

Newsletter

College of Physical and Mathematical Sciences

March 2009



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Spring Research Conference 2009



The College's 23rd annual Spring Research Conference (SRC) was held from 8 a.m. to 2 p.m. on Saturday, March 21. The SRC gives students, both undergraduate and graduate, a chance to present the results of their research from the previous year. Each student participant had twelve minutes

to present his or her research, with three minutes afterward to answer questions from the audience and session judges. Students were judged on organization, verbal presentation, visual presentation, the content of the research, and the impact of the research on society¹. This year, over 300 students presented their original research in a variety of fields.

The conference also held a special session for high school students from 10:00 am to 1:00 pm on the same day. This session included free t-shirts, a drawing for a free iPod, and pizza. The titles were as follows:

- "DNA Origami" — Chemistry and Biochemistry
- "Active Learning In Computers" — Computer Science
- "Exploring Io, Jupiter's Volcanic Moon" — Geological Sciences
- "Why Mathematicians Play With Bubbles" — Mathematics
- "CRT: Risky Business" — Mathematics Education
- "Ultraviolet Optics: Magnetospheres And Solar Flares" — Physics and Astronomy
- "Adaptive Clinical Trials: Don't Stick To The Status Quo" — Statistics

(The winners of the Spring Research Conference can be found on page two.)



¹http://www.cs.byu.edu/article/2009-03-23-winners_2009_college_spring_research_conference

²<http://byunews.byu.edu/archive09-mar-springconf.aspx>

Important Dates & Events in the College

April 2009

Wednesday, April 8th

Chemistry/Biochemistry

Awards Banquet

3220-3222 WSC

5:45 PM

RSVP to Janet Fonoimoana

Friday, April 10th

Geology Awards Banquet

Skyroom

6:30 PM

Tuesday, April 14th

Last Day of Class—Winter

Wednesday/Thursday,

April 15th-16th

Reading Days

Thursday, April 23rd

Commencement

Friday, April 24th

Convocation

WSC Ballroom

8:00 AM

Tuesday, April 28th

First Day of Class—Spring



Student Employee of the Year: Hollie Irving

Hollie Irving, Student Budget Assistant for the Physics and Astronomy Department, was awarded the Brigham Young University Student Employee of the Year on March 31, 2009, and received a plaque and BYU Cougar blanket. In addition to the BYU Student of the Year, Hollie was also awarded the Utah State Student Employee of the Year Award by the Western Association of Student Employment Administrators, and received a plaque and stipend. Hollie's nomination has now been submitted to the regional competition for their consideration.

Hollie's employer, Nan Ah You, reports that Hollie is a very motivated and determined person, and is always anxious to get things done. "She has added valuable input regarding department procedures and has enhanced department programs. She also recently created a check-list process for student employees to eliminate in-house errors with paymentnet. This process not only eliminated careless errors, but also helped to identify problems different student employees were having so that the issues could be addressed and further training provided. Hollie visualizes the needs of students and the Department of Physics and Astronomy personnel."

An example of Hollie's team spirit was described as follows, "We had a bus taking faculty members and students to a conference in El Paso, Texas. There was not time for the bus to stop for meals, reach the conference on time, and keep the bus charges within budget. Her supervisor chose to be at work at 3:00 am. to prepare meals for those traveling and Hollie was the only student worker who volunteered to assist her (she was not asked to volunteer). Without her assistance it would have been difficult for all of the Department goals to have been met."



Along with the above information, Hollie is reported to be valiant in the Gospel, smart, considerate, and an exceptional problem solver. She is extremely respected by her peers and co-workers and shows equal respect to everyone. She is hard working, well groomed, and trustworthy in all walks of life. She not only brings efficiency to the work place, but also happiness to those around her.

The college wishes to join the Department of Physics and Astronomy in congratulating Hollie on her well-deserved awards.

Spring Research Conference Winners

Chemistry & Biochemistry

Elisabeth Pound
Changna Wang
Jie Xuan
Thomas Ence
Jon Low
Michael Wood
Na Li
Allen Nicholson
Marie Chilton

Computer Science

Kenneth Sundberg
Maria Soledad Pera
Joseph Butler
Paul Felt
Adam Drake
Nathan Rasmussen
John (Alan) Atherton
William Lund

Geological Sciences

John Hoopes
Landon Burgener
Colton Goodrich
Christopher Spencer

Mathematics

Skyler Simmons
Mark Meilstrup
Emma Turner
Mark Kempton
Drew Johnson
Sijin Chen

Mathematics Education

John Gruver
Erin Sorensen

Physics & Astronomy

Adam Hall
Nicholas Morrill
Brian Wilcken
Chris Verhaaren
Jun Song
Daniel Wilcox
David Krueger
Steven Allen
Brian Davis
Joseph Nelson

Statistics

Erica Hernandez
Tomo Funai
Andrea Thomas
Rachel Poulsen

Art Benjamin: Mathemagician!



