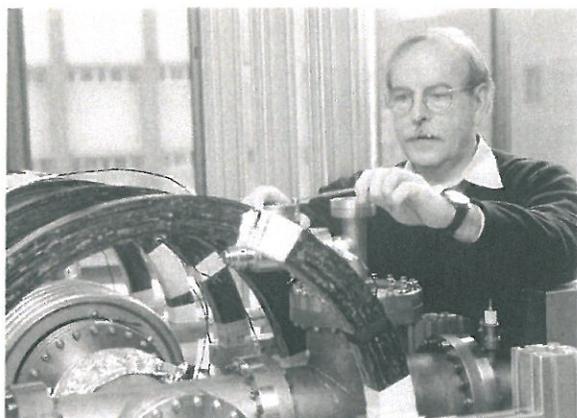
probed in real time. Some of the initial work in her research group will involve the use of these short laser pulses to examine the interplay of electronic and vibrational excitations and their role in the fast response of materials such as low-dimensional semiconductors and molecular electron transfer complexes. A related research area involves the development of time-resolved spectroscopic techniques using recently devel-

oped methods for generating ultrashort pulses of far-infrared light. This work will allow femtosecond measurements in a spectral region that is as yet largely unexplored, and holds promise for opening a broad range of physical phenomena for study.

Sue is currently teaching the upper division undergraduate optics course. She enjoys bringing examples from her own research and from other current applications of laser and optical technology to her classes.

Kelvin Lynn

In August 1996, Kelvin Lynn moved to WSU, where he is now director of the Materials Research Center, professor of physics and mechanical and materials engineering, and Boeing Chair. He has broad experience in using fundamental particles in understanding physics, materials science, and industrial questions. He has developed positron beams for studying problems in physics, both fundamental and applied in nature. This beam technique is used to measure the electronic structure of metals and alloys and to carry out defect profiling in thin films of semiconductors (i.e., epilay-



Kelvin Lynn

ers), polymers and metals, and their respective interfaces.

Kelvin obtained a B.S. in materials science in 1970, a B.S. in mathematics in 1972, and a Ph.D. in materials science in 1974 from the University of Utah. He took a position as assistant physicist with Brookhaven National Laboratory in New York after a short time as a postdoctoral fellow at the University of Utah. His intended two-year East Coast experience stretched over 22 years. He became a tenured senior physicist with a research group in the physics department and was head of the Materials Science Division. From 1974 to 1979 he was a resident visitor at AT&T-Bell Labs. He spent 1979-80 at Los Alamos National Laboratory performing neutron and muon experiments.

The model of the atom which depicts a nucleus surrounded by whirring electrons is among our first introductions to atomic particles. Through this model the electron, proton, and nucleus are introduced into our vocabulary. The poor positrons, anti-particles of the electrons, are rarely mentioned in such introductions, and in this world of matter they only live for typically a tenth of a billionth of a second. However, in vacuum they will live forever. While electrons and positrons annihilate each other on contact, their annihilation produces mainly two gamma-rays. It is the detection of these gamma-rays or other by-products which is the basis of Kelvin's positron research.

When a magnetically guided positron beam reaches a sample, the positrons annihilate with the electrons giving off gamma-rays, which are measured using various types of solid state spectrometers. Counts of these annihilations are stored for later analysis. The gamma-rays carry unique information about the defects in the sample and in some cases can provide the electronic properties.

Kelvin has studied a number of different materials using this technique with many variations as to the methods and equipment used to generate, accelerate, moderate, focus, transport, detect, and analyze the positrons and their annihilations. For those interested in reading more about this research, Kelvin has over 200 publications which are sure to put even the most die-hard insomniac straight to sleep!

William Torruellas

William Torruellas came to our department after touring a large portion of the world. He was raised in Andorra, one of the smallest countries in Europe, located between France and Spain, with a population rivaling that of Pullman. William obtained his electrical and applied physics engineering and master of science degrees from the Polytechnic Institute of Grenoble (France). While working for his doctorate at the Optical Sciences Center at the University of Arizona, he dealt with nonlinear optical spectroscopy of polymeric thin films. After obtaining his doctorate, he became a senior scientist in the corporate research division of Raytheon in Lexington, Massachusetts. A NATO fellowship brought him back to France, where he continued his work on nonlinear organic crystals and polymers at CNET in Paris with Joseph Zyss. Upon his return to the States, he became a senior research associate in the Center for Research and Education in Optics and Lasers in Orlando, Florida. At WSU he has been able to continue his world tour, having been invited to speak at international conferences in Australia and Israel. Next summer he will be a guest lecturer in Germany and Russia.

