



photo by Thomas Lehman

CAARMS attendees Etienne Ogoubi, Stephanie Somersille, Irene Moshesh and Luke Stewart were honored for their research poster presentations.

## African-American mathematicians meet for annual research conference

SAMSU and the Mathematics Department of University of North Carolina at Chapel Hill co-hosted this year's Conference for African American Researchers in the Mathematical Sciences (CAARMS). A total of 68 attendees registered for the event, held June 20-23 in the UNC Mathematics Department and at SAMSU.

Eleven invited lecturers gave research reports on widely varied topics. In an opening lecture on "Gravity, Light and Mathematics," Arlie Petters, professor of Mathematics and Physics at Duke University, included career guidance based on his own experience. His concern for the group's younger members continued in conversations after the lecture.

Other speakers, coming from North Carolina, Maryland and Florida, spoke on measurement error, solitons, HIV

pathogenesis, DNA dynamics, modeling national economic growth, analysis of social networks, protein structure prediction, involutions of simplectic groups and optimization of nurse/patient ratios in hospitals.

The banquet speaker, Professor Johnny Houston of Elizabeth City (North Carolina) State University, stressed the importance of international organizations of mathematicians and urged the audience to include Africa in their global perspective. His campus has a program to provide learning materials for Senegal.

Many conference attendees have gone to previous CAARMS meetings, so the annual event has a strong social as well as mathematical dimension; networking was on the minds of many participants.

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## Programs for 2007-08 finalized

In May, the programs for the 2007-08 year were finalized. As usual, SAMSU will have a full range of educational and outreach programs for graduate students, undergraduate students and members of underrepresented groups. The approved scientific programs are the following:

**Risk Analysis, Extreme Events and Decision Theory:** This full-year SAMSU program will address fundamental issues in risk analysis, as well as associated problems associated with extreme events and decision theory. The program will engage researchers from the statistical sciences, applied mathematical sciences and decision sciences, including operations research. The goal is to produce genuine impact on the practice of risk analysis and assessment, as well as on theory and methodology for extreme events and decision theory. Related policy concerns direct attention not only to the dramatic risks for huge numbers of people associated, for example, with events of the magnitude of Hurricane Katrina or bioterrorism, but also to "small-scale" risks such as drug interactions driven by rare combinations of genetic factors.

**Random Media:** This full-year program will address a number of fundamental issues pertaining to random media including scattering theory in highly discontinuous and random media, time reversal, model development, analysis, and numerical approximation for interface methods, and imaging in random media. The inherent

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Summer program tackles multiplicity

Spring program looked at Astrostatistics

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## samsi alumni:

Do you have news you want to share with other SAMSII fellows, visitors and faculty? E-mail us at [alumni-news@samsi.info](mailto:alumni-news@samsi.info) and we'll include it in a future "News from the SAMSII family" column.

## From the director...

It is great to see the long-planned SAMSII newsletter come to fruition. The newsletter will be published quarterly, with the dual purpose of reporting on what has happened at SAMSII and what is going to happen. My thanks to Joanna Worrell and Thomas Lehman for putting together an excellent first edition!

Summer is a good time to reflect on the past year at SAMSII. The three research programs from last year have finished, ending on a high note with the Astrostatistics closing workshop at Penn State (joint with the Astrostatistics Center there). It was a joy to see the way that modern statistics and mathematics have taken hold in astronomy and astrophysics.

One of the exciting developments this past year was the opportunity for people who were not resident at SAMSII to participate in the research working groups. Indeed, 25 individuals from around the world regularly participated from afar in the weekly meetings and research of the working groups of the National Defense and Homeland Security and Astrostatistics programs. Technology at SAMSII is being continually improved to further enhance the capability for remote participation.

This summer was a busy time at SAMSII. We co-sponsored the 12th Annual Conference for African-American Researchers in the Mathematical Sciences from June 20-23, and had the first SAMSII summer research program, from July 10-28, on Multiplicity and Reproducibility in Scientific Studies. Summer programs will be a regular feature of SAMSII henceforth,

allowing individuals who are not free during the academic year to visit SAMSII for an intensive period of research during the summer.

