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FACULTY newsletter

CPMS Physical and Mathematical Sciences

New Chair Hopes to Accelerate Department Toward Goals

Above Left: Richard Vanfleet has been appointed as the new chair of the Department of Physics and Astronomy. **Above Right:** Grant Hart was named associate chair.

The College of Physical and Mathematical Sciences recently announced that Dr. Richard Vanfleet has been appointed as the new chair of the Department of Physics and Astronomy, effective immediately. Dr. Grant Hart was named associate chair.

Richard Vanfleet

When he was first named chair of the department, Vanfleet quipped that he felt "the end of the universe is near."

Vanfleet adds that while he did not seek for or expect the appointment, he appreciates the opportunity to help the department continue to succeed.

"I realize the importance of the job and will do my best to lead and represent the great department that we have," he said.

Vanfleet received his bachelor's degree in physics from BYU in 1992. He earned his master's and PhD from the University of Illinois at

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Falling in Love With Chemistry

The College of Physical and Mathematical Sciences welcomes David Michaelis as a new assistant professor in the Department of Chemistry and Biochemistry.

Michaelis completed his undergraduate work in chemistry at BYU in 2005. He earned his PhD in 2009 in organic chemistry from the University of Wisconsin–Madison, where he worked on the development of new oxidation reactions. He then took his family to California to perform postdoctoral studies at Stanford University as a National Institutes of Health (NIH) postdoctoral fellow. There he studied the design and synthesis of a promising anticancer agent.

During his second year at Stanford, Michaelis applied for and was offered a position as an assistant professor at BYU, but decided to remain at Stanford to finish out his fellowship, a decision that served him well.

"This 2013 year allowed me not only to finish work at Stanford but also to set up my lab at BYU remotely, recruit

Above : New chemistry professor David Michaelis.

students, and write grant proposals for my proposed research," he said.

By the time Michaelis arrived at BYU in April of 2013, he already had three graduate and three undergraduate students researching in his lab. Two of his three undergraduate students had received Undergraduate Research Awards from the chemistry department to fund their research.

During the years to come, he and his

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Skywalker Disappearing into the Sand

Above: *BYU geologist Jani Radebaugh is at left next to Ralph Lorenz of Johns Hopkins University and Jason W. Barnes of the University of Idaho.*

New research describes a fast-moving sand dune in Tunisia that is spilling onto the streets of the Star Wars set used to portray Anakin Skywalker's childhood home.

BYU professor Jani Radebaugh visited Mos Espa in 2009 and observed a nearby dune measuring 20 feet tall and 300 feet wide. Mos Espa is notable in the film for its annual pod races, and Radebaugh and other scientists utilized Google Earth to calculate how fast the dune raced toward the town. With images dating back to 2002, they clocked the dune at speeds of 50 feet per year.

"In terms of geologic time scales, it's one of the fastest things we see happen, aside from lava flows and landslides." said Radebaugh. "You can compare it to some glaciers, but even most glaciers tend to move slower."

Coincidentally, Radebaugh credits the Star Wars films for sparking her interest in planetary science. Ordinarily she teams up with NASA to study moons of Saturn and Jupiter. But a visit to Tunisia with other planetary scientists prompted the dune research that the journal *Geomorphology* recently published.

"It's so fun to see geology in action," Radebaugh said. "We live on a dynamic planet."

The set of Mos Espa began attracting tourists in 1999 following the release of "Episode 1: The Phantom Menace." Prior to that, people had visited some of the 1970's-era Episode 4, 5 and 6 sets, which have since been overrun by dunes. Bulldozing the dune to save the set isn't an option, as a larger dune

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Cinderellas Are On the Ball

Most pro basketball fans would assume that TV executives want to see teams from the largest markets go the furthest in the playoffs. But in college basketball, however, the most fans tune in for teams they probably hadn't heard of a month ago.