William's main research interest centers around the understanding of advanced optical materials by attempting to control light propagation, particularly in bulk geometries. In the past, he has concentrated on spectroscopically investigating the behavior of polymers and organic compounds under the strong excitation of laser fields, specifically in the near infrared portion of the spectrum. His work has resulted in a better understanding of one-dimensional electronic systems under multiphoton excitation. As a result of his understanding of the nonlinear response of materials, he has been able to demonstrate for the first time in a condensed material, stable self-trapping of a laser beam. In a related effort, he also demonstrated the existence of optical solitary waves in bulk quadratic nonlinear media. The latter materials are currently being used to generate widely tunable laser sources. He hopes to expand his prior work into areas where the optical nonlinearity of polymers will help probe low-frequency electric fields, particularly at the surface of sub-micron electronic circuits and where light itself will manipulate/engineer a new generation of nonlinear optical materials.



William Torruellas

Around the Department

Congratulations to our undergraduate Space Team: **A.C. Binner**, **Nate Hicks**, **Susan Richardson**, and **Jeremy Young**. Their NASA miniproposal was a part of the 1997 NASA Reduced Gravity Student Flight Opportunities Program. Congratulations also to their faculty mentors, **Philip Marston** and **Mark Kuzyk**.

Julia Plummer was selected as a Goldwater Scholar this year. The scholarship pays \$7,000 a year for two years. Julia was one of two undergraduate students from WSU selected from a national pool of candidates. She also received the College of Sciences Distinguished Student Award during commencement ceremonies on May 10.

Nick Cerruti, physics Ph.D. student, was named Outstanding Teaching Assistant by the American Association of Physics Teachers.

Wen-Yen Chang, physics doctoral student, was awarded second prize in the Natural & Physical Sciences Division of the GPSA Research Exposition. **Bradford Pate** is his adviser.

Yogendra M. Gupta has been appointed Westinghouse Distinguished Professor of Materials Science and Engineering for academic year 1996-97.

David Citrin has been named an ONR Young Investigator. This is a three-year award which will commence in April.

Lai-Sheng Wang has been selected for a five-year NSF Career Award and named as an Alfred P. Sloan Research Fellow.

Monitoring & Testing

Researchers **Nam-Seok Park**, **Myoung-Won Kim**, **Stephen Langford**, and **J. Thomas Dickinson** are using scanning force microscopy to probe the mechanics of solution on surfaces exposed to water. They have determined that drawing the 40 nm Si₃N₄ tip of a Digital Instruments Nanoscope III SFM across a thin slice of single-crystal calcite immersed in a saturated solution of calcium carbonate increases the rate of calcite dissolution where the tip crosses a step in the crystal surface at the edge of a pit. The microprobe does not affect a dry surface.

The SFM experiments help explain how combined mechanical loading and chemical attack can accelerate the growth of cracks in brittle materials. They provide a new model for testing the mechanical and chemical dynamics of corrosion and failure in aqueous systems as different as dental cavities and high pressure turbines.

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President's Academic Honor Roll

We are proud to announce the names of the following physics students who earned places on the President's Honor Roll for fall 1996.

Arthur Binner, Wenatchee

Nathaniel Hicks, Cheney

Shane Gray, Bainbridge Island

Randall Keeney, Bainbridge Island

Jessica Mjelde, Longview

Julia Plummer, Spokane

Susan Richardson, Richland

Chad Sprouse, Mountain Home AFB, Idaho

Alex Velkov, Monterey, California

Scholarship Recipients, 1996-97

Many of the gifts we receive from our alumni and friends support scholarships for our department's most deserving students. For this academic year, the following scholarship awards have been made.

Daniel Paul Michael, Ephrata, received the Paul and Dian Bender Freshman Scholarship in Physics.

Dana Louise Honn, Endicott, received the Claire May Band Freshman Scholarship.

A.C. Binner, **Chris Breckon**, **Nate Hicks**, **Randall Keeney**, **Jessica Mjelde**, **Julia Plummer**, **Susan Richardson**, **Chad Sprouse**, and **Jeremy Young** were awarded Physics Textbook Scholarships. This award is presented to physics majors receiving a 3.30 (B+) in a semester.

