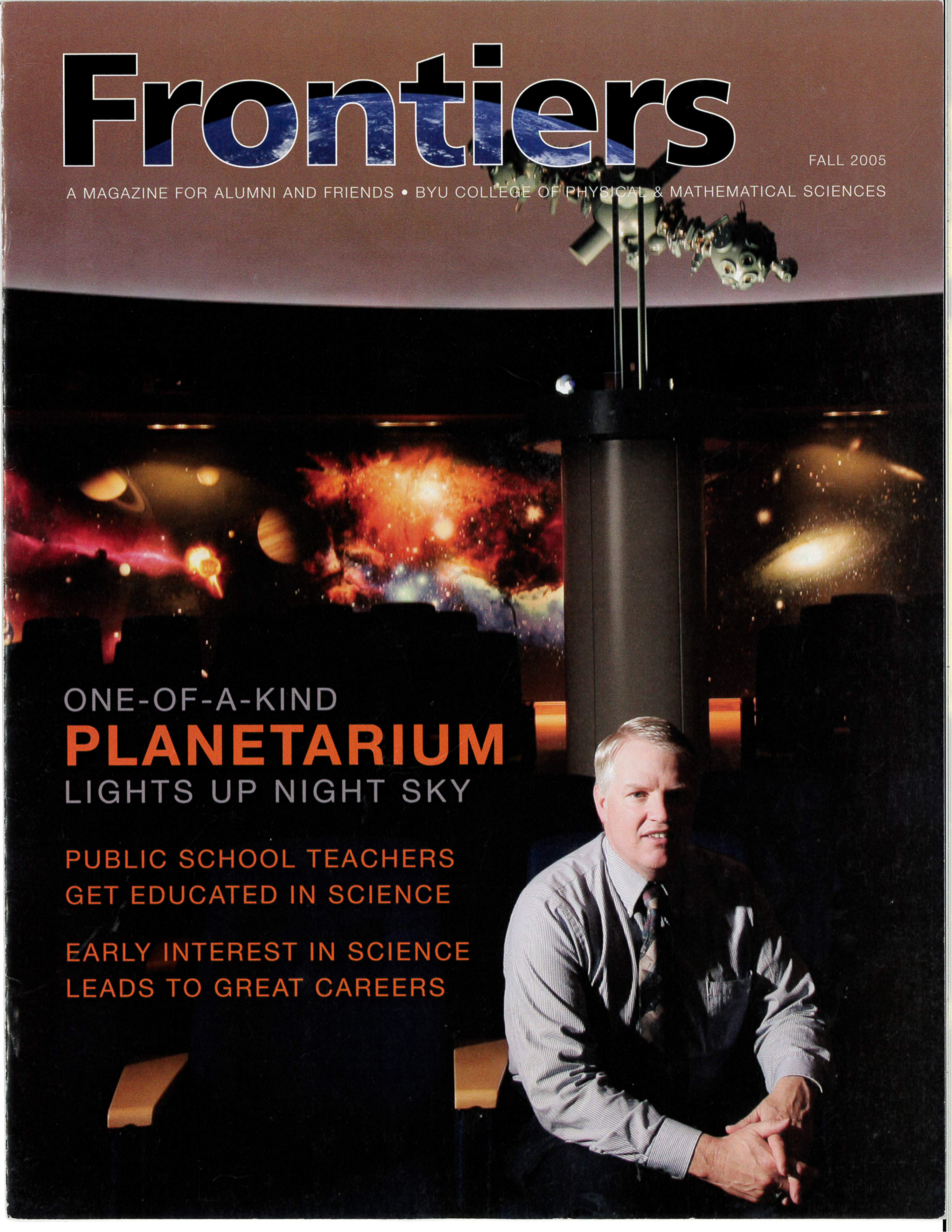


# Frontiers



FALL 2005

A MAGAZINE FOR ALUMNI AND FRIENDS • BYU COLLEGE OF PHYSICAL & MATHEMATICAL SCIENCES

ONE-OF-A-KIND  
**PLANETARIUM**  
LIGHTS UP NIGHT SKY

PUBLIC SCHOOL TEACHERS  
GET EDUCATED IN SCIENCE

EARLY INTEREST IN SCIENCE  
LEADS TO GREAT CAREERS

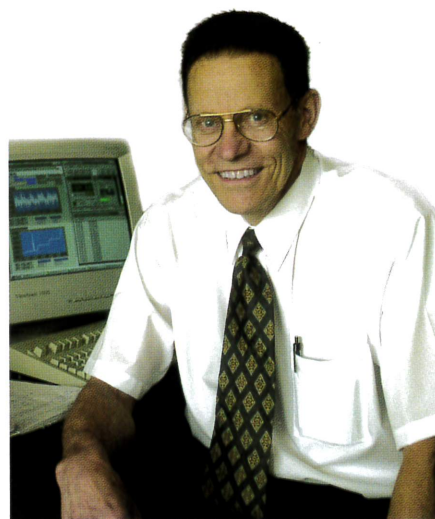


## FOCUS ON Teaching

Welcome to the third issue of *Frontiers*. In this issue you will see that we remain committed to student mentoring in the college. We sincerely appreciate the added financial support we have received from alumni and friends since our last issue of *Frontiers*.

