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FACULTY newsletter

CPMS Physical and Mathematical Sciences

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BRIGHAM YOUNG UNIVERSITY

New Leadership for the Math and Stats Depts

Leadership changes have been announced for the Department of Mathematics and the Department of Statistics in the College of Physical and Mathematical Sciences, effective July 1. Robin Roundy has been appointed as mathematics chair with associate chairs Steven McKay and Darrin Doud. In the statistics department, Dennis Tolley is the new chair, with Gilbert Fellingham serving as associate chair.

Robin Roundy graduated from BYU with bachelor's and master's degrees in mathematics. He earned his doctorate in operations research at Stanford University before becoming a professor at Cornell where he taught for 26 years. He started teaching at BYU in 2010 after being released as president of the Colombia Barranquilla Mission. Roundy is replacing Tyler Jarvis as chair of the Department of Mathematics.

Steven McKay received his bachelor's degree in mathematics from Utah State University in 1983 and his master's degree two years later. He completed his doctorate in mathematics from Colorado State University in 1990. McKay has been a BYU faculty member since 1993 and will be replacing William Smith as associate chair of the math department.

At BYU, Darrin Doud received his bachelor's degree in mathematics in 1992 and his master's degree one year later. He then earned a second master's in math teaching and a doctoral degree in math, both from the University of Illinois at Urbana-Champaign. Doud has been teaching at BYU for the past 11 years and will continue his position as associate chair of the department.

Dennis Tolley graduated from BYU in 1970 with a bachelor's degree in statistics. He completed a doctorate in biostatistics from the University of North Carolina four years later and was appointed as an associate of the Society of Actuaries in 1981. Tolley has taught at BYU for 29 years and will replace Del Scott as chair of the Department of Statistics.

Gilbert Fellingham received his bachelor's degree in mathematics at Occidental College in 1971. He graduated from BYU with two master's degrees, the first in physical education in 1977 and the second in statistics a year later. He then went on to receive his doctorate from the University of Washington in biostatistics in 1990 and joined the BYU faculty that same year. Fellingham will fill the associate chair position formerly held by Shane Reese. William Christensen will continue as the department's undergraduate coordinator.

by: Stacie Carnley

BYU Photo

ABOVE Derek Thomas

New Faculty Spotlight: Derek Thomas

The College of Physical and Mathematical Sciences welcomes Derek Thomas, a new visiting assistant professor in the Department of Physics and Astronomy.

Thomas graduated from BYU with a bachelor's degree in applied physics in 2007 and went on to receive his master's degree in physics from BYU one year later. Now, returned to BYU, he will complete his PhD at the University of Texas at Austin this year.

As both a teacher and a student, Thomas has appreciated BYU's mentoring programs.

"One of the outstanding things about BYU is the involvement of undergraduates in research," he said. "I was on the receiving end of that type of mentoring; but now, to come back and to be on the other side has definitely been a great experience."

Thomas said mentoring helped shape his career path and directed him toward his area of research. He is involved in both the acoustics of jet and rocket noise as well as modeling systems of interacting bubbles. His work with bubble systems has broad applications in the medical field.

"One application that we look at is a procedure called shockwave lithotripsy for treating kidney stones," he said. "A shockwave is generated outside of the body and focused on the kidney stones.

continued on page 2

Levi Price

ABOVE Dr. Josh Price

Rank and Status

Chemistry and Biochemistry

Emily Bates, granted candidacy for continuing faculty status

Matt Linford, promoted to full professor

Richard Watt, promoted to associate professor and granted continuing faculty status

Computer Science

Dan Ventura, promoted to full professor

Geological Sciences

Jani Radebaugh, promoted to associate professor and granted continuing faculty status

Mathematics

Darrin Doud, promoted to full professor

David Cardon, promoted to full professor

Pace Nielsen, granted candidacy for continuing faculty status

College Grants

Physics and Astronomy

Robert Davis and Richard Vanfleet
Sponsor: NSF
Title: Carbon Nanotube Templated Battery Electrodes

Stabilizing Protein-based Medications

This year an estimated 8,880 Utah residents will be diagnosed with cancer, according to the Huntsman Cancer Foundation. When you include friends and loved ones of patients, the number of individuals affected by cancer is much larger. The research of Josh Price, of the Department of Chemistry and Biochemistry, is aimed at reducing that impact by enhancing the effectiveness of pharmaceutical drugs like those used to treat breast cancer and glaucoma.