Terra Lynn McInerney and **Susan Richardson** were awarded Claire May Band Scholarships during fall semester 1996.

We are looking for additional scholarship funds to support talented freshmen. We would appreciate any donations for this purpose.

Life after Pullman

Students earning Ph.D.s from the Department of Physics go on to a variety of careers. Some of the department's recent graduates are listed below

Michael Boteler '93, Army Research Lab, Maryland

Zhenming Wang '93, University of Texas Medical Institute

Fassil Ghebremichael '93, USAF Academy, Colorado

Thomas Matula '93, University of Washington APL Lab

Leonid Muratov '94, West Virginia University

Constantina Poga '94, Allied Signal Inc., Morristown, New Jersey

Gregory Kaduchak '94, University of Texas

Christos Bandis '94, Greece

Thomas Asaki '95, Los Alamos Scientific Lab, New Mexico

John Stroud '95, University of Cincinnati College of Medicine

Praveen Sinha '95, University of Wisconsin

Richard Webb '95, Pacific Union College, California

Chung-Po Huang '95, Quantronix Corporation

Jianping Zhou '95, Massachusetts Institute of Technology

Jaw-Jung Shin '96, National Taiwan University

Jin-Kee Hyun '96, University of Texas, Austin

Christopher Kwiatkowski '97, WSU

Gregory Taft '97, University of Wisconsin-Stevens Point

Alumni Achievements and News

Alums; Where Are You Now? *For our next issue of Physics Matters, we would like to know where you are and what you're doing. Please use the enclosed envelope to drop us a line.*

Late last fall, **Jennifer Kramer**, sciences development director, met with **George and Rusty Fullmer** in Los Gatos. She told us a bit of their conversation. After WW II, George worked for General Electric in operational and core physics until his retirement in 1982. He then worked with GE part-time with out-placement for another 10 years. George has written a book, *The Great American Carpool and Other Stories*, which describes his many adventures and stories from carpooling to work. The book is an Altos Publication and is illustrated by Reynaldo L. Maninang. George and Rusty remain busy at their retirement center complex in Los Gatos.

Jennifer S. Hille (B.S. '95) is employed by Scientech, North Highlands, California, a technical services company that provides assistance to clients in the fields of safety, the environment, security, and systems engineering. She will be working on a project for the military that will involve reverse engineering on an existing RADAR tracking system to determine how it operates and then to improve and redesign it.

Gary L. Bennett (Ph.D. '70), AIAA associate fellow (retired), received the Schreiber-Spence Space Achievement Award from the Institute of Space and Nuclear Power Studies. The award recognized Gary's "outstanding leadership of the safety and nuclear operations of the Galileo and Ulysses Radioisotope Thermoelectric Generator (RTG) programs, which provide the most advanced highest power space RTG design flown to date." Gary retired as manager of Advanced Space Propulsion Systems, Office of Advanced Concepts and Technology at NASA Headquarters last year. He currently resides in Emmett, Idaho.

Robert Stephenson (B.S. '68), associate professor of physiology, received the SCAVMA Teacher Award from the first-year class of students at Michigan State University's College of Veterinary Medicine. The award recognized his superior ability to communicate with students and to present a teaching balance by integrating clinically relevant information. He earned a Ph.D. in physiology from the University of Washington in 1976. He teaches in all three medical schools at Michigan State University—the College of Veterinary Medicine, College of Human Medicine, and College of Osteopathic Medicine. He is also the associate chairperson for curricular affairs in MSU's Department of Physiology.

Gerald Reynolds III (B.S. Physical Science '86) is a senior system engineer with Lockheed Martin in Virginia. Gerald and Tracy are proud parents of a baby girl, **Tracy Lou**, born at Georgetown Hospital, March 3, 1996.

Tom Matula (see cover photo) conducted an experiment aboard NASA's 'vomit comet,' an aircraft designed to train astronauts in the complexities of work-

ing in zero gravity. His experiment involved testing the gravitational effects on sonoluminescence—bubbles that can respond to sound waves by emitting a short, intense bluish light. The highly nonlinear oscillations of these bubbles result in time-varying buoyancy effects, which may influence emission mechanism from sonoluminescing bubbles. Experiments in micro- and hyper-gravity should help evaluate theories that purport to explain the sonoluminescent mechanism. Tom earned his master's degree in 1990 and his doctorate in 1993 and is now a physicist at the Applied Physics Laboratory at the University of Washington.