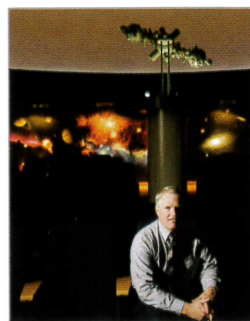
Our cover and centerfold feature articles highlight our remodeled and expanded planetarium. We invite you to visit the planetarium when you are in Provo (visit <http://planetarium.byu.edu/> for more information). In our planetarium visitors can see simulations of some of the wonders of astronomy even in daylight hours or during a furious blizzard. Planetarium shows are presented by the student Astronomy Club, whose members are mentored by BYU's astronomy faculty and staff. The first thing you will notice inside the planetarium is the spectacular mural designed by an undergraduate astronomy major who was simultaneously working under a mentoring grant to design a remotely controlled telescope.

Our feature on preparing public school science and mathematics teachers (page 8) highlights our commitment to help children and youth beyond BYU's campus learn and appreciate science and mathematics. They are society's future scientists and mathematicians, doctors and engineers, politicians and parents, and we are committed to helping them gain the same enthusiasm our undergraduates gain while in our programs. The article on the National Science Foundation Research Experience for Undergraduates (REU) program in mathematics (page 9) illustrates the national attention being



given to our faculty as they help undergraduates. This new REU joins the successful REU that has been part of physics and astronomy for the past eight years.

We invite you to visit any area of the college that might interest you when you are in Provo. We believe you will enjoy seeing how our exceptional undergraduates are participating with faculty and graduate students in research and support of our teaching. We also thank the hundreds of you whose donations are providing mentoring grants and scholarships to our students.



**COVER**  
Professor J. Ward Moody sits in front of the new planetarium star projector and a spectacular mural of the near and far reaches of the universe. The mural was created by undergraduate student Brett Little.

Photography by Mark A. Philbrick

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## Early Interest Leads to Great Careers

What do a rocket scientist, DNA researcher, security systems analyst, frontier energy explorer, and statistical researcher all have in common? They became interested in mathematics or science at an early age, received their undergraduate degrees at BYU, went on to receive graduate degrees, and now work for national and international corporations and government entities.

### BARRY HOWELL

RESEARCH STAFF, CENTER FOR NAVAL ANALYSIS,  
ALEXANDRIA, VIRGINIA



Barry Howell's (B.S. Physics, '85) university experiences, along with those on his LDS mission to Japan, prepared him for a multifaceted career in defense of the United States.

"When I graduated from BYU," said Howell, "I wanted to pursue graduate work in physics and use my experience abroad. I was fortunate enough to get involved in particle physics research on an international scale and find a career where a unique combination of skills was important."

Howell pursued a graduate degree in experimental high-energy physics at Purdue University. He was awarded a Fulbright grant in 1989 for research in Japan on the TOPAZ Experiment—a collaborative effort involving 100 Japanese physicists. Howell was one of only three non-Japanese physicists involved.

In 1994, Howell joined the Center for Naval Analysis (CNA) in Alexandria, Virginia, a non-profit research organization. There he contributed to national security projects and military scientific technologies. His early work involved new submarine detection technologies for which he was awarded the Admiral Parsons Award by the U.S. Navy League in 1998. He currently directs CNA's Tomahawk missile deployment study.

Howell's BYU experience prepared him for graduate studies and his career. He said, "Seventy percent of CNA's researchers hold advanced degrees in physics, chemistry, mathematics, engineering, economics, and even political science or law. My background gives me a unique opportunity to interact with great people who see problems differently."

Howell also says undergraduates will be more valuable employees if they use multiple tools. Howell had a dual major in physics and math and a minor in Japanese. "A competent person with many tools is more valuable than the world's foremost authority on one tool."

Howell and his wife Barbara have two children.

### JOHN BUTLER

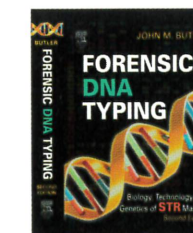
PROJECT LEADER, HUMAN IDENTITY, NATIONAL  
INSTITUTE OF STANDARDS AND TECHNOLOGY,  
GAITHERSBURG, MARYLAND



John Butler (B.S. Chemistry, '92) enjoyed law and science so much he decided to pursue a career in forensic science. Following his undergraduate studies at BYU, he pursued graduate work in analytical chemistry at the University of Virginia. His doctorate research at the

FBI Laboratory involved pioneering work in modern forensic DNA testing.

Over the past decade, Butler has continued his work in forensic DNA typing. He designed and maintains the internationally recognized Web site



STRBase [www.cstl.nist.gov/biotech/strbase]. In addition to 80 publications in every major forensic science journal, he has written the definitive book, *Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers*. He is the associate editor of a new forensic DNA journal to be published in 2006. Today he leads the human identity project team at the National Institute of Standards and Technology to develop new forensic DNA testing tools.

Butler has received several awards, including the 2002 Presidential Early Career Award for Scientists and Engineers and the 2003 Scientific Prize of the International Society of Forensic Genetics, the first American to be so honored.

