The Southwestern Center for Arithmetical Algebraic Geometry

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The Southwestern Center

- A DMS funded project with 10 PIs at 5 Universities (Arizona, UT Austin, UNM, USC, Berkeley)
- Funded by GIG in 1997, Infrastructure in 2002
- The focus is on training and research in arithmetical algebraic geometry (modern number theory).
- The most important activity is the Arizona Winter School.

The Arizona Winter School

- A 5-day instructional meeting for advanced graduate students and post-docs. Characteristics:
  - focused (4-5 courses of 4-5 lectures each on a carefully chosen topic of current interest)
  - top quality participants (Deligne, Katz, Mazur, Rubin, Sarnak, ... and students selected competitively from across the country)
  - very intensive (lectures and working session from 9 am to 10 pm and beyond)
  - very interactive (students work with a speaker on a project which they present at the meeting)

Typical Schedule: Lectures

	Saturday 3/9	Sunday 3/10	Monday 3/11	Tuesday 3/12	Wednesday 3/13
9:00	Deligne	Deligne	Deligne	Deligne	Villegas students
10:00	Coffee	Coffee	Coffee	Coffee	Coffee
10:30	Voisin	Voisin	Voisin	Deligne students	Voisin
11:30	deJong	deJong	deJong	deJong	Voisin students
12:30	Lunch	Lunch	Free Time	Lunch	Lunch
2:00	PD: Hughes Hallet	PD: Takahashi		PD: Velez	PD: Ulmer
3:00	Villegas	Villegas		Villegas	Villegas
4:00	Coffee	Coffee		Coffee	Coffee
4:30	Deligne	Voisin		deJong students	

Typical Schedule: evening working sessions and professional development

- **Evening Working Sessions**
  There will be evening sessions with light refreshments from 7 to 10 pm on Friday, Saturday, Sunday, Monday, and Tuesday evenings. These sessions will provide students with an opportunity to discuss their projects with the speakers, as well as a chance for everyone to get more details or clarifications from the speakers. Active participation is strongly encouraged.

- **Professional Development Component**
  The professional development component will be on the use of technology (such as the web, spreadsheets, and a calculator based laboratory) in the classroom.

Evening Working Sessions

Here two speakers---Peter Sarnak and Kevin Buzzard---work late at night with their students and some post-docs. It's past midnight in the Sarnak picture.

Student Presentations

Luis Finotti and Chris Hurlburt after their presentation at AWS 2000. See our site for more pictures.

One speaker's experience

I was worked very hard---that is to say four days of active participation in lectures, giving lectures, mentoring students, etc. The activity started at around 9 am and finished at 1 am each day. When I think about it now it seems a bit crazy but I found the hard work very rewarding. I learned quite a bit myself and I believe the 10 or so students with whom I worked continuously over this period also learned a lot. ... Three of our Princeton students, who participated in projects with Clozel and Ramakrishnan and Mazur, learned more in this short period than in months under standard conditions at a place like Princeton. ... Had I not been part of and seen that such an intense activity could work, I would no doubt be quite skeptical about its possible success. However, I can vouch that it works and in fact very well ...

- Peter Sarnak

Impact

- There were ~400 participants in the first 5 years, ~250 students, ~250 distinct individuals.
- Many relationships have developed across geographic and age boundaries.
- Our site has notes, course and project descriptions, streaming video of lectures, ...
- Significant high-level research (published in Inventiones, the Annals, Duke, ...) acknowledges SWC support or inspiration.

Costs

- About $500K for the first 5 years
- About $544K for the next 3-4 years:
  - participant travel
  - significant honoraria to motivate notes, projects
  - support for organizers
  - other activities of the center (distinguished lecture series, visitors, a web server)

Remarks

- Multi-year, multi-PI (and so multi-institutional) support makes this project possible.
  - multi-PI: pooled talents, energies, connections
  - multi-year: experiments, refinements, momentum
- Choices of topics, organizers, speakers, participants are, among other things, funding decisions. Pushing these decisions out to the "grass roots" (PIs) is an efficient way to distribute NSF funds.
- This type of activity might scale well in a "network" model.

Some Issues

- Multi-institutional grants are hard to administer. Can DMS simplify this?
- Distributing rewards, in particular overhead, is a source of conflict. Again, can DMS help?
- What is the appropriate form of oversight for funding decisions pushed out to the "grass roots"?
- What are appropriate budgets, durations, and numbers of PIs for this sort of project?

Conclusions

- Topically focused, multi-institutional groups can have a large impact in research and training.
- A distributed funding model can be efficient.
- DMS can and should do more to encourage these types of activities.

More information about the Southwestern Center is available on our web site:
http://swc.math.arizona.edu