Letters from Alumni

The letters we receive from you, our physics department alumni, are always greatly appreciated. We hope to hear from more of you. Please let us know where your careers have taken you. We are very interested and would like to share your accomplishments with your fellow alumni and our current students.

“... **T**hanks for that fine shirt with the spherical μ cow! It's just great and much appreciated (even though my tired old man speed of response doesn't show it). It's been proudly displayed even if I haven't fathomed the “in house” jokes. My best regards to you, **Mickey**, and those vigorous students. It's good to see the world's work in such capable hands.”

Art Lathrop (B.S. '43)

“... **A**fter sending off an e-mail message to you, WSU was in my thoughts and an irresistible urge came over me to let folks know back at my old stomping grounds how one of their own has fared over to these many years (we're talking nearly 50). The enclosed material, snatched from random piles lying around my office, pretty much tells what I've been up to for the last 20 of these years. The early development of Wakefield concepts was mainly my work. All this is challenging, interesting and just plain fun, which hints at why I'm still plugging along and very much at the center of things in this field. Also, tell your students that physics is an international activity, with lots of opportunity to travel!”

Perry Wilson (B.S. '50; M.S. '52)

Perry's WEB address:

<http://www.slac.stanford.edu/grp/arb/dhw/dpb/edcom/edhome/pwilson.html>

A Bit of Department History

Although a Department of Physics did not exist at Pullman until 1919, several levels of physics instruction were available from the start. Still, it wasn't until 1910 that the first full-time physics teacher arrived at the State College of Washington. **Brenton L. Steele** (M.A., Indiana University) was appointed assistant professor of physics in the Department of Mechanical Engineering and Electrical Engineering, where he taught until 1931. By 1913, Steele was teaching General Physics for Engineers, Non-Mathematical Physics, Methods of Teaching High School Physics, Molecular Physics, Heat, Light, Physical Theory of Music, Electricity and Magnetism, and Heat and Illumination.

Five years later, a four-year schedule of courses in physics was listed, but not yet a bachelor's degree. The next year the Department of Physics, offering a B.S. degree, was created in the College of Mechanical Arts and Engineering, with Steele as its head. The department remained in the College of Engineering until 1946.

In 1921, the physics faculty had grown to include Steele, who was still head; **R.B. Abbott**, assistant professor; **F.G. Tucker**, assistant professor; **Elsie Worthen**, teaching fellow; **Mr. Nash**; and **Mr. Lytle**.

Steele was succeeded as chair by **Paul A. Anderson**, who arrived in 1931 and led the department for the next 30 years. Anderson had a strong research orientation. Starting with a Ph.D. at Harvard, he spent two years in research at Eastman Kodak, became chair of physics for three years at Yenching University in Peking, then was a National Research Council Fellow at Harvard and in Berlin. His background convinced Anderson that research was a normal activity for any trained physicist or physics professor. Of course, it was recognized that research is part of the graduate training in physics, but beyond that, he felt that a professor should engage in research for its own sake.

At WSC, Anderson initiated a significant program of research on electronic work functions. It was a truly pioneering effort, and he was one of the first persons to do experiments in an ultra high vacuum environment. The degree of vacuum Anderson achieved could not be measured or reached by most other physical research laboratories for 20 years. His measurements of work functions are still cited today as standard values.

Soon after coming to Washington State, Anderson learned about research in progress by Ruska and Knoll in Berlin aimed at producing a microscope based on the very short wavelengths associated with electrons. With the assistance of **K.E. Fitzsimmons**, he decided to develop such a microscope at Pullman. With very little support from the College and no dedicated time, they developed the first electron microscope in the U.S. They used electromagnetic rather than electrostatic lenses, developed a new and workable vacuum camera, and were able to obtain resolution better than possible with optical microscopes. In the end, how-

ever, they gave up the contest to better equipped and technically-staffed industrial laboratories where research was a full-time job. They lost the final competition, but their success can be attributed to the fact that both Anderson and Fitzsimmons were excellent shop hands. They could design equipment, run machine tools, and blow glass, as well as do physics.

Our most famous alumnus, **Phil Abelson**, received his M.S. degree with Anderson in 1935. He went on to earn a Ph.D. at the U. of California in 1939 with E. O. Lawrence, and became director of the Lamont Geophysical Laboratory, editor of *Science*, and director of the Carnegie Foundation. Abelson is a Distinguished Alumnus of WSU.