*"I cannot be content to work in my own little world and not extrapolate the research that I do to a common understanding."*  
—Barry Howell

"BYU provided a wonderful undergraduate education," said Butler. "I was fully prepared for graduate school and easily passed my entrance qualifying examinations in each area of chemistry. My BYU research experience in Dr. Reed Izatt's lab involved performing precious metal chemical separations and analytical measurements, which prepared me well for the rigors of graduate school."

Dr. Butler and his wife Terilynne ('93) are the parents of five (soon to be six) children, all of whose DNA has been thoroughly analyzed.

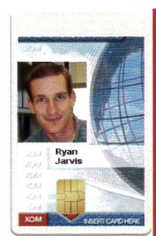
### RYAN JARVIS

SENIOR SYSTEMS ANALYST, SMART CARD PROJECT, EXXON/MOBIL CORPORATION, HOUSTON, TEXAS



Ryan Jarvis (M.S. Computer Science, '03) got his start in computer security in the Internet Security Research Lab at BYU, headed by Dr. Kent Seamons. There he studied how to negotiate trust between strangers using digital certificates. "My BYU education was critical to getting a job at Exxon and to my specific job assignment," said Jarvis. "Last year Exxon recruited 18 graduates from 33 universities including three from BYU. When they hired just six, all three from BYU made the cut."

At Exxon/Mobil, Jarvis has helped design a "smart card" that provides both building access and computer security. "Some 100,000 people at Exxon/Mobil will get smart cards to enter buildings and log in to computer systems," said Jarvis. "When an authorized employee gains access to a computer, he needs both his smart card and a PIN—much like a credit card. If the card is lost, it can't provide access without the PIN. The digital certificate on the smart card chip authenticates the user to the domain controller. Using the user's public key in his certificate, the domain controller encrypts a Kerberos session ticket which, if decrypted by the private key on the user's smart card, can then be used to access resources for which the user is authorized."



The smart card project took one year to design and another 18 months for testing, vendor selection, and implementation. Today, Jarvis is leveraging what the smart card did on Windows for other operating systems.

Jarvis encourages computer science majors to get advanced degrees. "It's common for people to change jobs every three to five years," he said. "To stay marketable during those transitions, it's good to have something that distinguishes you above the rest."

Jarvis and his wife Tonya (BYU, '99) have one daughter and twins on the way.

### GREGORY HERBERTSON

FRONTIER EXPLORATION PROJECT MANAGER, ANADARKO PETROLEUM, THE WOODLANDS, TEXAS



After graduation, Greg Herbertson (M.S. Geology, '94) went to work for Anadarko Petroleum, one of the largest independent oil and gas exploration companies. There he manages hydrocarbon exploration in both the Alaska and Canadian Arctic and oversees development of the 429 million recoverable barrels in the Alpine oil field—operated by Conoco/Phillips, Alaska—on the Alaskan North Slope. "At the time of its find,"

said Hebertson, "it was the largest North American onshore oil discovery in more than a decade."

"Anadarko recruited me out of college and away from Arco Alaska, Inc. (now Conoco/Phillips Alaska)," said Hebertson. "I was working a summer job with Arco in Alaska on a project that Anadarko was a partner. I met a few of their employees and was impressed with their exploration, the people, and personal growth opportunities." Since that time, Anadarko has actively recruited geologists from BYU and hired a number of graduates.

Hebertson has also worked on exploration and development projects in several U.S. states and in Canada and West Africa. "I was involved in the discovery of the Anadarko Operated Dew Field in Texas," said Hebertson. "It's estimated that this field contains recoverable reserves in excess of one trillion cubic feet of natural gas. I also played a key role in recently-announced oil and gas discoveries in the Alaskan National Petroleum Reserve."

Hebertson spent a portion of his early career advising Anadarko's executive management regarding long-term strategic direction, risk analysis, business intelligence, and commodity market analysis. During this period he received the Certificate of Management in Energy from the Rice University Jones School of Management.

Hebertson and his wife Melinda (BYU '90) have two children.

### BRETT AMIDAN

RESEARCH SCIENTIST, PACIFIC NORTHWEST NATIONAL LABORATORY, RICHLAND, WASHINGTON

The friendly skies are a little safer because of statistical research by Brett Amidan (M.S. Statistics, '94). Amidan has helped develop statistical methods to find atypical patterns in commercial airline flights. This work has resulted in one patent and two patents pending. The resulting software package, Morning Report, was a 2005 R&D 100 award winner from *R&D Magazine*. He also received the Space Act Board Award from NASA in 2005.

Amidan works for Pacific Northwest National Laboratory (PNNL), one of nine U.S. Department of Energy national laboratories. "The flight data recorder on large airplanes records data for hundreds of flight parameters every second of the flight," said Amidan. "Our program processes the latest batch of flights overnight and compares them to past flights to discover atypical data patterns."



Amidan says one example is of engines running significantly hotter during a specific flight phase. The data his program processes helps analysts discover emerging engine problems and avoid catastrophic failure.

"One problem that the airlines first discovered using our software," said Amidan, "was high energy approaches. When a flight approaches too high or too hot it must lose the energy before landing. This can result in a difficult or even aborted landing. Our software can reveal data that helps find out which airports have a larger tendency to have high-energy approaches."

Amidan's use of statistics is only one example of hundreds—perhaps thousands—of different jobs in the field. "I recommend that a student of statis-

*"My BYU education was critical to getting a job at Exxon and to my specific job assignment."* —Ryan Jarvis

tics focus on the field that most interests him or her," he said. "A little computer science background and some background in the natural sciences are big pluses."