BYU statistics professor Scott Grimshaw's research found that a NCAA Men's Final Four game featuring a Cinderella team, or an underdog from a smaller school, will have a 35 percent larger TV audience than a game featuring two national powerhouse schools. That 35 percent jump translates to 3 million more viewers for a semifinal game and 4.5 million more for the championship game.

"The Cinderella teams, with all the national media attention they get, become a national star," Grimshaw said. "It's not that these schools have an established national fan base, it's that the NCAA tournament celebrates the Cinderella more so than other sports."

Grimshaw built a statistical model to gauge how valuable each team was in terms of its TV popularity. The study, published in the Journal of Quantitative Analysis in Sports, used Nielsen TV ratings to examine the 30 Final Four games that occurred from 2003-2012.

The jump in ratings is even bigger when two Cinderella teams face off in the Final Four. Nearly 11 million households tuned in when Virginia Commonwealth met Butler in a 2011 semifinal game. Without their respective Cinderella labels, the model predicted an audience of only 6.4 million.

Although a championship game featuring two Cinderella teams hasn't happened yet, Grimshaw's model extrapolates that it would result in an 81 percent larger audience.

"Our research can't answer definitively why Cinderella's are more popular for fans, though it does prove they are," said co-author Paul Sabin, a student in the integrated BS/MS statistics program. "By the time the tournament reaches the Final Four, most fans' local teams have been eliminated. It's plausible that interest for casual fans decreases as a result, but that Cinderella's provide them the motivation to tune in and root for the little guy."

Above: *Statistics professor Scott Grimshaw.*

The data included 24 teams and the viewership from 56 major television markets. Although powerhouse schools like UCLA, Florida and Syracuse might hail from the largest TV markets, audiences tune in more to root for Butler, VCU, George Mason and other Cinderella teams that have won their way into the Final Four over the past decade.

Previous research using National Football League and European Premier League soccer data found three main reasons fans tune in: big-market teams, big-name stars and closely contested matches. Only the last of those three factors held up when it comes to the NCAA Tournament.

"Our paper was myth-busting to a certain degree because two of those three assumptions are wrong in college basketball," said Grimshaw. "The top 10 teams in terms of national importance had no national effect on TV ratings, though they all had a strong local following."

The statistical model built by Grimshaw, Sabin and BYU Broadcasting Director of Marketing Keith Willes allows for audience size prediction in

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Research Development

Proposal Writing Seminar and Upcoming "Speed Networking" Event

Would you like to find research collaboration opportunities? Do you want to learn about current research in the colleges of Engineering and Technology and Physical and Mathematical Sciences? Interested in a free lunch?

Then attend the "Speed Networking Event" on Monday, August 26, from 9:30 a.m.–1:00 p.m. The event will begin in W-111 BNSN with faculty from the two colleges presenting 3-minute highlights of their latest and greatest research, followed by lunch and networking in W-170 BNSN. We plan on 30–40 presenters as well as dozens of additional attendees. It will be a great chance to see what is happening across the colleges.

Speed Networking has been successfully used by a growing number of universities to help their faculty get a better understanding of what others are doing and who might be good collaborators. **Those wishing to present need to RSVP no later than Wednesday, August 21, to resdev@byu.edu, and those not presenting need to RSVP by Thursday, August 22, to resdev@byu.edu.**

Presentations should be in PowerPoint and need to be emailed by Wednesday, August 21. Each presentation should begin with a title slide stating the speaker's name, department, and title followed by an appropriate collection of additional slides that clearly convey the essence of your research to a diverse audience within 3 minutes.

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Urbana-Champaign in 1994 and 1997, respectively. Following his education, he worked as a postdoctoral research associate at Cornell University in the School of Applied and Engineering Physics.

Vanfleet worked as an assistant professor at the University of Central Florida before joining the BYU Department of Physics and Astronomy in 2003. His current research focuses on atomic and near-atomic scale studies of materials by transmission electron microscopy.

