University of Utah
Department of Mathematics

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A f t e r m a t h

Clay Research Award

by Aaron Bertram

Chris Hacon, together with James McKernan of UC Santa Barbara (and a former post-doc at the University of Utah), will receive the Clay Research Award for their recent work on the existence of flips in algebraic geometry of many dimensions. The Clay award recognizes outstanding contemporary research breakthroughs.

This is an extremely prestigous award! Only one or two are given each year, and previous recipients include Andrew Wiles, Edward Witten, Terence Tao, Alain Connes, Laurent Lafforgue, as well as a few other mathematicians who have not won the Fields Medal.

The award will be presented at the Clay Research Conference, to be held on May 14 at Harvard University. Chris and James will each receive a bronze sculpture by Helaman Ferguson at the ceremony. Congratulations Chris and James!

Sloan Fellow Jared Tanner

by Peter Alfeld

We are proud to announce that Jared Tanner is the recipient of a 2007 Sloan Fellowship. This prestigious award is given each year to 20 mathematicians who are no more than six years past their Ph.D.in the year of the nomination. It pays $45,000 in research funds over a period of 2 years.

Jared's original Ph.D. work was in the area of high order approximation of piecewise smooth functions, with particular emphasis on the Gibbs phenomenon and its ramifications in the solution of nonlinear hyperbolic partial differential equations. However, Jared did not linger in his original Ph.D. subject. After a brief interlude working on Shannon's sampling Theorem as applied to nonlinear sampling, Jared is now working in the area of high dimensional geometry of Gaussian point clouds and its connection to L_1 regularization.

Jared holds the John E. and Marva M. Warnock Presidential Endowed Chair in our department. He will spend the year 2007-2008 on leave at the University of Edinburgh. His current extracurricular projects include his wedding to Coralia Cartis in August. We congratulate Jared on his accomplishments and wish him and Coralia a very happy and long life together.

MAA Teaching Award

Peter Alfeld has been awarded the Mathematical Association of America's Intermountain Section Award for Distinguished University Teaching of Mathematics. Peter has been teaching at the University of Utah since 1977 and has taught subjects from algebra and trigonometry to numerical analysis. In recent years he has been instrumental in the development of online mathematics courses and the use of WeBWorK, serving as the department's WeBWorK coordinator for several years. It is wonderful that Peter has been recognized for his extraordinary teaching career.

Giao Huynh Off to Lindau

by Fred Adler

Since 1951, the Lindau Meeting of Nobel Laureates and Students has convened annually in Lindau, Germany, to create open and informal meetings between the stodgy scientific stars of yesteryear and the bright researchers of the future. A few weeks ago, a random email gave the opportunity to nominate a top graduate student working in the biological sciences to attend this meeting. Giao Huynh was the ideal candidate, and thanks to Heather Rasmussen we turned around the application materials in time to make the deadline, and soon found that our efforts had paid off. From July 1-6, Giao will join about 20 Nobel Laureates in Medicine and approximately 499 of the world's other most talented young scientists of tomorrow to discuss current scientific issues via lectures, seminars, and "personal encounters."

In addition to these priceless interactions, the participants will soak up the scenery in the picturesque island city of Lindau, conveniently set at the eastern end of Lake Constance just north of the Swiss Alps. Located in the always peaceful tri-country region abutting Austria, Germany, and

Switzerland, the medieval city is rich with the products of European culture, including many storied liquids. Giao will certainly have a lot to tell us when she returns, and we can only hope she will make time for some personal encounters to share her experiences.

The E8 Hoopla

by Peter Trapa

At the behest of the Aftermath editors, I've been asked to write a few paragraphs about a calculation involving the Lie group E_8 which has recently attracted an unexpected amount of attention. (For instance, in what will forever remain the most embarrassing turn of my professional life, my mother was even interviewed about E_8.)

To get started, what is E_8? The answer requires a little background. The classification of complex simple Lie groups is one of the most pleasant (and relatively elementary) surprises in all of mathematics. There are four infinite families indexed by a positive integer n, each of which behaves more or less like the group of n-by-n invertible matrices with determinant one. But there are also five exceptional Lie groups: G_2, F_4, E_6, E_7, and E_8. The exceptional groups are really a wonderful surprise, since one would expect either no exceptions at all, or else a very long list of them. These five groups keep turning up in all kinds of unexpected places in mathematics.

The group E_8 is the largest among the exceptional groups. It is a 248 dimensional complex manifold; the 8 in E_8 refers to the fact that this manifold can, in some sense, be described by an eight dimensional "backbone" of sorts.

What was the actual calculation that garnered so much attention? The set of all maximal solvable subalgebras of the Lie algebra of E_8 has a natural structure of a projective algebraic variety. The group $Spin(16, \mathbb{C})$, a member of one of the infinite series mentioned above, acts with finitely many orbits on this space. (There are about 300,000 of them.) Each orbit is smooth, but the closure of such an orbit is usually singular. The actual calculation, roughly speaking, computed the intersection cohomology sheaves of these orbit closures. (Such sheaves are designed to measure the nature of the singularities that are present.) Earlier Lusztig and Vogan had given an algorithm describing how to make such computations. The recent work was devoted to writing software to implement the algorithm, and then devising very clever ways to execute the calculation on existing hardware.

Knowledge of the intersection cohomology sheaves described in the previous paragraph has a number of important applications to representation theory. In fact, the calculation itself is really a small part of a much larger project undertaken under the umbrella of the so-called Atlas of Lie Groups and Representations (*www.liegroups.org*).

So why all the hoopla? That's something I'd prefer to defer to the other members of the Atlas project (or, in the very least, to my mother).