Amidan and his wife Gina (BYU '91) have four children. ■

### EARLY INTEREST KEY TO SCIENCE CAREER

There may be a correlation between early interest in science or math and later success in these fields.

John Butler enjoyed science and law so much he decided early to pursue forensic science. In high school, Brett Amidan received a letter from the BYU statistics department that sparked his interest in statistics. Barry Howell was also influenced by BYU when a physics professor talked to his AP Physics class.

Gregory Hebertson's geology interest began "while driving on family trips and my father stopped to examine fossils, minerals, and energy-related equipment. He helped me appreciate the blessing of the creation of the earth."

"I've been interested in computers ever since I first played on a Texas Instruments computer at a very young age," confessed Ryan Jarvis.



# An Out-of-This-World Experience

Improved from its original 1958 design, the new BYU Planetarium will continue to fulfill Joseph Fielding Smith's prophetic dedicatory prayer that "those who come to study may be impressed by thy holy spirit, . . . the greatness of thy glory, and thy power."

BYU students and professors will more easily be able to share the secrets of the universe in the new planetarium that was completed in April 2005. Built at the same location as the previous planetarium—on the fourth floor of the Eyring Science Center—its cantilevered edge, supported by three large concrete and steel columns, allows the 62 percent bigger space. It contains new seating, a unique acoustical design and a state-of-the-art star projector.

## Purpose

"Our planetarium fulfills several needs of our students," said J. Ward Moody, professor of physics and astronomy. "First, it acquaints them thoroughly with the nighttime sky. An astronomy major should be as familiar with the sky as a mathematician is with real numbers or a chemist is with the Periodic Table. Next, it helps students learn how to teach astronomy to others, particularly children. All astronomers should be skilled at communicating the heavens to the public. Finally, it provides opportunities to explore deeper ideas in planetary alignments, calendaring, and all aspects of observational astronomy."

"There's an explorer mentality about astronomy—it's fun and exciting," said Jeannette Lawler, planetarium director. "To learn stars and



Professor J. Ward Moody and planetarium director Jeannette Lawlor stand in front of a spectacular mural of the universe, created by undergraduate Brett Little.

constellations without a planetarium, students would need to come to night labs held only on clear nights. And even then, they could learn only about half of the sky in a given semester."

Unlike public planetariums, the BYU facility is designed for teaching and uses a different style of projector. "Public shows entertain with an added touch of science," said Lawler. "Our shows teach science with an added touch of entertainment."

## Plaster Dome

The BYU planetarium houses more than just star shows—it serves as a classroom. Something had to be done about the acoustical challenge the domed ceiling would present in a classroom setting. Physics professor Timothy Leishman devised a plan:

"Good projection surfaces in planetariums often produce poor acoustical conditions," said Leishman. "They create undesirable sound reflections and reverberation. Conversely, common acoustical treatments provide poor projection surfaces where the stars get lost in the seams or sound-absorbing perforations. We were introduced to a European treatment with a porous, plaster-like surface called BASWaphon. The product had been used in numerous public places

like airports, libraries, and recording studios, but to our knowledge it has never been used in a planetarium—until now."

The acoustical design is much more than just the dome treatment, however. "We wanted a reasonable balance of sound absorption and diffusion to make the environment more pleasant to the ear," said Leishman. "Jim Manookin at BYU information technology installed a steerable loudspeaker array to direct sound to the audience and away from the dome. The design will work with Dolby/DTS surround sound, which we hope to install in the future."

The acoustical work was a mentored learning project involving undergraduate Micah Shepherd and graduate student Utami Sentagi. Prior to construction, they generated computer models of the room with various acoustical treatments and loudspeaker configurations. They then created "auralizations," allowing professors to decide which configuration functioned best and at what cost. Their work was presented to the Acoustical Society of America in October 2005 and is scheduled for a presentation at the American Astronomical Society.

## Projector

The planetarium, however, would only be a dome without its star projector. "There are only a handful to choose from," said Moody. "We chose the best we could get for the money that was adequate for our 39-foot dome. The manufacturer has an excellent record—Zeiss has been making this particular model for 20 years and all of them are still working."

While star presentations are available commercially, BYU has not yet purchased any. "All our shows are written and presented by students and professors," said Moody. "It takes between 10 and 100 hours to create a presentation, depending on the complexity."

## Student Experiences

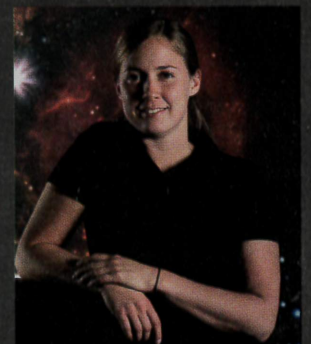
Tabitha Bush (Burleson, Texas) is in the physics master's program at BYU and has been interested in astronomy as long as she can remember. "I feel at peace and close to something divine when gazing

*Our shows are written and presented by students and professors. It takes between 10 and 100 hours to create a presentation, depending on the complexity.*

at the stars," she said. "It's amazing that we can learn so much from these objects that are so far away."

