Summary of 2004 Research Activities - continued

Research profiles of three Liftoff students

Matthew Young (AIM) works on analytic number theory, random matrix theory and elliptic curves. He spent his time as a Liftoff fellow working with his adviser Henryk Iwaniec at Rutgers University. His research focuses on trying to prove that a large number of elliptic curve *L*-functions do not vanish at the central point. This is a question of great interest because of the Birch and Swinnerton-Dyer conjecture. Matthew has been working on extending the analytic methods developed in his thesis to learn more about the root number influence on the distribution of zeros. Mathew's work is deep and very new, going far beyond what was previously known. He has also continued his project of computing lower order terms of certain interesting families of elliptic curves. These results will appear in an article "Lower-order terms of the 1-level density of families of elliptic curves".

Etienne Rassart works on algebraic combinatorics and combinatorial aspects of representation theory and symplectic geometry. He spent his time as a Liftoff fellow working with his adviser Victor Guillemin at MIT, but also attended the Formal Power Series and Algebraic Combinatorics (FPSAC) conference in Vancouver, Canada, as well as the IAS/Park City Mathematics Institute program in geometric combinatorics. His research with Victor Guillemin over the summer resulted in a publication "Signature quantization and representations of compact Lie groups" (Proc. Nat. Acad. Sci. USA 101 (204), no. 30, 10884–10889) and a preprint "Signature quantization, representations of compact Lie groups, and a *q*-analogue of the Kostant partition function (arXiv:math.CO/0405379).

Chenchang Zhu (ETH, Zürich) works on the interface of symplectic geometry, contact geometry, Poisson geometry and Lie algebroids/groupoids. The primary focus of her doctoral work was the integration of Lie algebroids. Important examples come from Palais' work on integration of infinitesimal actions of Lie algebras and Weinstein's integration of Poisson manifolds into symplectic groupoids. During her time as a Liftoff fellow she attended the "Mathematical and Physical Aspects of String Theory" conference, in Ascona, Switzerland, the "Groupoids and Stacks in Physics and Geometry" meeting at CIRM-Luminy, France, as well as made visits to Alan Weinstein in Paris VII, Yvette Kosmann-Schwarzback at the École Polytechnique, and Giovanni Felder at the ETH, Zürich. Some of her recent results will appear in "Morita equivalence of general Poisson manifolds" (joint with Henrique Bursztyn) and "Morita equivalence of Poisson manifolds and symplectic groupoids and their quantizations" (joint with Bailing Wang).

Research Academy Colloquium Speakers

Martin Nowak, ***Evolutionary game dynamics***

Kiran Kedlaya, ***The number theory of the upper half plane***

Akshay Venkatesh, ***How many integral solutions to polynomial equations?***

Cumrun Vafa, ***Physics and math of crystal melting***

Robert Devaney, ***The Mandelbrot set, the Farey tree, and the Fibonacci sequence***

Timothy Gowers, ***The largest positive integer ever contemplated***

Peter Shor, ***Quantum computing***

András Vasy, ***Distributions—generalized functions***

Jim Carlson, ***The mathematics of Google***