MAA Intermountain Section Meeting

by Nick Korevaar

The Intermountain Section of the Math Association of America holds annual spring meetings, and this year we hosted it on March 23-24. About one hundred faculty and students from Idaho and Utah schools converged on LCB and JWB during the Friday and Saturday of spring break to hear invited lectures, present their own research, and catch up with friends. These annual meetings provide a link to our neighboring college and university math departments, and a forum for us to discuss common concerns.

Bob Palais, Westminster's Carolyn Connell and I organized the schedule, with Sandy Hiskey handling the many other details that go into putting on a successful meeting. Utah was well represented on the speakers list, which consisted of Jim Keener, "How cells make measurements"; Roger Baker of BYU, "Riemann and the idea of a zeta function"; Graeme Milton, "Cloaking: new phenomena in electricity and magnetism"; and Peter Trapa "Organizing a high school math circle." Dan Schaal of South Dakota State University led a mini-course, "Undergraduate research in mathematics, getting it started and keeping it going"; Hugo Rossi gave a banquet presentation entitled "The disappearance of boundaries in mathematics." A number of participants commented on the excellent quality of the invited presentations, an opinion I share.

Other highlights of the meeting for me included the large number of student presentations, in which Utah was well-represented; presenting the annual Intermountain Section teaching award to our own Peter Alfeld; and finally, watching our Department's undergraduate competitors in the entertaining integration bee: even though three of them wiped out on the same nasty trig-substitution integral and none of them lasted until the final three competitors, it looked like Charles Cox, George Yuen, Wang Zhu and Carlos Gamez had some sort of fun.

Personality!

For a change of pace, we're going to let those being spotlighted tell us about themselves in their own words.

Yael Algom-Kfir is working on her Ph.D. in Geometric Group Theory and Topology with Mladen Bestvina:

Aftermath: Tell us about your family.
Yael: My husband, Ori, is currently working as a software engineer in a startup company in Draper. Ori makes great cheese from yogurt and can name all the capitals of the world! My Dad is a psychology professor at the Tel Aviv University. He would like me to say that he's a "Hungarian speaker." My Mom is an English teacher. She also speaks Hungarian. She didn't ask me to mention that. My older sister is a therapist and my younger brother is an aspiring historian. None of us speak Hungarian.

Aftermath: What is your hidden talent?
Yael: I'm a pretty good liar. When I was a teenager I used to do it quite a lot. Once, while I was waiting for the bus, I made up this story about going to visit my dad who was incarcerated for tax fraud. My interlocutor was very entertained and so was I, but I had to get off the bus at the wrong stop. Nowadays I don't lie anymore. I just embellish the truth.

Aftermath: What do you like to do in your spare time?
Yael: Dr. Bestvina shouldn't find out that I have spare time.

Aftermath: Is there something you can tell us about yourself that would surprise us?
Yael: Many things. Here's one: I was kicked out of a basket weaving class when I was 12. My family spent that summer in Connecticut because of my father's job. My mother had me take a basket weaving class. I was never so bored in my entire life. It was really hard on my fingers, too. One day, the other kids started talking about their plans for the future, and I said that I was going to join the army and become the first female paratrooper. The instructor, a devout pacifist, didn't like my attitude, and decided to teach me what was right. Needless to say this was one argument she couldn't win. They called my mother and asked her to pick me up since the instructor said it was either her or me. My mother didn't object, and I was never so happy.

Aftermath: Is there anything else you'd like us to mention?
Yael: I never did become a paratrooper, but I compensated by taking skydiving lessons after my discharge from the army. It was fun, but it's one of those things that you are crazy enough to do only when you're 20.

Zack Kilpatrick is a Ph.D. student studying applied mathematics, particularly dynamical systems as they relate to large-scale neuronal networks:

Aftermath: Tell us a little bit about your family.
Zack: 2 boys, 2 girls, 2 parents. Elisabeth, my older sister, lives in Chicago, and is attending Northwestern's journalism school. Charlie, my younger brother, studies astrophysics at Caltech. Alexandra, my younger sister, is sixteen. My parents, Peter and Nancy, still live in North Carolina, where I was born and raised.

Aftermath: What is your hidden talent?
Zack: When I want to, I can keep my mouth shut for long periods of time.

Aftermath: What do you like to do in your spare time?
Zack: Tell bad jokes, cook, read, go to coffee shops, help people, music, climbing, skiing, running, talk to pretty girls.

Aftermath: Is there something you can tell us about yourself that would surprise us?
Zack: I don't drink and I'm not Mormon.

Aftermath: Is there anything else you'd like us to mention?
Zack: Kurt Vonnegut just died the other day. I liked a lot of what that guy wrote. Here's a quote I'd like to pass along: "Laughter and tears are both responses to frustration and exhaustion. I myself prefer to laugh, since there is less cleaning up to do afterward."

To Math Dept Faculty and Staff

I have been one of your main custodians in the math building here for the past 6 1/2 years now, and I must sadly now say goodbye. I will be taking a graveyard shift up here on campus starting June 1st, so will no longer be in this building. I have gotten to know only a small handful of the faculty and staff, but that small group I am truly grateful for knowing, they have treated me like a person and not just like the janitor and I will never forget any of them. With that having been said I wish everyone including myself the best of luck and hope that the person taking my place in time is able to get the same respect and feeling of worth that I got here from the math dept. Goodbye.

Best wishes to all,
Chris Supak

Graduation!!

This year approximately 50 undergraduate mathematics majors will receive a baccalaureate degree. Thirteen students will receive a Masters degree in Mathematics and two will receive the Master of Statistics degree. Students receiving the Ph.D. in 2006-2007 are Domagoj Kovacevic, Lars Louder, Elijah Newren, Andy Oster, and John Zobitz.

Aftermath is (usually) published roughly monthly during the academic year. Issues of the newsletter are archived on the web at:

www.math.utah.edu/newsletter

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