Another important alumnus is **Gerald W. Johnson**, who received a bachelor's degree and a master's degree in 1939 in work with **S. Town Stephenson**. Completing a Ph.D. at the University of California in 1947, Johnson enjoyed a notable career in the nuclear energy field as associate director of Livermore Laboratory before becoming the personal representative of the U.S. secretary of defense to the Strategic Arms Limitation Talks. He was given an Alumni Achievement Award in 1987.

Two major changes took place in the Department of Physics during World War II. Research was directed toward understanding radar, and the teaching was mainly of AAF cadets. The radar research involved Anderson, S.T. Stephenson, and **Charles R. Barker**, a civil engineer. Anderson and Stephenson worked on radar at Lincoln Laboratory at MIT during the summer of 1942 and landed a contract to study the propagation of microwaves which, from a practical standpoint, could make low-flying aircraft invisible to radar. Studies of propagation from Mt. Spokane led to the development of equipment which won in a competition with equipment from MIT and which was tested in the South Pacific.

The AAF cadet training program involved teaching 2,000 students introductory physics material. **Dale Riggins**, **Al Butler**, **Clarence Zener**, and **Horace Chandler** were members of the department at this time. After the war, the veterans came to WSC in large numbers. They tended to be serious students, and many were married. This bulge of students stretched the resources of the department as it returned to teaching a full curriculum in physics. In this period, Anderson became interested in biophysics and developed some superior techniques for recording growth rates and synchronizing cell division in microorganisms. He also continued his interest in work functions.

After the war, Stephenson, who had joined the department in 1934, returned to the study of low-energy X-rays which he had begun several years before. His research into X-ray absorption edges was carried on actively from 1946 through 1960. His classic review article on the "Continuous X-ray Spectra" published in the 1957 edition of *Handbuch der physik*, is still used as a reference. He and his students were among the first investigators of the fine structure of X-ray absorption edges, a field which has now achieved a renaissance as



Carpenter Hall is one of the former homes of the Department of Physics.

a means of studying the structure of many materials. Stephenson became chair of physical sciences in 1947, dean of faculty in 1950, and vice president of WSU in October 1964. He died on December 15, 1964.

The period following World War II was one of rapid development for the physics department. **Wilson Compton** became president of WSU. His two brothers were the well-known physicists, K.T. Compton, who studied photo electron energies in 1912, and A.H. Compton, who discovered the inelastic "Compton" scattering of X-rays in 1923. Wilson Compton understood the importance and power of physics, and he supported the department as well as other areas of science and engineering.

In 1950, the department moved into the newly constructed Technology Building (now Dana Hall), occupying the north half of that structure. Paul Anderson had designed the building especially for physics research. Accordingly, a small tunnel about four feet high was placed around the perimeter of the building so that researchers would have access to the electricity or water necessary in any experiment. This tunnel was connected to the campus steam tunnel system. Reaching across the basement floor was a network of utility trenches which spanned most of the labs and permitted power to reach almost any location.