On the education front, the highly popular Industrial

Workshop for Graduate Students was held at the end of July, and another new initiative, a Summer School, was held in mid-August. The Summer School was on statistical and applied mathematical issues involved in development and use of complex computer models, and is a lead-in to next year's program on that topic. Information about these upcoming 2006-07 programs and the 2007-08 programs can be found at the SAMSII Web site, as well as information about opportunities for participation in SAMSII activities.

We are very pleased to welcome Sue McDonald to the SAMSII staff. Sue joined us in April and has made a very positive impact. Many of you will likely interact with Sue in your visits or afterwards.

I look forward to the opportunity to contribute to this newsletter every quarter and, even more, look forward to the opportunity to see many of you at SAMSII in the future.



James O. Berger

**James O. Berger**  
Director

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This was evident as 15 young scientists presented posters and drew much discussion in an early evening session and dinner reception. Posters were judged with the following results. Best algorithm - Etienne Ogoubi, Université de Montréal; best modeling - Abdoul Kane, University of Toronto; best presentation - Stephanie Somersille, University of California at Berkeley; best theory - Irene Moshesh, Howard University; honorable mention: Luke J. Stewart, Duke University.

Throughout the conference Derrick Raphael, a new bachelor's-degree graduate of Princeton University, interviewed

attendees to understand the types of educational preparation and resources that prepare African-Americans for Ph.D.s in the mathematical sciences. A great majority attended public schools, and 42% attended a historically black college or university. Half of them were supported by a government fellowship for graduate study. This report to the conference in its final hour led participants to challenge each other to create conditions that make scientific careers accessible to gifted students, whatever their backgrounds.

This was the twelfth annual CAARMS meeting, under the leadership of William

Massey, the Edwin S. Wilsey Professor of Operations Research and Financial Engineering at Princeton University. Patrick Eberlein, chair of the UNC-CH Mathematics Department, and Chris Jones, Associate Director of SAMSII and Guthridge Professor of Mathematics at UNC-CH, provided local leadership throughout the meetings. The National Security Agency augmented the support of UNC-CH, SAMSII, and NSF with its major annual gift to CAARMS. Additional support came from the Mathematical Sciences Research Institute of Berkeley, California.

# Summer program tackles multiplicity

A summer program on Multiplicity and Reproducibility in Scientific Studies began on July 10 and continued through July 28. More than 60 participants – from clinical researchers to statistical analysts – studied fundamental questions such as why the results from so many scientific studies do not stand up to further scrutiny.

Program leaders were Peter Westfall, of Texas Technical University, chair; Peter Mueller, of the M.D. Anderson Cancer Center in Houston; and Juliet Shaffer, of the Department of Statistics, UC-Berkeley. Stan Young, of NISS, was the local scientific coordinator.

Research reproducibility, subgroup analysis, and massive multiple testing were scrutinized by working groups. The working group on research reproducibility sought to identify the characteristics of scientific studies whose results do not reproduce, with the hope of significantly improving scientific practice.

One likely cause of a lack of reproducibility is the all-too-frequent practice of looking through subgroups of subjects in a study, searching for a

“treatment effect” in some subgroup. If one looks at enough subgroups, an apparent – but not real – effect can be found just by chance. The statistical challenge is thus to devise methodology that can allow for adjustment of such apparent effects to reflect the looks at many subgroups, and was the focus of this working group.

A related problem is that of massive multiple testing, as arises in huge genomic data sets; if thousands of genes are separately tested for possible effects, a seemingly significant result will arise sooner or later due to random chance. Scientists that are not trained in statistics can be misled by such results teased out of a large data set, and society can be

badly misled by the false conclusions that emerge. The working group on multiplicity pursued methodology that correctly adjusts the possible effects, allowing more effective determination of those that are real.



photo by Thomas Lehman

Stan Young, Julie Shaffer and Peter Mueller, leaders of the current Multiplicity and Reproducibility in Scientific Studies program.

## SAMSI's spring program focuses on Astrostatistics

More than 100 scientists participated in the SAMSI Program on Astrostatistics, which began with tutorials and workshops in January of 2006 and ended with a workshop at Pennsylvania State University in June.

G. J. Babu, professor of Statistics and director of the Center for Astrostatistics at Penn State, served as the program leader.

Tutorials and workshops designed to deliver a common base of concepts to people from different disciplines drew nearly 80 attendees. The program working groups – on exoplanets, astronomical



G. J. Babu  
Program Leader

surveys and population studies, gravitational lensing and source and feature detection, engaged 45 people, many of them through the entire spring semester.