During his time at BYU, Vanfleet has taught mostly calculus-based introductory physics classes and senior physics labs. From 2010 to 2011 he took a sabbatical leave from BYU and worked as a visiting professor in Materials Engineering at the University of Cape Town in Cape Town, South Africa, and in the Electron Microscopy Unit at the University of the Western Cape in Bellville, South Africa.

Back at BYU and ready for a new adventure, Vanfleet hopes to use this opportunity to influence the department for good.

"I do see challenges in the next few years in hiring both staff and faculty and in pushing the Department to meet our potential in scholarship and teaching. We can do better, and I hope to do what I can to facilitate our improvement."

In addition, Vanfleet joked that he hopes "to survive and still get some research done."

Vanfleet is married to Christina Borden Vanfleet, and they have five sons. Their oldest will be a freshman at BYU this fall and their youngest will start kindergarten.

In his spare time, Vanfleet enjoys reading, gardening, biking, hiking, and camping.

Grant Hart

Associate chair Grant Hart received his bachelor's degree from BYU in 1977. He earned his PhD from the University of Maryland at College Park in 1983. Following graduation, he worked for two-and-a-half years at the Princeton Plasma Lab in Princeton, New Jersey. He joined the BYU Department of Physics and Astronomy in 1985 and works in plasma physics.

Hart and his wife, Deborah Aamodt Hart, have 13 children. They enjoy camping and hiking together.

Vanfleet replaces Dr. Ross L. Spencer as chair, with Dr. Grant Hart replacing Dr. Harold Stokes as associate chair. Spencer and Stokes had served since 2007.

by Meg Monk

Love continued from page 1

lab hope to develop new catalysts to enable more efficient reactions.

"We plan to develop new catalysts for converting oil-based materials into drug-like molecules," he said. "We also hope to develop catalysts that mimic the way nature synthesizes drug-like molecules, which could greatly impact the cost of production for important antimicrobial drugs like those for malaria and tuberculosis."

After his first chemistry class as a freshman, Michaelis decided he didn't like chemistry. After his mission, however, he took organic chemistry and "fell in love." He hopes to impart this love of learning about the natural world to his students, especially those who may be less excited about chemistry, as he was as a young student.

"I teach a really challenging subject matter which is often dreaded by the students that have to take it. . . . They generally come in scared or with a negative attitude towards the class," he said. "I hope to help my students get over the negative stigmas about organic chemistry and help them see it is really cool and fun to learn chemistry, and help them translate this vision into lifelong learning."

Michaelis met his wife as an undergraduate at BYU, and they welcomed their first daughter just before moving to Wisconsin for Michaelis' doctoral work. They now have three daughters and a son.

When he is not busy at the lab or with church service, Michaelis enjoys reading and spending time with his wife and children.

"We really enjoy swimming and playing in the water together, especially with water-weenies that you can make from materials purchased from the chemistry stockroom!"

by Meg Monk

Rank Advancements

Congratulations to all faculty receiving advancements in rank!

Chemistry & Biochemistry
Steven L. Castle, professor
R. Todd Bronson, associate teaching professor
James E. Patterson, associate professor,
Jeffrey H. Macedone, associate teaching professor

Computer Science
Kenneth J. Rodham, teaching professor
Quinn O. Snell, professor

Geology
Barry R. Bickmore, professor
Summer B. Rupper, associate professor

Mathematics
Denise M. Halverson, professor

Mathematics Education
Douglas L. Corey, associate professor

Physics & Astronomy
Michael D. Joner, research professor
Richard R. Vanfleet, professor

Statistics
David A. Engler, associate professor

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follows on the heels of the first dune. The most feasible plan to rescue the site would require moving everything about 200 meters to the south.

However, it may be too late for a rescue operation – recent photos from Radebaugh's local collaborator show one dwelling and a pair of "moisture evaporators" partially buried.

"Sometimes we just have to move out of the way," Radebaugh said. "The sand people in Star Wars are nomads, right? Maybe they are nomads because the sand moves."

by Joe Hadfield

Cinderella continued from page 2

different TV markets. This information could allow CBS to strategically target their advertising regionally.

