

## Spring 2001 Progress and Activities

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### Dissertation research progress:

My general area of interest has been algorithms in arithmetic algebraic geometry, focusing on algorithms for finding rational points on algebraic curves. Under the guidance of Professor Bill McCallum, the investigations have focused on the genus 1 case. This semester, in McCallum's absence, I met with Professor Minhyong Kim. The first month was devoted to filling in holes in my knowledge of abelian varieties and higher category theory. Next we pursued algorithmic questions concerning rational points on curves of genus  $g \geq 2$ ; this effort led to a number of conjectures and a new theorem, results I intend to write down this summer and eventually incorporate into a paper for publication. This last month I have been examining the distribution of closed points on the arithmetic surface  $\mathbf{P}_{\mathbf{Z}}^1$ , climbing towards a vantage point for covers of  $\mathbf{P}_{\mathbf{Z}}^1$  from which Hilbert irreducibility and Cebotarev density will be seen as special cases of a general theory.

### Vertical integration:

At the Recruitment Workshop for prospective graduate students, I gave a talk entitled *Story of a research project*, telling the story of how a group of graduate students a few summers ago, under the guidance of Bill McCallum and Minhyong Kim, found explicit equations of Jacobians of genus one curves.

With faculty mentoring by Dr. Jim Cushing, fellow graduate student Jeff Edmunds led an undergraduate research project with students Derek Sperry and David Wood. (They put together a website: see [www.u.arizona.edu/~dsperry/urp.html](http://www.u.arizona.edu/~dsperry/urp.html).) They invited my participation in the last month to help them modify their program (which computes the box dimension of an attractor) to run faster and provide more accurate results. This effort was successful, and the results are on their website. Jeff Edmunds graduated this semester and therefore will not be around next semester to continue leading this project. I have agreed to take over leadership. I met with the group recently, and David Wood and Derek Sperry have prepared a proposal for next semester.