Bush is past president of the BYU Astronomical Society, where most members take turns creating and presenting public star shows.

"One of my favorite shows," said Bush, "is entitled 'Observatories Around the World.' I take the audience to different latitudes and show them how the sky looks. I also show pictures of widely-scattered observatories and talk about the things that are studied there."



Like many astronomy students, Tabitha Bush writes and presents her own star shows.

Bush believes the undergraduate programs at BYU are unique because they allow students to apply knowledge learned in the classroom. "Research was a big part of my experience, and it helped me focus on the kind of work I'd be doing in graduate school and later on," she said.

"About a third of astronomy majors end up as professional researchers," said Moody. "Another 30-to-50 percent choose education. The others end up in industry in a variety of engineering or science-related positions." ■

## OLD AND NEW

When the original planetarium was completed in 1958, it was the first in the state of Utah and the only one within 500 miles of Provo.



	1958	2005
Dedicated Projector Cost	\$5,500	\$320,000
Projector Model	Spitz A-1	Zeiss ZKP3
Theater Seating	60	119
Dome Diameter	24 feet	39 feet

# TEACHING TEACHERS

*For most people, learning math and science is enough of a challenge. Many BYU students, however, are choosing not just to learn these complicated subjects, but to teach them as well.*



Students Elizabeth Schnell and Laura Cuff Hanson work on a physics problem with Professor Merrell.

Because of a recent decision to shift shared responsibility of secondary science education programs into areas of each specific discipline, BYU's College of Physical and Mathematical Sciences has taken on a greater role in preparing future junior high and high school teachers. To prepare teachers and to enhance the college's own math education

role, a new Department of Mathematics Education was established, and college supervision of the four science teaching degrees was undertaken.

*"Math teachers are needed so much, and our students are so well prepared, that we have no trouble placing our graduates in teaching positions all over the nation."* – Gerald Armstrong

"BYU is a major preparation university for teachers, so we were all extremely happy to see these new changes develop," said Jacqueline Voyles, professor of mathematics education. "Students can now remain very close to their chosen subject, while gaining the skills needed to be effective teachers."

## Math Education

Established in 2000 when it separated from the Department of Mathematics, the Department of



Garth Braithwaite and Daniel Melville learn problem solving skills from Prof. Merrell.

Mathematics Education was designed to help mathematicians and math educators to better focus on their different curriculum goals.

"By separating into two departments, we have all been able to do our jobs better," said Gerald Armstrong, chair of the Mathematics Education Department. "Though we've split, we still maintain a good relationship, with our faculty teaching one-third of

general undergraduate math classes at BYU."

"The Math Education Department works closely with students through a strong advising program and abundant mentoring opportunities," said Voyles. "It now is one of the largest programs of its type in the nation, graduating about 50 students each year."

"Math teachers are needed so much, and our students are so well prepared, that we have no trouble placing our graduates in teaching positions all over the nation," said Armstrong.

## Science Education

Science disciplines at BYU also graduate their share of teachers. The four science teaching degrees are physics, earth and space science, chemistry, and composite physical science.

Students in the teaching programs earn a bachelor's degree for their selected majors, along with a teaching certificate. Though smaller than the math education program at BYU, science teaching is still strong, graduating 15 to 20 students each year.

Duane Merrell, assistant teaching professor of physics and astronomy, leads the science education program. Hired last year, Merrell has 20 years of science teaching experience in Utah public schools.

"We've tried to create an advising program that focuses on getting students into the classroom early," said Merrell. "We also maintain contact throughout the students' course of study."

Not only does he work with students as they earn their teaching certificates, but Merrell also manages several state grants and outreach programs designed to improve science teaching in Utah schools.

"All in all, our goal is just to help students learn to understand that their job is to teach students and reach as many of them as possible," said Merrell.

President David O. McKay said, "Since we can't teach everyone, we should emphasize the teaching of teachers." Though somewhat different from standard university math and science college programs, these secondary education programs are following this prophetic counsel. ■

## Math and Science Education

Department	Degree
Geology	Earth and Space Education
Physics	Physics Education
Physical Science	Composite Physical Science Teaching
Chemistry	Chemistry Education
Math Education	Mathematics Education



# SUMMER SCHOOL Offers Mathematics Research Opportunities

REU participants Colleen Hughes (Denison), Keith Penrod (BYU), Ashley Swannack (Southwestern), Dr. Gary Lawlor, Christy Truesdell (Ashland), Angela Hicks (Furman), Ryan Hubscher (BYU-I), Heather Helmandollar (Pacific), Dr. Michael Dorff, and Laura Cannon (BYU) at Bryce Canyon National Park.

A handful of undergraduate math majors undecided about their future have found direction from a small but vibrant program at BYU. The program—the BYU Summer Mathematics Research Experience for Undergraduates (REU)—is an exciting eight-week course that helps participants prepare for graduate school. It is sponsored by a three-year National Science Foundation grant.

*To be successful in research you must be able to consider problems that have not been solved and that have no answer key.* —Heather Helmandollar

"Female students and those from institutions with limited research opportunities are encouraged to attend," said Dr. Michael Dorff, professor of mathematics and REU program director. "Many of them have not been encouraged to study mathematics, some are the first in their family to attend



REU students visit overlook near Squaw Peak.

college, and of course the U.S. has a shortage of citizens qualified in mathematics and the sciences. A graduate degree in mathematics provides a well paying, very satisfying, and often flexible career opportunity. Our program also becomes a

great ambassador for the BYU and LDS culture."