On April 1st, 2009 at 8:00 pm in 140 JSB, BYU will have the opportunity to enjoy Arthur Benjamin's unique presentation.

"Dr. Arthur Benjamin is both a professor of mathematics and a magician. He has combined his two loves to create a dynamic presentation called "Mathemagics," suitable for all audiences, where he demonstrates and explains his secrets for performing rapid mental calculations faster than a calculator. Reader's Digest calls him "America's Best Math Whiz". He has presented his high energy talk on over a thousand occasions to audiences throughout the world.

Dr. Benjamin has appeared on many television and radio programs, including: The Today Show, CNN, Amazing Discoveries! and National Public Radio. He has been profiled in The New York Times, Los Angeles Times, USA Today, Scientific American, Discover Magazine, Omni Magazine, Esquire Magazine, People Magazine, and Reader's Digest. "

For more information, see <https://math.byu.edu/home/colloquia/event/26>

BYU Professor Shows Which Way the Wind Blows on Saturn's Largest Moon

BYU geologist Jani Radebaugh is part of a team that mapped the vast sand dunes of Titan with four years of radar data collected by the Cassini spacecraft.

— Joe Hadfield, *BYU News*

Titan's vast dune fields, which may act like weather vanes to determine general wind direction on Saturn's biggest moon, have been mapped by scientists who compiled four years of radar data collected by the Cassini spacecraft.

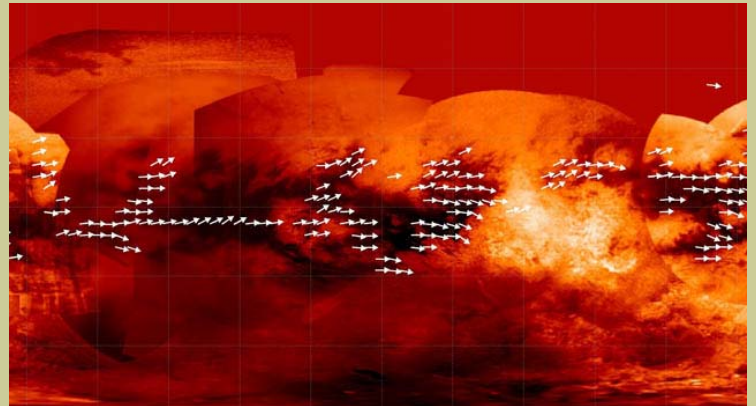
Titan's rippled dunes are generally oriented east-west. Surprisingly, their orientation and characteristics indicate that near the surface, Titan's winds blow toward the east instead of toward the west. This means that Titan's surface winds blow opposite the direction suggested by previous global circulation models of Titan.

"At Titan there are very few clouds, so determining which way the wind blows is not an easy thing, but by tracking the direction in which Titan's sand dunes form, we get some insight into the global wind pattern," says Ralph Lorenz, Cassini radar scientist at Johns Hopkins University Applied Physics Laboratory in Laurel, Md. "Think of the dunes sort of like a weather vane, pointing us to the direction the winds are blowing." A paper based on these findings appeared in the Feb. 11 issue of *Geophysical Research Letters*.

"Titan's dunes are young, dynamic features that interact with topographic obstacles and give us clues about the wind regimes," said Jani Radebaugh, Brigham Young University, Provo, Utah. "Winds come at these dunes from at least a couple of different directions, but then combine to create the overall dune orientation."

The new map, based on all the high-resolution radar data collected during a four-year period, is now available at: <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini>.

The wind pattern is important for planning future Titan explorations that might involve balloon-borne experiments. Some 16,000 dune segments were mapped out from about 20 radar images, digitized and combined to produce the new map.