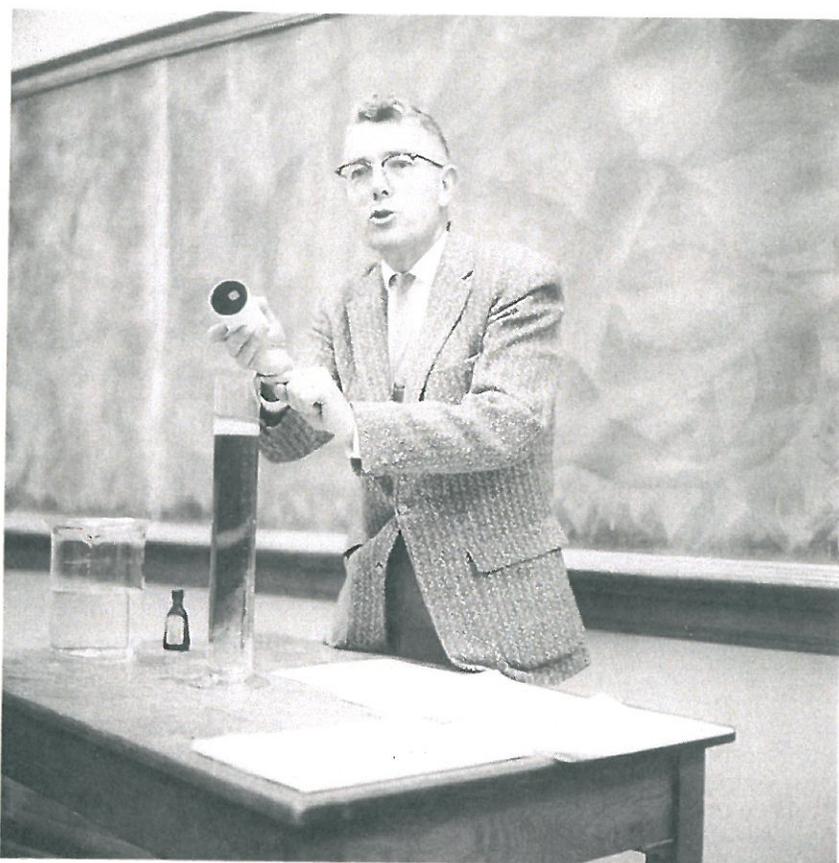
This interconnecting tunnel and trench system fulfilled its function perfectly, but it had two slight disadvantages. One came about because the Unifine flour mills were operated in the engineering end of the basement of the building. Rats from the campus steam tunnels established a permanent colony based upon a diet of high quality flour and wheat, and they had free ac-

cess to every lab via the trenches. Supplemental rat food, such as bag lunches and snacks disappeared as if by magic.

Larger members of this subterranean world were student prowlers busy exploring the steam tunnel system. Sometimes when researchers worked late at night, stand pipes connected near the perimeter tunnel would bob up and down mysteriously, and whispering voices could be heard. Apparently campus steam tunnels were not as secure against student explorers as they are now. As far as was known, none of these students ever penetrated into the utility trenches.

Anderson and S.T. Stephenson knew that research in physics called for specialized equipment, some of which they would have to fabricate locally. A glass shop and an instrument shop had already been set up in the Mechanic Arts Building (now Carpenter Hall). This shop was enlarged and improved in the new Technology Building. Because Anderson and Stephenson held federal grants and contracts, they had access to government surplus machine tools which were available at shipping cost. They soon had a fine instrument shop operating. Later this became the Technical Services Shop.

By 1952, the department consisted of eight faculty, four staff members, 16 graduate students—very roughly half the size it is today. Research was conducted on cosmic rays, nuclear magnetic resonance, surface physics, biophysics, X-ray absorption, and theoretical physics. A physics doctoral program was initiated in about 1950 with Art Evett and E.E. Donaldson among the first to be awarded Ph.D. degrees in physics.



A Tribute to a Master Physics Teacher: Alfred B. Butler

by Rodney Aho '73

Alfred B. Butler, 85, died January 15, 1997, in Spokane.

"He could be a crotchety son of a gun, but I sure learned a lot of physics from him."

Please, oh please! A buck for every time I heard someone say that!

Al Butler was one of those special teachers you tell your kids and grandkids about—a role model, a person you could look up to and depend on for wisdom and credibility and believability. In my book, he was tops among the elite guard of WSU professorial notables, whose membership over the years has included **Glenn Crosby**, **Bob Jonas**, **Charlie Drake**, **Elizabeth Lord**, and **Sidney Hacker**. These were individuals who operated from the premise that people were responsible

for their own choices and actions, that education was serious business, though you could have fun in the process, and a teacher's job was to empower students to achieve their highest potential through the catalysis of great teaching.

Alfred Bisbee Butler stood out among the enlightened educators in the world of science teaching. He was a professional of the highest caliber who truly believed in the achievability of "teaching excellence," a dedicated public servant in the highest tradition who made higher education a reality in his classrooms every day of his career.

Butler reigned supreme for nearly three decades as the Mister Wizard of the venerable Carpenter 110 and, during the last several years of his career leading up to

retirement in 1975, in Lecture Hall 16 of the campus's sparkling-new physical sciences building. Who could forget his Hindenburg hydrogen balloons exploding over our heads, the Mt. Vesuvius volcanoes gushing forth smoke and steam and fire in a dramatic finale to a day's lecture on plate tectonics and the heat properties of water, the cat fur dancing atop a Van de Graaff generator, the roar of a locomotive whistle to cap a discussion of the principles of sound propagation and displacement antinodes, or the brilliant flash of a color spectrum across the walls of Dana Hall?