Price's work at BYU focuses on protein structure and folding. He began this line of research during his postdoctoral fellowship at The Scripps Research Institute. He recently published two articles on protein folding guidelines that may further stabilize and increase effectiveness of certain pharmaceutical drugs.

The first article appeared in the Proceedings of the National Academy of Sciences and proposed guidelines for linking a sugar to the protein chain in a way that makes the protein more stable.

Because the stomach easily digests protein, protein-based medications are administered via injection. Adding sugars to the protein chains could strengthen these medications, helping them to resist breakdown and to last longer in the bloodstream.

"Even once the medications are injected, your immune system can sometimes recognize the proteins as foreign, giving you an undesired immune response," Price said. "Research has found that adding a sugar to a protein can help avoid all of those problems."

Price's second article, published in the journal *ACS Chemical Biology*, demonstrates that linking a polyethylene glycol (PEG) polymer to a protein can also increase protein stability.

"So what we're doing now in my lab at BYU is following up on this observation to try to understand why PEG stabilizes the protein, what the rules are and if we can use them to our advantage," he said.

These advances in protein research may someday be useful to the pharmaceutical industry. In 2010, six of the twenty top-selling drugs were protein based.

"Five of those [protein-based drugs] were antibodies, two were directed at autoimmune disease, and three directed at cancer," Price said. "We believe that general strategies for enhancing protein stability could make these drugs even more effective."

by: Stacie Carnley

Derek Thomas continued from page 1

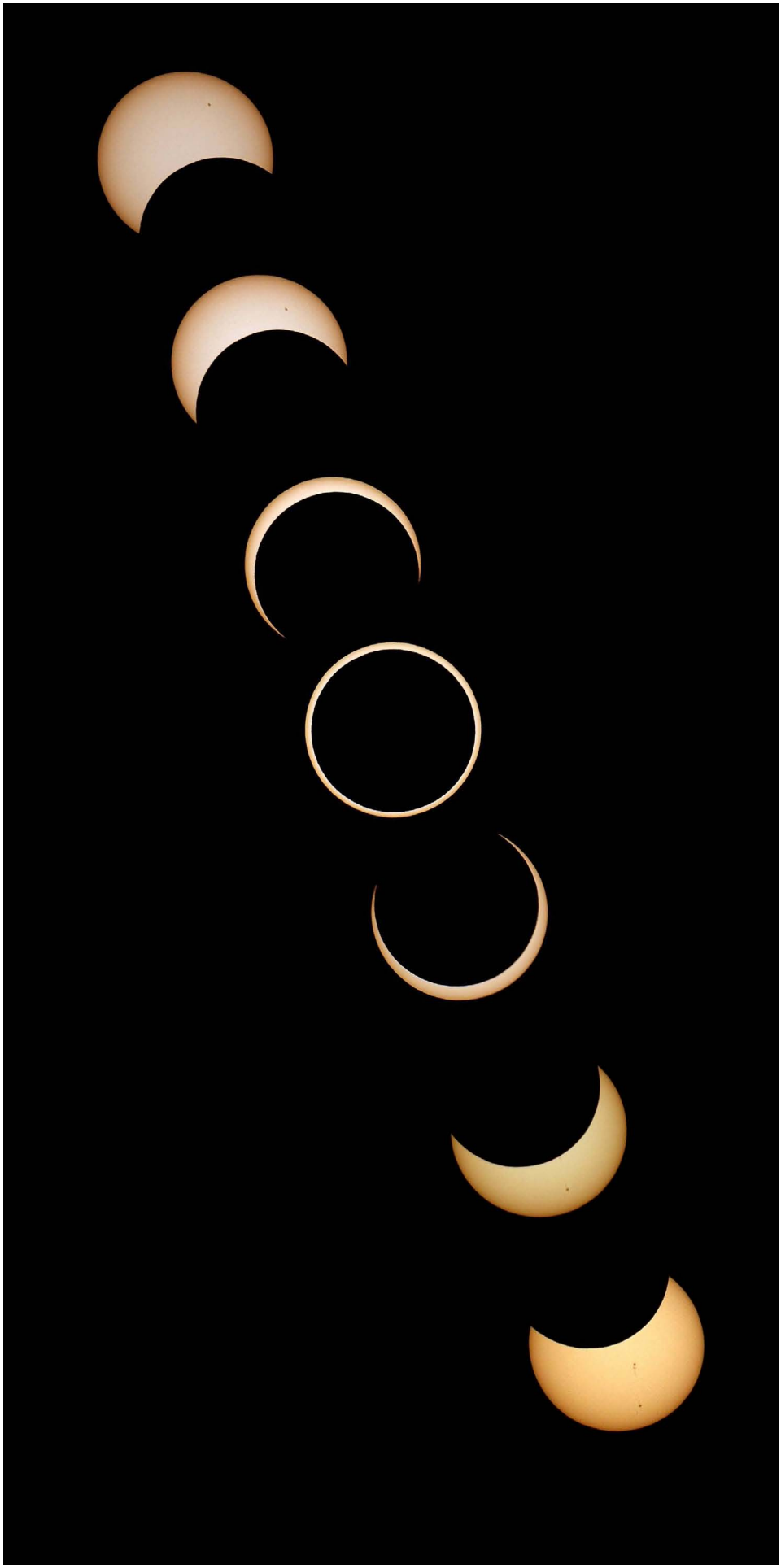
The violent collapses of bubbles caused by the wave are able to pulverize the kidney stone without cutting you open."