"I applied because other students at Furman said it was a great experience," said Angela Hicks (Furman University, Greenville SC). "It was a good place to learn about graduate programs while finding out about a fascinating branch of mathematics. I tell my friends about the great trips we took and the interesting time I had living in a Mormon community. But I also tell them about the wonderfully supportive professors and grad students we worked with."

"I already had a strong desire to go to grad school,"

added Ryan Hubscher (BYU-Idaho, Rexburg, ID). "But the REU definitely helped give me direction. It helped me know how to apply and the things to consider when selecting schools."

The BYU Mathematics REU program focuses on two research groups—one investigating geometric optimization problems and the other investigating minimal surfaces. While projects are intense, so are the accompanying recreational opportunities used to foster collaboration. Included are evening hikes to local waterfalls and a day trip to a southern Utah national park. The intense fun and intense work also come with a competitive edge—this year 30 people from 20 institutions applied for the eight available positions.

Dr. Dorff is optimistic about the program's success. "One non-BYU student has applied to our graduate program," he said. "Two participants submitted a research paper to a top professional journal, and another received a cash award for a conference presentation."

"I applied to gain experience in the research side of mathematics," said Heather Helmandollar (Pacific University, Forest Grove, OR). "Undergraduates sit in class and complete book problems that have been solved hundreds of times. It's a great way to learn the basics, but to be successful in research you must be able to consider problems that have not been solved and that have no answer key. At the REU I gained the ability to use mathematical reasoning to solve problems with only the help of my fellow mathematicians."

*I tell my friends about the interesting time I had living in a Mormon community. But I also tell them about the supportive professors and grad students we worked with.* —Angela Hicks

REU participants are given a \$2,750 stipend, up to \$450 for travel to BYU, free housing, and a \$400 travel allowance to present research at a conference the following academic year.

Visit [www.math.byu.edu] and click on "BYU Summer REU" for application information. ■



Dr. Dorff and the REU investigate big bubble problems.



# Charles & Kathleen Cline

*Giving only in life is not enough for some BYU supporters like Charles and Kathleen Cline. They want to go on giving forever.*

Charles (Chuck) and Kathleen (Katie) Cline have joined a growing number of BYU alumni and friends in donating a portion of their estate to the BYU College of Physical and Mathematical Sciences. They are fond of BYU and realize what their support means to hundreds of future students.

Following his graduation from BYU in 1957 with a master's degree in geology, Chuck went to work for Mobil Oil Corporation. He became general manager of world exploration in 1983 and retired in 1991.

Chuck served eight years as president of the BYU Geology Alumni Board and is a member of the college volunteer leadership council. Three of the

*"The dollar amounts of some of Jesse Knight's contributions do not appear impressive in this day of astronomical financial figures—nor do seeds seem large compared to the crops they yield."*

—Ernest L. Wilkinson, BYU President 1951–1971

Cline's four daughters also graduated from BYU. "I thought I should give something back because of what BYU has given to me and my family, which led to my success in the oil business," he said.

Chuck and Katie knew each other since first grade, but they didn't start dating seriously until college. They faced two obstacles: military service and the fact that Katie would only marry a member of The Church of Jesus Christ of Latter-day Saints. Chuck overcame both by serving in the Air Force—and being baptized—during the Korean War. Chuck then married Katie, graduated from BYU, and was hired by Mobil.

"You have to be a good-natured mover if you're going to marry a geologist," said Katie. They moved 22 times with Mobil. "We've

enjoyed all the places we've lived, but geologists like to come back to where the rocks—and their children—are. We moved back to Utah in 1992."

Back in Utah, Chuck grew close to students in the geology department through his BYU service and became a scholarship contributor. "We tried to get a mentor for every senior and graduate student," said Chuck. "That effort evolved into the present mentoring concept where donated funds employ students in research. Students who work with professors have virtually no limits in what they can accomplish, and industry looks favorably on that experience when offering jobs."

The Clines remain active in their support of BYU, which will continue even after their passing. "We redid our will last year," said Chuck. "We donated a portion of our estate to provide future scholarships and mentoring opportunities for BYU students."

The Clines are members of the Jesse Knight Society, which honors those who help secure BYU's future through deferred gifts, trusts, wills, and life insurance. Such philanthropy is not publicly acknowledged because it doesn't bear fruit until the donor's death, so the society was created to recognize deferred gift donors. Created by LDS Philanthropies, the society has over 600 members in 24 states, Canada, and England. ■

## Keep on Giving

A planned gift need not be large. Everyone can do something. Such support of the college ensures that the educational experience enjoyed by donors will be available to bless future generations of BYU students.

A bequest through a will can take many forms—a specific item or amount of cash, a percentage of an estate, or a residuary gift that allocates a portion of the estate after other bequests have been distributed. If a donor has already created a will, a simple codicil (amendment) can include the department or college in the estate plan.

For assistance in creating an effective estate plan, please contact David Bonner, 1-800-525-8074; david\_bonner@byu.edu.

# CLASS NOTES

Mentored students at BYU's College of Physical and Mathematical Sciences cash in on scholarships and fellowships to encourage and fund their research.