"CBS didn't pay $10.8 billion to acquire the rights to the NCAA basketball tournament because they love sports, they did it to make money," said Grimshaw.

by Joe Hadfield

College Publications

Chemistry & Biochemistry

G.K. Lam, M. Hopoate-Sitake, C.D. Adair, V.M. Buckalew, D.D. Johnson, D.F. Lewis, C.J. Robinson, G.R. Saade, S.W. Graves, "Digoxn antibody fragment, antigen binding (Fab), treatment of preeclampsia in women with endogenous digitalis-like factor: a secondary analysis of the DEEP Trial", American Journal of Obstetrics & Gynecology, 2013, volume 209, pp. 1-6.

A.C. Pearson, M.R. Linford, J.N. Harb, R.C. Davis, "Dual Patterning of a Poly(acrylic acid) Layer by Electron-Beam and Block Copolymer Lithographies", Langmuir, 2013, volume 29, pp. 7433-7438.

K.D. Reichl, D.H. Ess, A.T. Radosevich, "Catalyzing Pyramidal Inversion: Configurational Lability of P-Stereogenic Phosphines via Single Electron Oxidation", Journal of the American Chemical Society, 2013, volume 135, pp. 9354-9357.

A.D. Curtis, A.R. Calchera, M.C. Asplund, J.E. Patterson, "Observation of sub-surface phenyl rings in polystyrene with vibrationally resonant sum-frequency generation", Vibrational Spectroscopy, 2013, volume 68, pp. 71-81.

D. Henderson, S. Lamperski, L.B. Bhuiyan, J. Wu, "The tail effect on the shape of an electrical double layer differential capacitance curve", Journal of Chemical Physics, 2013, volume 138/issue 14, article 144704 (3 pages).

D.S. Jensen, S.S. Kanyal, N. Madaan, J.M. Hancock, A.E. Dadson, M.A. Vail, R. Vanfleet, V. Shutthanandan, Z. Zhu, M.H. Engelhard, M.R. Linford, "Multi-instrument characterization of the surfaces and materials in microfabricated, carbon nanotube-templated thin layer chromatography plates. An analogy to 'The Blind Men and the Elephant'", Surface and Interface Analysis, 2013, volume 45, pp. 1273-1282.

J. Lin, N. Cheng, J.M. Hogle, A.C. Steven, D.M. Belnap, "Conformational Shift of a Major Poliovirus Antigen Confirmed by Immuno-Cryogenic Electron Microscopy", The Journal of Immunology, 2013, volume 191, pp. 884-891.

Mathematics

F. Huijun, T. Jarvis, Y. Ruan, "Quantum Singularity Theory for A_(r-1) and r-Spin Theory", Annales de L'Institut Fourier, 2013, volume 61, pp.2781-2802.

D. Futer, J. S. Purcell, "Explicit Dehn filling and Heegaard splittings", Communications in Analysis and Geometry, 2013, volume 21, pp. 625-650.

D. Cooper, D. Futer, J. S. Purcell, "Dehn filling and the geometry of unknotting tunners", Geometry & Topology, volume 17, pp. 1815-1876.

Physics & Astronomy

A.C. Pearson, M.R. Linford, J.N. Harb, R.C. Davis, "Dual Patterning of a Poly(acrylic acid) Layer by Electron-Beam and Block Copolymer Lithographies", Langmuir, 2013, volume 29, pp. 7433-7438.

D.S. Jensen, S.S. Kanyal, N. Madaan, J.M. Hancock, A.E. Dadson, M.A. Vail, R. Vanfleet, V. Shutthanandan, Z. Zhu, M.H. Engelhard, M.R. Linford, "Multi-instrument characterization of the surfaces and materials in microfabricated, carbon nanotube-templated thin layer chromatography plates. An analogy to 'The Blind Men and the Elephant'", Surface and Interface Analysis, 2013, volume 45, pp. 1273-1282.