Scientists have used data from the Cassini radar mapper to map the global wind pattern on Saturn's moon Titan using data collected over a four-year period, as depicted in this image. Image credit: NASA/JPL/Space Science Institute

For the full article from NASA, please see <http://www.jpl.nasa.gov/news/news.cfm?release=2009-032>

College Publications

Chemistry & Biochemistry

Boda, D.; Valisko, M.; Henderson, D.; Gillespie, K.; Eisenberg, B.; Gilson, M.K.; *Biophysical Journal*, **2009**, *96*, 1293-1306. Ions and Inhibitors in the Binding Site, of HIV-Protease: Comparison of Monte Carlo Simulations and the Linearized Poisson-Boltzmann Theory.

Christiansen, M.A.; Butler, A.W.; Hill, A.R.; Andrus, M.B. *SYNLETT*, **2009**, *4*, 0653-0657. Wynthesis of Kurasoin B Using Phase-Transfer -Catalyzed Acylimidazole Alkylation.

Dearden, D. V.; Ferrell, T. A.; Asplund, M. C.; Zilch, L. W.; Julian, R. R.; Jarrold, M. F. *J. Phys. Chem. A* **2009**, *113*, 989-997. One Ring to Bind Them All: Shape-Selective Complexation of Phenylenediamine Isomers with Cucurbit[6]uril in the Gas Phase.

Farruggia, G.; Iotti, S.; Prodi, L.; Zaccheroni, N.; Montalti, M.; Savage, P. B.; Andreani, G.; Trapani, V.; Wolf, F. I. *J. Fluorescence* **2009**, *19*, 11-19. A simple spectrofluorometric assay to measure total intracellular magnesium by a hydroxyquinoline derivative.

Isogai, E.; Isogai, H.; Takahashi, K.; Okumura, K.; Savage, P. B. *Oral Microbiol. Immunol.* **2009**, *24*, 170-172. Ceragenin CSA13 exhibits antimicrobial activity against cariogenic and periodontopathic bacteria.

Kim, H. Y.; Pichavant, M.; Matangkasombut, P.; Koh, Y. I., Savage, P. B.; DeKruyff R. H.; Umetsu, D. T. *J. Immunol.* **2009**, *182*, 3252-3261. The development of airway hyperreactivity in T-bet-deficient mice requires CD1d-restricted NKT cells.

Nielsen, D.K.; Nielsen, L.L.; Jones, S.B.; Toll, L.; Asplund, M.C.; Castle, S.C. *Journal of Organic Chemistry* **2009**, *74*(3), 1187-1199. Synthesis of Isohasubanan Alkaloids via Enantioselective Ketone Allylation and Discovery of an Unexpected Rearrangement.

Roohi, S.; Amir, N.; Ahmed, M.; Savage, P. B.; Saluhiddin, S. M.; Jehangir, M. *J. Radioanal. Nuclear Chem.* **2009**, *97*, 57-62. Synthesis, quality control and biological evaluation of ^{99m}Tc labeled CSA-13.

Saini, G.; Wiest, L.A.; Herbert, D.; Biggs, K.N.; Dadson, A.; Vail, M.A.; Linford, M.R. *Journal of Chromatography A* **2009**, *1216*, 3587-3593. C₁₈, C₈, and perfluoro reversed phases on diamond for solid-phase extraction.

Sun, X.; Yang, W.; Geng, Y.; Woolley, A.T. *The Royal Society of Chemistry* **2009**, *9*, 949-953. A general microchip surface modification approach using a spin-coated polymer resist film doped with hydroxypropyl cellulose.

Zhang, H.; Grabenauer, M.; Bowers, M. T.; Dearden, D. V. *J. Phys. Chem. A* **2009**, *113*, 1508-1517. Supramolecular Modification of Ion Chemistry: Modulation of Peptide Charge State and Dissociation Behavior through Complexation with Cucurbit[n]uril (n = 5,6) or □-Cyclodextrin.

Computer Science

Geological Sciences

Hintze, L.F. and Kowallis, B.J., 2009, Geologic History of Utah, Brigham Young University Geology Studies Special Publication 9, 225 p.

J. K. Rigby, R. B. Blodgett, and Nicolle K. Anderson, 2009. Devonian sponges from west-central and south-central Alaska. *Journal of Paleontology*, v. 83, no. 2, p. 293-298, 5 figures.

Mathematics

Mathematics Education

Physics and Astronomy

Colton, J. S. and Wienkes, L. R. "Resonant microwave cavity for 8.5 -12 GHz optically detected electron spin resonance with simultaneous nuclear magnetic resonance," *Rev Sci Inst* **80**, 035106 (2009).

Statistics