Quintessential Butler: "A 100-ton electric locomotive on the Milwaukee Railroad is pulling a 1,000 ton train up a 2 percent grade in the Bitterroot Mountains. If the coefficient of friction is 0.25, what is the maximum rate of acceleration the engineer can hope to attain?"

That was our Butler: inspiring, terrorizing, witty, challenging. Always on the go. Always looking for that next opportunity to delight and fascinate; to find the magical key to unlock the spirit of enthusiasm residing within each of his students; to find ways to make science seem real and have personal value, and not be just some "required course" one had to take to graduate. Professor Butler always strove to make the physics, geology, and chemistry he taught undergraduates come alive and be personally meaningful to them. He sought to give them something they'd take out of the classroom and hold life-long in their hearts and minds. Butler wanted his students to be better citizens for having sat through his lectures and demonstrations. His teaching was an extension of his soul, and it was a powerful way through which he reached out over the decades to touch the lives of thousands of young citizens in the state, and across the country.

After I left WSU in the late 1970s, having worked in the physics department as one of Butler's lecture assistants, it surprised me how frequently—and for how long after my departure—people would come up to me and ask, "Hey, didn't you work at WSU?" Of course, I'd swell with pride. But then I'd really experience a deeper sense of gratitude and appreciation and admiration when they'd add, "Do you remember Professor Butler? I took physics from ol' Butler. He was some teacher, wasn't he?"

So it was always with the greatest personal satisfaction that I was able to acknowledge to these individuals in a very positive and enthusiastic way that, yes, Alfred

Alfred B. Butler, 1911-1997

Al Butler graduated from Lewis and Clark High School and from Washington State College with a bachelor's degree in physics and a master's degree in education.

He taught physics in Pasco and in Spokane for several years before he joined the Washington State College physics department in 1943. He retired from WSU in 1975 and moved to the Newman Lake area.

He served as the director of the National Science Foundation Summer Institute and presented a 15-minute weekly radio program called "Science in the News" for many years. In 1972 he received the Washington Science Teachers Association award for outstanding contributions and service to the young people of Washington. Al also received the Outstanding Educators of America Award in 1973 in recognition of professional and civic achievements.

Al is survived by a son, **Bruce Butler** of Spokane; a daughter, **Beryl Turner** of Portland; four grandchildren; and two great-grandchildren.

Memorial contributions in his name may be made to the Department of Physics, Physics Scholarship and Development Fund.

B. Butler was, indeed, "some teacher." Those of us who were privileged enough to have taken Introductory Physics or Physical Science 101 from him knew that we had experienced something special, one of those once-in-a-lifetime opportunities to be taught by a master, a real pro, someone unique in the otherwise crowded and noisy and often boastful world of academia.

He was the best; he was tops. Al Butler was our professor, our mentor, our helper and, thank God, we can also say he was our friend.

January 16, 1997



Rodney Aho is a physical science graduate and former instructional technician in the Department of Physics. He is now with Bonneville Power in the Tri-Cities area.

Remembering Milo B. Sampson, 1908-1971

Before his death, Al Butler lived near Lois Sampson, the sister of distinguished 1933 physics alumnus Milo B. Sampson. Butler sent this biography of Sampson for us to share with those who remember him. Sampson's sister lives in Spokane, and his son, also named Milo, is a physician in New York City.

Milo Sampson was born in Erie, North Dakota on June 18, 1908. He moved to a farm near Spokane with his parents when he was seven years old. Even as a boy he exhibited interest in an academic future. He attended Richland High School in a rural consolidated district near Spokane and graduated as valedictorian of his class. Surviving high school classmates still recall his quiet studiousness and his helpfulness—traits which were to characterize his life.

Although originally interested in medicine (a field in which his son now makes a career), Milo felt he could not afford the training and entered Washington State College to study engineering and later physics. He received his B.S. in 1931 and obtained a teaching fellowship which led to a master's degree in 1933. Continuing his graduate work at Princeton, he received the James W. Queen Scholarship. He was awarded his Ph.D. in physics in 1937—a major achievement for a farm boy from the West.