All members of working groups were at SAMSI for part of the program; weekly teleconferences enabled scientists who were not able to remain here for the entire program to continue their participation.

These working groups, now officially ended, have produced several ongoing collaborative projects.

A related working group, led by Louis Lyons, dealt with statistical issues in

particle physics, and will conclude its work this summer in a transition workshop developed by the Banff International Research Station.

SAMSI exists to bring scientists in several disciplines together to collaborate on problems that are larger than any one discipline. Thus all working groups contained both statistical/mathematical scientists and astronomers/physicists.

For Prof. Babu, his contact with Duke University's Arlie Petters has drawn him to a new interest in gravitational lensing. Babu summarizes his work as Astrostatistics Program Leader as “a great experience.”

He would like SAMSI to reconvene the Astrostatistics core in one or two years to see what impact the program has had on others.

To learn more about SAMSI and its affiliated programs and workshops, visit us on the Web at <http://www.samsi.info>

## samsi spotlight



A year ago **James Lynch** stepped down as chair of the Statistics Department at the University of South Carolina to return to fulltime teaching and research. As the duties of a department chair can be all-consuming, he looked for a means to reconnect with the excitement of research.

The SAMSI program on National Defense and Homeland Security looked right for him; his interest in reliability statistics drew him to the working groups on anomaly detection and data confidentiality. While teaching in the fall of 2005 he participated in the NDHS

group activities via a weekly phone connection. Others in the group from the Centers for Disease Control in Atlanta and the Department of Homeland Security in Washington DC also called in. With a second-semester sabbatical, he moved into a SAMSI office in January and stayed until May.

While here, Lynch quickly teamed up with Francisco Vera, a SAMSI postdoctoral scientist from Ecuador who had been Lynch's doctoral student at South Carolina. He also worked closely with David Dickey, one of the NDHS program leaders. The three of them have drafted a paper on anomaly detection, and Lynch is working on one or two other papers.

The state of South Carolina, like some others, is setting up what the CDC calls a "Syndromic Surveillance System" such as one in operation in New York City. It receives real-time clinical data from hospitals and serves as a rapid detection system for potential epidemic outbreaks or acts of bioterrorism. Lynch's experience with anomaly detection and previous work on reliability of data analysis may lead to collaboration with this project.

James Lynch came to SAMSI to revitalize his scientific career. He says it worked and calls it "very rewarding."

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synergy between deterministic, statistical and physical analysis necessitates a concerted collaboration between applied mathematicians, statisticians, engineers, geologists, and material scientists.

**Environmental Sensor Networks:** This spring 2008 program will consider wireless sensor networks. These pose unique challenges for environmental modeling: a complex system is being observed by a dynamical network. This presents an opportunity to organize the sensor system so that a local or micro event can trigger a broad or macro observation - or conversely, a macro observation can trigger highly detailed local data gathering. Success in modeling and optimizing this network will require a collaborative effort by statisticians, mathematicians, computational scientists and environmental scientists.

**Dynamic Treatment Regimes and Multistage Decision-Making:** This summer program (June 18-29, 2007) will consider development of "dynamic treatment regimes" or "adaptive treatment strategies" which are explicit, operationalized series of decision rules specifying how treatment level and type of treatment should vary over time for individual patients. Clinicians routinely and freely tailor treatment to the characteristics of the individual patient, based on instincts and experience. The goal of this program is to develop an evidence-based process for assisting in these decisions.

See the SAMSI website for information as to how to participate in these programs.

## program workshops

### Development, Assessment and Utilization of Complex Computer Models

Opening Workshop and Tutorials  
Sept. 10-14, 2006  
(Radisson Hotel RTP)

### High Dimensional Inference and Random Matrices

Opening Workshop and Tutorials  
Sept. 17-20, 2006  
(Radisson Hotel RTP)

### High Dimensional Inference and Random Matrices

**Bayesian Focus Week**  
Oct. 30 - Nov. 3, 2006  
(Radisson RTP)

### High Dimensional Inference and Random Matrices

**Transition Workshop**  
April 10-13, 2007, at AIM, Palo Alto, California

For more information about SAMSI programs and workshops, visit SAMSI's Web site at <http://www.samsi.info> or call 919-685-9350.



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