Thomas's interest in physics and acoustics reaches beyond his career. His love of music has caused him to collect a variety of musical instruments.

"I have a French horn, a trumpet, some guitars, a mandolin, a clarinet, a harmonica and other assorted things," he said. "The only one that I play reasonably well is the French horn, but it's a fun acoustics-related hobby."

Thomas enjoys other hobbies such as cooking and cycling as well as spending time with his wife and three kids.

by: Stacie Carnley



Shooting the Moon

About a mile northwest of Kanarraville, Utah, BYU astronomer Mike Joner waited near the center of an eclipse path to make this image. He captured this stunning astronomical phenomenon in a series of photos as the moon gradually darkened the sun during a rare solar eclipse on May 20, 2012.

Alysa Hoskin

ABOVE Matthew Allen now manages the Chemistry Central Stockroom.

Dates to Remember

Commencement
Thursday, Aug. 9
4 p.m., Marriott Center

College Convocation
Friday, Aug. 10
8 a.m., Ballroom WSC

AUC College Meeting
Wednesday, Aug. 22
10 a.m., W170 BNSN

Learning Suite Training
Wednesday, Aug. 22
1 p.m., 1149 TMCB

TA Training Conference
Friday, Aug. 24
8 a.m., 1102 JKB

New Student Orientation
Friday, Aug. 24
1-3 p.m., W111 BNSN

New Manager in the Chemistry Stockroom

The Department of Chemistry and Biochemistry is mixing up the management of the stockroom, as a result of Larry Dungan stepping down due to serious health challenges. Matthew Allen is now the manager of the Chemistry Central Stockroom (CCS).

Allen previously worked with environmental compliance and waste management in the research and development labs at the Department of Energy in Idaho. His job centered around helping dispose of research waste following approved standards. He decided to change jobs in favor of BYU's unique environment.

"What brought me here was the opportunity to work in a great environment with positive students who are excited to be here," Allen said. "I knew in a place like BYU, even though I didn't go to school here, I knew there would be a positive attitude."