## GOOGLE FUNDS GENEALOGY WORK

[Computer Science] **Moriah McClanahan** (Bowling Green, OH) was one of only five undergraduate students in the nation to receive the 2005 Google Anita Borg Memorial Scholarship. The \$10,000 scholarship is given to outstanding female undergraduate and graduate students completing their degrees in computer science or related fields. McClanahan was one of 115 applicants from 80 different universities applying for ten awards.



"I do research for One-PageGenealogy.com," said McClanahan. "I create pedigree charts that fit many generations on one piece of paper." She created a new interface to make creating the charts easier for users. The program will be installed on computers at the Family History Center in Salt Lake City. A student of Professor **Tom Sederberg**, McClanahan will graduate in December 2006 and plans to go to graduate school.

## NEW LEARNING METHOD STUDIED

[Computer Science] **Kristine Perry** (Livermore, CA) was awarded a National Science Founda-



tion research fellowship that pays tuition and a monthly stipend for three years. Perry came to BYU after finishing her baccalaureate in music therapy at Utah State University, and is working concurrently on her masters and doctorate degrees.

Perry is researching machine learning and neural networks to discover how real world applications can be

learned using current techniques. Her results will propose improved techniques for learning difficult tasks. She is working in Dr. **Tony Martinez's** neural networks/machine learning lab.

"I have really enjoyed BYU," said Perry. "The people I've worked with here are amazing. I appreciate the opportunity to pursue my other interests. Eventually, I'd like to work at a research facility or teach as a professor."

## STATISTICS PRIZE GIVEN TO CO-ED

[Statistics] **Carly Pendleton** (San Diego, CA) has been awarded the prestigious Gertrude Cox Scholarship. Along with a certificate, she will receive a \$1,000 cash prize. The scholarship is awarded each year to encourage women to enter statistically-oriented professions. This is the second



time a student from BYU has received the award.

Pendleton will graduate with an M.S. in statistics in 2006 and seek work in pharmaceuticals to combine her loves of biology and statistics.

"At BYU, I have appreciated the unique spirit on this campus," said Pendleton. "There is a greater appreciation for education than I have ever experienced elsewhere. I work in the statistics department and coordinate the introductory statistics course which enrolls nearly 2,000 students." Pendleton was mentored by **Shane Reese**, professor of statistics.

## MOBILE ROBOTS EARN AWARD

[Computer Science] **Morgan Quigley** (New Canaan, CT) graduated in August 2005 with degrees in music and computer science. He received a National Defense Science and Engineering Gradu-



ate Fellowship—one of 170 awards from a field of 3,700 applicants. The fellowship covers tuition and fees for three years of graduate work and provides a yearly stipend of \$31,000. Quigley is pursuing graduate work at Stanford University, and will use the money towards his research in

aerial and ground-based mobile robots—of interest to the U.S. military.

Quigley was a research assistant for professor **Randy Beard** in the College of Engineering and Technology. "It's the experience of stepping into the unknown and trying to solve problems that have no solutions—yet," said Beard. "In engineering there are real problems to solve that are not in textbooks. There is not a solution manual to go to."

"I enjoy being a part of a team where we all can make stuff work," said Quigley. "To get this thing off the ground, it takes six or seven different people's systems working together. If any system fails, the plane wrecks."

At BYU, Quigley created control systems and flight path algorithms for small unmanned airplanes and applied machine learning to automobile controls and human-robot interaction studies. ■

## JOIN US ON THE INSIDE PASSAGE TO ALASKA

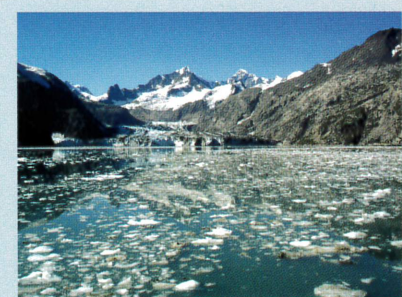
The BYU College of Physical and Mathematical Sciences invites you to experience the Alaskan cruise of a lifetime. This unique itinerary has been planned to give travelers an in-depth, close-up perspective of America's last frontier.

Travelers will visit wilderness areas beyond the reach of the large cruise ships. They will experience the free spirit of Alaska—its bald eagles, pods of humpback whales, vast glaciers, and hidden fjords where kittiwakes nest in the rocky walls.

In the blue waters of the fabled Inside Passage, travelers may see mountain goats perched on sheer granite faces and ice floes serving as resting pads for harbor seals. Experienced naturalists will answer questions, accompany shore excursions, and provide valuable insight into the natural wonders and wildlife of this part of the world.