Milo met Emily Smythe a year earlier, and they were married one week after he received his Ph.D. For six years they lived in Swarthmore, Pennsylvania, where he worked for the Biochemical Research Foundation of the Franklin Institute on the cyclotron operated jointly with

the Bartol Research Foundation. When World War II began, Sampson went to Princeton to do classified research, then moved to the Metallurgical Laboratory of the University of Chicago, where he was Section Chief Physicist in charge of the Chicago cyclotron. In 1945, he went to the Los Alamos Scientific Laboratory, where he was active in experimental work associated with the development of the atomic bomb.

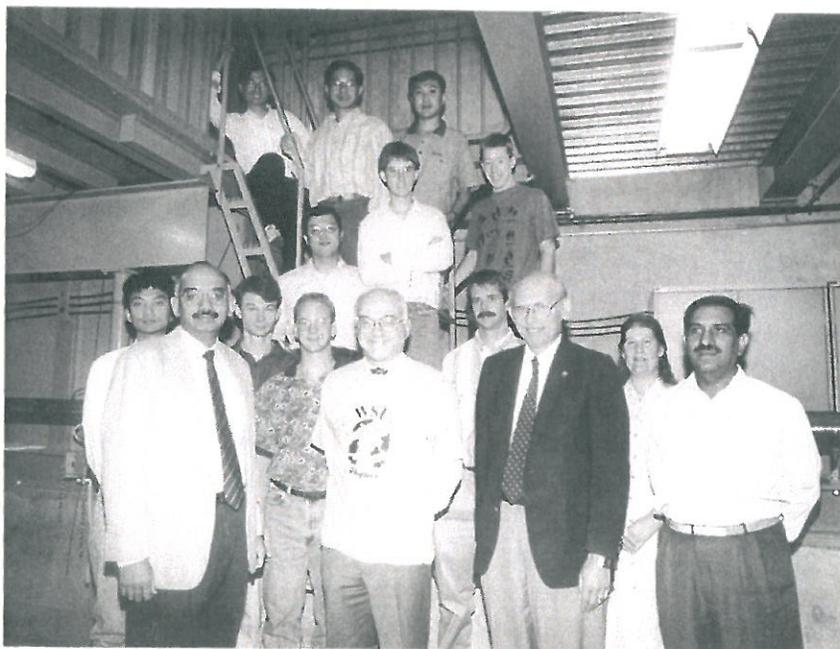
Sampson joined the Indiana University faculty in 1946 as assistant professor, and was promoted to associate professor in 1950 and full professor in 1958. The first Indiana University cyclotron had been completed just prior to World War II and had achieved an internal beam. Shortly after Sampson's arrival, he brought the beam out of the cyclotron, allowing external experiments for the first time. From then until the shutdown of the cyclotron in 1968, he was in full charge of its operation. As a result of his skill, the cyclotron had an excellent operating record and was seldom out of action for significant periods of time. He was widely known for his ability with accelerators, and was invited to spend the summer of 1959 at Wisconsin, helping to construct a prototype high-energy accelerator for the Midwestern Universities Research Association.

Sampson was a key physicist in the planning, design, and construction of the new Indiana University cyclotron, which was the first of its type in the world. He was the author of many scientific publications reporting experimental work in the fields of mass spectroscopy, neutron physics, nuclear reactions and scattering, and cyclotron design.

Sampson was dedicated to his profession, both as a teacher and as a researcher. He was a friend to student and colleague alike.

Distinguished Visitor

Victor Reis, assistant secretary (Defense Programs) in the U.S. Department of Energy, visited WSU and presented a public lecture entitled, "Our Nuclear Stockpile and National Security Issues in the Post Cold War Era." During his visit, Reis toured the Shock Dynamics Center, met with faculty from the physics department and the College of Sciences, and with WSU administrators. In the picture, Reis, wearing the Physics tee shirt, is seen with Yogendra Gupta, professor of physics and director of the Shock Dynamics Center, Leon Radziemski, professor of physics and dean of the College of Sciences, and other members of the Shock Dynamics Center.



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Schroedinger's Cat

Cecil, you're my final hope
Of finding out the true Straight Dope.
For I have been reading of Schroedinger's cat,
But none of my cats are at all like that.
This unusual animal (so it is said)
Is simultaneously live and dead!

What I don't understand is just why he
Can't be one or the other, unquestionably.
My future now hangs in between eigenstates.
In one I'm enlightened, the other I ain't.
If you understand, Cecil, then show me the way
And rescue my psyche from quantum decay.
But if this queer thing has perplexed even you,
Then I will and won't see you in Schroedinger's zoo.

—Randy F., Chicago