Located in the Nichols building, the CCS serves 2,000 different accounts from across campus and carries 10,000 chemistry products, from dry ice to syringes. This resource is available also for anyone with a BYU I.D. card, although certain products are restricted to only research accounts.

The stockroom employs ten to twelve students every semester. Between semesters, there are usually employment openings as students graduate. Potential employees must have completed basic level chemistry courses (such as Chem 111 and 112) and apply via the flyers located around the Nichols building.

Matthew Allen, with the help of assistant manager Linda Richards, is now the manager of this student team and the stockroom. Allen is originally from Eastern Idaho. He graduated from BYU-Idaho (then Rick's College) in 2000 with an associate's degree in biology and a minor in chemistry and then received his bachelor's degree in economics at Utah State. When he accepted the manager position, Allen was halfway through the MBA program at Idaho State University and is now applying to transfer to the MBA program on campus. He's excited for the unique Provo atmosphere.

"As I was waiting [for my interview] I was looking around and the secretary's desk had a picture of Christ," Allen said. "Before when I was working for the government, I couldn't talk about religion. But being able to have that freedom [here] is really amazing."

by: Alysa Hoskin

College Publications

Chemistry and Biochemistry

E. Castro-Nallar, M. Perez-Losada, G. Burton, K. Crandall, "The Evolution of HIV: Inferences Using Phylogenetics", Molecular Phylogenetics and Evolution, 2012, volume 62, pp. 777-92

J. Lin, L. Lee, M. Roivainen, D. Filman, J. Hogle, D. Belnap, "Structure of the Fab-Labeled 'Breathing' State of Native Poliovirus", Journal of Virology, 2012, volume 12, pp. 5959-62

E. Mansfield, D. Mansfield, J. Patterson, T. Knotts, "Effects of Chain Grafting Position and Surface Coverage on Conformation of Model Reversed-phase Liquid Chromatography Stationary Phases", Journal of Physical Chemistry C, 2012, volume 116, pp. 8456-64

A. Quast, N. Wilde, S. Matthews, S. Maughan, S. Castle, J. Patterson, "Improved Assignment of Vibrational Modes in Sum-frequency Spectra in the C–H Stretch Region for Surface-bound C18 Alkylsilanes", Vibrational Spectroscopy, 2012, volume 61, pp. 17-24

N. Taylor, P. Farnsworth, "Experimental Characterization of the Effect of Skimmer Cone Design on Shock Formation and Ion Transmission Efficiency in the Vacuum Interface of an Inductively Coupled Plasma Mass Spectrometer", Spectrochimica Acta B, 2012, volume 69, pp. 2-8

N. Taylor, R. Spencer, P. Farnsworth, "The Effect of Matrix Composition on Radially Resolved Argon Metastable Atom Populations in an Emission ICP", Journal of Analytical Atomic Spectrometry, 2012, volume 27, pp. 857-67

Mathematics

F. Barioli, W. Barrett, S. Fallat, H. T. Hall, L. Hogbend, H. van der Holst, "On the Graph Complement Conjecture for Minimum Rank", Linear Algebra and its Applications, 2012, volume 436/issue 12, pp. 4373-91

W. Barrett, S. Butler, H. T. Hall, J. Sinkovic, W. So, C. Star, A. Yielding, "Computing Inertia Sets Using Atoms", Linear Algebra and its Applications, 2012, volume 436/issue 12, pp. 4489-502

G. Conner, C. Grant, M. Meilstrup, "A Sharkovsky Theorem for Non-locally Connected Spaces", Discrete and Continuous Dynamical Systems, 2012, volume 32/issue 10, pp. 3485-99

Physics and Astronomy

N. Taylor, R. Spencer, P. Farnsworth, "The Effect of Matrix Composition on Radially Resolved Argon Metastable Atom Populations in an Emission ICP", Journal of Analytical Atomic Spectrometry, 2012, volume 27, pp. 857-67