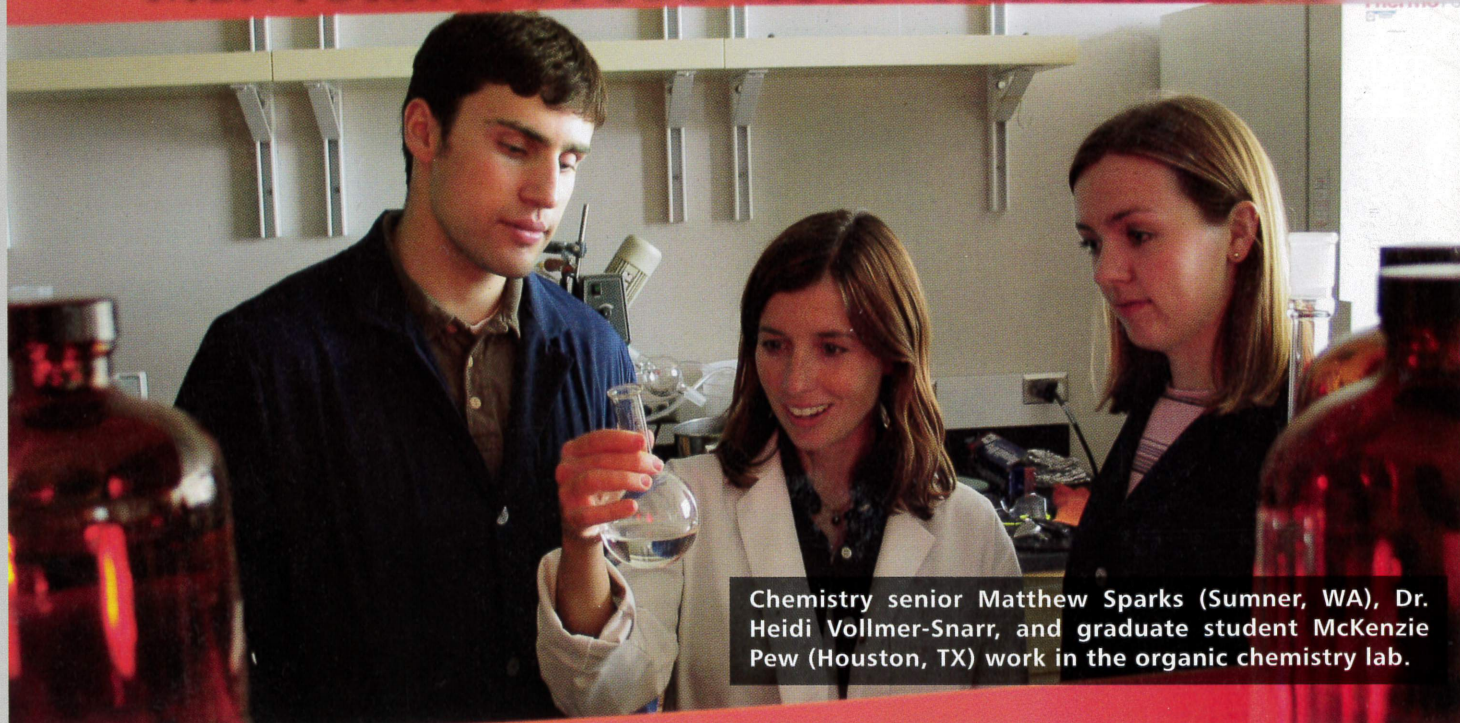
Scheduled for August 2006, the voyage includes seven nights aboard ship in outside staterooms with lower beds, individual temperature controls, and private bathroom facilities. All meals aboard ship are included. Optional excursions in Skagway, Haines, and Sitka are available at additional cost.

For more information, visit [cpms.byu.edu] and click on Travel, or call (801) 422-4022. Places will be reserved in the order received up to a maximum of 50 people.



# SHAPING THE FUTURE

## MENTORING STUDENTS IN THE SCIENCES



Chemistry senior Matthew Sparks (Sumner, WA), Dr. Heidi Vollmer-Snarr, and graduate student McKenzie Pew (Houston, TX) work in the organic chemistry lab.

Every student who leaves the College of Physical and Mathematical Sciences with a mentored learning experience is better prepared to bless others and help the world solve its problems. Consider BYU organic chemistry professor Heidi Vollmer-Snarr's experience:

"When I came to BYU three years ago, I recruited undergraduate and graduate students to join my lab," said Vollmer-Snarr. "One in particular—Josh Cameron—helped me set up the lab and get things started. He wanted to be a medical doctor, but became interested in macular degeneration. We published a paper together, and he presented papers alongside professors and post-doctoral students. He collaborated with a professor at the University of Utah and is now working with him as he pursues his Ph.D."

Vollmer-Snarr said other students have similarly focused their interests as a result of their mentored research. Several have gone on to medical and other graduate programs at Johns Hopkins, Texas A&M, the University of Wisconsin at Madison, and Creighton.

She believes additional funded fellowships at BYU could provide full-time summer work between academic semesters and provide a wonderful way to get students fired up about research and better prepared for graduate school and careers.

Vollmer-Snarr is enthusiastic about mentored learning because of her own mentored experience in school. "I'm where I am today because of the influence of my undergraduate professor," she said. "I had the opportunity to work alongside graduate students in his lab, and he helped direct me toward a fellowship at Oxford. It was because of this experience I changed from medical school to organic chemistry."

To help professors like Dr. Vollmer-Snarr mentor more students, I invite you to contact David Bonner at 1-800-525-8074 or [david\\_bonner@byu.edu](mailto:david_bonner@byu.edu). Mentored learning experiences lead our undergraduates along paths toward new discoveries and positive contributions to society. Together, you, our faculty, and our students are pushing back the frontiers of science.

—Earl M. Woolley, Dean

BYU COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES