

ARCHIVAL RECORDS	53
PLANS FOR CORPORATE AND ACADEMIC COLLABORATION	53
FOCUS GROUP	53
FOCUS GROUP SUMMARY	54
EXTERNAL SUPPORT.....	54
OTHER FUNDING SUPPORT 2010-2011	55
OUTREACH/DIVERSITY.....	55
CREATING COMMUNITY AWARENESS	55
DIVERSITY	56
<i>AWM 40 years and counting: conference at Brown University in September 2012.....</i>	<i>56</i>
<i>SACNAS conferences, 2010 and 2011</i>	<i>56</i>
<i>Blackwell-Tapia Conference 2012.....</i>	<i>56</i>
ADMINISTRATION AND STAFF	56
FACILITIES.....	59
DATABASES, RECORDS, AND WEBSITE.....	60
IT RESOURCES	61
WORK STATIONS.....	61
WEB BASED TOOLS.....	61
MULTIMEDIA RESOURCES	61
PUBLICATIONS.....	62
APPENDIX	NOT AVAILABLE IN PUBLIC DOCUMENT
<i>APPENDIX A: Board of Trustees Meeting Minutes.....</i>	<i>63</i>
<i>APPENDIX B: Scientific Advisory Board Meeting Minutes.....</i>	<i>70</i>
<i>APPENDIX C: Education Advisory Board Meeting Minutes.....</i>	<i>73</i>
<i>APPENDIX D: A la Carte Menu for Corporate Sponsorship (Draft).....</i>	<i>80</i>
<i>APPENDIX E: Meeting Minutes from Math Institute Director's Meeting.....</i>	<i>84</i>
<i>APPENDIX F: Participant List.....</i>	<i>91</i>
<i>APPENDIX G: Participant Financial Support List.....</i>	<i>100</i>
<i>APPENDIX H: Income and Expenditure Report.....</i>	<i>101</i>

Letter from the Director



I am happy to report that our core programs and activities are on track, and that we have successfully hired most of our key staff. The directors have held twice weekly management meetings since August 2010, and these now include some or all of our staff. Let me begin this letter by providing a chronological overview of our ramp up year at ICERM in order to set the stage for the detailed reports on activities that follow.

In the months just prior to the award in August 2010, we (the Directors at ICERM) prepared for the semester long programs beginning in Fall 2011 and for the hiring of key staff. We (together and/or separately) visited every Math Institute in the country, except IAS and AIM, and interviewed directors and staff there. We collected information about best practices, and learned about problems and mistakes. The IMA generously offered to share its database software which we are now customizing, IPAM provided many templates for letters and working documents, and MBI gave us a wealth of information about A/V and lecture capturing equipment. I had conversations with past directors (Mark Green, Doug Arnold) as well as present directors, and I would like to express our gratitude for their generous assistance.

In May 2010, we had our first teleconference with the Science Advisory Board (SAB). At this meeting, we discussed, and they approved, the semester programs planned for 2011/2012. SAB members made suggestions for topical workshops that we subsequently solicited and developed.

In July 2010, we reviewed and commented on architect proposals for the renovation of the Institute space at 121 S. Main. By August, Brown had made its choice, and the weekly architecture meetings began. From August to the present, I have been in weekly 1-3 hour meetings with architects, construction engineers, and Brown Facilities Project Managers. All directors participated in the weekly architecture meetings in the fall 2010, and our IT manager participated in the construction meetings in spring 2011. Our job has been to inform everyone what a math institute requires, and desires, in order to function in its multiple roles: office space, administrative space, collaborative work and teaching space, and conference space. I was somewhat surprised at the scale of my responsibilities to the building project and the amount of time it required: I have personally reviewed and approved of every aspect of the renovation and construction from the choice of carpets to the A/V and lecture capture equipment, from the layout of the offices to the design of the glass enclosed lecture space. At various points in time, the observations of the ICERM team present at these meetings resulted in new designs and even one major change of scope in the project.

In August 2010, the initial batch of invitations went out to potential participants in the semester programs for Fall 2011 and Spring 2012 and we met (by phone or in person) with the organizing committees to plan programs, which were only 12 months away. The invitation process has continued throughout the year. In the ICERM model, each of the half-time Associate Directors (Jeff Brock, Jan Hesthaven) assumes responsibility for the development of one of the semester programs. Jeff Brock is working on the Spring 2012 program in Dynamics and the Spring 2013 program, Jan Hesthaven is working on Kinetic Theory in Fall 2011 and Probability in Fall 2012.

In September 2010, we focused on hiring staff. The job applicant pool was spotty until we were able to announce the award and have a web presence. The hiring process consisted of writing job descriptions, phone-screening applicants, and interviewing candidates in person, Staff hiring has

taken an enormous amount of time, even though much help was provided by Brown HR and by Doreen Pappas, the Mathematics Department Manager. In October 2010 we found our Assistant Director, Ruth Crane, who functions as my right hand and supervises everyone except the IT group. Ruth started work on November 1. In November, we found our IT Manager at Purdue University – Calumet: Mathew Borton started work on December 1, 2010. Ruth and Mathew immediately got started on the next hires: program, finance, and IT staff. Lauren Barrows, our Program Coordinator, came on board in February and Shaun Wallace, our web applications developer started work in March. He is working on the new ICERM web site and has been customizing the database. Bjorn Sandstede spent an unexpectedly large amount of time this fall and spring working with the database - he was compensated for this extra effort from the salary we had not spent on regular IT staff. Two new hires have just recently been finalized. While the hiring process has been slower than anticipated, we were able to (mostly) compensate for it by leveraging departmental resources (Math and Applied Math) and other Brown University resources provided by the Office of the Vice President of Research. Assembling a skilled team of committed staff members is critical not just to the functioning of this institute but to creating the right “cultural” environment for its scientific activities. I would say that the amount of time we have spent on hiring issues has been well worth the inconvenience, and even occasional hardship, of being understaffed.

In October 2010, Jeff Brock represented ICERM at SACNAS in Anaheim and he engaged in discussions with the Institute Diversity Committee regarding the all institute diversity workshop proposal. ICERM’s first workshop in this series is the Blackwell-Tapia event in November 2012, which is Bjorn Sandstede’s project. We continued to develop the participant list for our 2011/2012 semester programs and collect and develop proposals for the SAB in-person meeting in November. The ICERM proposal, which we had begun in the fall of 2008, contained plans for eight semester programs (as well as their organizing committees), two of which are in place for 2011/2012. Only two of the remaining six programs had organizers who were ready to submit a proposal to the SAB right away for the academic year 2012/2013. We continued collecting and developing proposals for topical workshops. We began working on our online application process for applicants to programs and workshops.

The November 2010 meeting of the SAB was very successful and productive. The minutes are attached to the annual report. We refined our process for selecting program participants and for ensuring the scientific integrity of these events. In particular, a three-member subcommittee of the SAB will always be assigned to a particular semester program, and these members will suggest possible participants, possible additional directions of research, and help ensure diversity. All programs and workshops begin with a ranked list of potential invitees created by the Organizing Committee. However, the final list of participants is created from (1) this list, with a possible re-ordering of the ranking determined by the directors, (2) additional people selected by the directors in consultation with the organizing committee, (3) suggestions of the SAB subcommittee, and (4) from an online application process whose applications are reviewed by both the Organizing Committee and the directors.

In November 2010 and December 2010, we trained Ruth and Mat, and developed our first promotional materials in anticipation of the JMM institute reception. Jan Hesthaven, who is also Director of the Center for Computation and Visualization at Brown, has taken charge of overseeing the IT resources and build out. While the IT manager in principle reports to me as Director, I rely on Jan Hesthaven’s expertise in this area to handle the supervision of Mat and IT issues. Towards the end of the year, Jeff Brock wrote a nomination to the Clay Foundation to fund one of our potential long-term visitors to the Spring 2012 program (Xavier Buff) – the nomination was successful and Clay will help support Xavier Buff for six months to attend the

program. The SAB meeting resulted in several specific suggestions for the programs in development and we (the directors) worked closely with their Organizing Committees to put these suggestions and modifications in place. We worked with several other potential long-term visitors to facilitate their acceptance of offers to visit ICERM for 2011/2012.

Shortly after the JMM in January 2011, the directors reviewed applicants for the salaried one-year (Institute Fellowships) and the semester postdocs (Postdoctoral Fellows) for the two semester programs. The Organizing Committee of each program made a ranked list of applicants that the Directors reviewed and, in one case, modified. The very top ranked applicants for the Dynamics program accepted immediately. For the Kinetic Theory program we went a little farther down the list. We are finding that a one semester visiting postdoctoral position is more difficult to fill when the applicants have an applied math background. These applicants are less likely to be released for a semester from a longer postdoctoral offer somewhere else. Nevertheless, we were able to fill the positions from the top ten. We intend to start exploring a variety of possibilities for extending an applied math/computational postdoctoral fellow to a one or more year position, using industry and non-NSF federal support.

In February 2011, our Program Coordinator started work and has taken over the housing, scheduling and meeting coordination. In March 2011, we hired our web application developer who is developing our new web site and customizing the database. The March 7 “launch” of the institute was an important event for Brown and ICERM, attended by the two RI Senators, one RI US Representative, the Mayor of Providence, the President and the Provost of Brown University, the Division Directors of DMS and CISE, and about 75 other dignitaries. There was tremendous local news coverage of the event. In March and April, we finalized the selection of postdocs for the upcoming semester programs. Throughout the spring we, and the organizers, reviewed applications to both semester programs and workshops.

In May 2011, our Board of Trustees (BoT) met by conference call on the afternoon of the 9th. Although we had planned for the BoT to meet in person in Providence, several last minute cancellations in an already small board caused us to change the meeting to a conference call. Next year we’ll move the meeting back a month in order to avoid the conflicts that arise in the busy month of May. Naturally, the subject of new members was a topic of that conference call. Also in May, Jeff Brock participated in the AIM workshop on the Mathematics of Planet Earth and is in charge of coordinating ICERM’s activities with this thematic year in 2013. The Education Advisory Board met in person on the afternoon of May 25. Frank Morgan skyped in and gave us a lot of advice about the summer undergraduate research programs, which was a main topic of the meeting.

In June 2011, we worked on a supplemental proposal, jointly with SAMSI, for a pilot program for a virtual institute in statistics, mathematics and computational sciences that initially involves ICERM, SAMSI and various Indian institutes. In preparing this proposal, we consulted with a few faculty members here at Brown who have extensive experience with Indian institutes, with Richard Taylor at SAMSI, and with Brown’s Office of the Vice President for International Affairs. I believe ICERM’s proposed pilot program is both ambitious and realistic, and is founded on our core activities and programs. Jeff Hoffstein has volunteered to organize the initial joint workshops and will lead the collaboration with the cryptography and cybersecurity group at Indian Statistics Institute.

In summary, we accomplished quite a lot this year.

In the next few paragraphs I would like to reflect on lessons learned and on challenges for the coming years.

The day-to-day start-up job of this institute has required a great deal of our energy in this first year. From now on, we need to devote more thought and creative energy to the scientific enterprise.

The current ICERM directorate model has two Associate Directors (each half time) and one full time Director, and all three are expected to be senior and active researchers in their fields. (Other senior Associate Directors lend their expertise to special projects, and may or may not receive compensation to do so.) The Associate Directors are not merely day-to-day managers of selected activities of the institute, but are partners in the development of scientific programs and activities. I believe that the collective expertise of the five of us currently listed as directors has been a tremendous advantage, and I hope to see this present model persist beyond the founding group of PIs, if possible. We will see whether this model is sustainable. While the present management structure makes it clear that the Director has the responsibility for final decisions and is to be held accountable for errors, I believe that our model of sharing scientific judgment and knowledge among a group of senior managers is an enormous asset to ICERM.

I would like to end this letter by summarizing our goals for the coming year, some of which have already been articulated in this letter, or will be further explained in the annual report.

GOALS:

- develop and implement model for university and industrial partnership
- develop and implement model for externally co-funded postdoctoral associates
- develop and implement process for dealing with externally requested activities (workshops, events etc)
- develop and implement model for globalization, international partnerships, and virtual institutes.
- develop and implement model for effective evaluation and impact.
- strengthen involvement and breadth of BoT
- increase outreach to local community, establish public lecture series.
- develop summer program for undergraduates
- develop and implement a unique social networking portal for ICERM that will allow a walled-garden for communication and collaboration within the institute, as well as tracking of ICERM supported research activity
- implement professional development programs for graduate students and undergraduates

Sincerely,



Jill Pipher
Director

Mission

“The mission of the Institute for Computational and Experimental Research in Mathematics (ICERM) is to support and broaden the relationship between mathematics and computation: specifically, to expand the use of computational and experimental methods in mathematics, to support theoretical advances related to computation, and address problems posed by the existence and use of the computer through mathematical tools, research and innovation.”

Core Programs and Events

ICERM is the only NSF-funded math institute charged with studying the convergence of mathematics and computation. The field is new, and it holds great promise to spin off technologies that could transform society. Contemporary subjects that internationally recognized scholars are expected to tackle in semester-long programs (with three workshops each), scholarly conferences, topical workshops and other initiatives include climate change, cryptography, cyber security, energy production and distribution, finance, personalized medicine, search engines, and social networks.

ICERM co-sponsored Brown University’s Symposium for Undergraduates in the Mathematical Sciences (SUMS) Conference in March 2011. The institute will hold its first program starting in August 2011.

Its scheduled upcoming events to date are as follows:

Event	Title	Date
Special Event	Brown University SUMS Conference	March 5, 2011
Topical Workshop	Mathematical Aspects of P versus NP and its Variants	August 1-5, 2011
Topical Workshop	Cluster Algebras and Statistical Physics	August 15-19, 2011
Semester Program	Kinetic Theory: Analysis and Computation	Fall 2011: September 7 – Dec. 9
Semester Workshop	Vlasov Models in Kinetic Theory	September 19-23, 2011
Semester Workshop	Novel Applications of Kinetic Theory and Computations	October 17-21, 2011
Semester Workshop	Boltzmann Models in Kinetic Theory	November 7-11, 2011
Topical Workshop	Synchronization-reducing and Communication-reducing Algorithms and Programming models for Large-scale Simulations	January 9-13, 2012
Semester Program	Complex and Arithmetic Dynamics	Spring 2012: January 30 – May 4
Semester Workshop	Complex and p-adic Dynamics	February 13-17, 2012
Semester Workshop	Global Arithmetic Dynamics	March 19-23, 2012
Semester Workshop	Moduli Spaces Associated to Dynamical Systems	April 16-20, 2012
Special Event	Blackwell-Tapia Conference 2012	November 9-10, 2012
Semester Program	Computational Challenges in Probability	Fall 2012: September 5 – Dec. 7
Semester Workshop	Bayesian Nonparametrics	September 17-21, 2012
Semester Workshop	Uncertainty Quantification	October 8-12, 2012
Semester Workshop	Monte Carlo Methods in the Physical and Biological Sciences	October 29-November 2, 2012
Semester Program	Automorphic Forms, Combinatorial Representation Theory and Multiple	Spring 2013: January 28 – May 3

	Dirichlet Series	
Semester Workshop	Sage Days: Multiple Dirichlet series, combinatorics, and representation theory	February 11-15, 2013
Semester Workshop	Crystals and Whittaker Functions	March 11-15, 2013
Semester Workshop	Combinatorics, Multiple Dirichlet series and Analytic Number Theory	April 15-19, 2013

In addition, during the summer of 2012 ICERM will host its first undergraduate summer research program.

Participant Summaries by Program Type

ICERM actively seeks women and members of underrepresented ethnic groups to participate in its programs as speakers and participants. While most participants choose to report their gender and ethnicity, some choose not to do so.

Please note that the participant data displayed below is not final, as ICERM's first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use for future annual reports by using the data the institute has for its pre-registered participants (including organizers) as of June 20, 2011.

Total Participants and Underrepresented Groups

<i>As of June 20, 2011</i>								
Program Type	Total Participants	Female	# Reporting Gender	American Indian	Asian	Black	Hispanic	# Reporting Ethnicity
Semester Programs*	142	22	127	0	26	1	6	58
Topical Workshops	60	9	57	0	8	0	0	24
Summer Programs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	202	31	184	0	34	1	6	82
% of # Reporting		17%			41%	1%	7%	

* Includes semester program workshops

Participant Citizenship

<i>As of June 20, 2011</i>			
Program Type	U.S. Citizens/Permanent Residents	Foreign Visitors	# Reporting Citizenship/Residency
Semester Programs*	73	61	134
Topical Workshops	51	9	60
Summer Programs	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A

TOTAL	124	70	194
% of # Reporting	64%	36%	

* Includes semester program workshops

Postdocs: Total Participants and Underrepresented Groups

<i>As of June 20, 2011</i>								
Program Type	Total Participants	Female	# Reporting Gender	American Indian	Asian	Black	Hispanic	# Reporting Ethnicity
Semester Programs* (ICERM Institute & Postdoc Fellows)	11	4	11	0	4	0	0	11
Semester Programs* (From Other Institutes)	6	1	6	0	1	0	1	6
Topical Workshops	3	0	3	0	1	0	0	2
Summer Programs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	9	1	9	0	2	0	1	8
% of # Reporting		11%			25%		12.5%	

* Includes semester program workshops

Postdocs: Citizenship

<i>As of June 20, 2011</i>			
Program Type	U.S. Citizens/Permanent Residents	Foreign Visitors	# Reporting Citizenship/Residency
Semester Programs* (ICERM Institute & Postdoctoral Fellows)	3	8	11
Semester Programs* (Participants)	4	2	6
Topical Workshops	2	1	3
Summer Programs	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A
TOTAL	6	3	9
% of # Reporting	66.6%	33.3%	

* Includes semester program workshops

In future years, postdoc participant comments will be included.

Graduate Students: Total Participants and Underrepresented Groups

<i>As of June 20, 2011</i>								
Program Type	Total Participants	Female	# Reporting Gender	American Indian	Asian	Black	Hispanic	# Reporting Ethnicity
Semester Programs*	19	4	18	0	8	0	1	14
Topical Workshops	8	1	7	0	3	0	0	7
Summer Programs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	27	5	25	0	11	0	1	21
% of # Reporting	N/A	20%	N/A	N/A	52%	N/A	4.7%	N/A

* Includes semester program workshops

Graduate Students: Citizenship

<i>As of June 20, 2011</i>			
Program Type	U.S. Citizens/Permanent Residents	Foreign Visitors	# Reporting Citizenship/Residency
Semester Programs*	13	6	19
Topical Workshops	7	1	8
Summer Programs	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A
TOTAL	20	7	27
% of # Reporting	74%	26%	

* Includes semester program workshops

In future years, ICERM expects to report on the number of IdeaLab applicants and the number selected to participate. Graduate student participant comments will be included.

Undergraduate Students: Total Participants and Underrepresented Groups

NOTE: ICERM will begin its summer undergraduate program in the summer of 2012.

<i>As of June 20, 2011</i>								
Program Type	Total Participants	Female	# Reporting	American Indian	Asian	Black	Hispanic	# Reporting

			Gender					Ethnicity
Semester Program*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Topical Workshops	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Summer Programs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
% of # Reporting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* Will include semester program workshops

Undergraduate Students: Citizenship

Program Type	U.S. Citizens/Permanent Residents	Foreign Visitors	# Reporting Citizenship/Residency
Semester Programs*	N/A	N/A	N/A
Topical Workshops	N/A	N/A	N/A
Summer Programs	N/A	N/A	N/A
IdeaLabs	N/A	N/A	N/A
TOTAL	N/A	N/A	N/A
% of # Reporting	N/A	N/A	N/A

* Will include semester program workshops

In future years, ICERM expects to report on the number of summer program applicants and the number selected to participate. Undergraduate student participant comments will be included.

Additional Participant Data

Anticipated Quantitative Data for Fall Semester Program 2011

ICERM is anticipating approximately 115 on-site participant visits (includes multiple visits for workshops). Of these, 110 will be distinct visitors: 80 will be faculty members, 2 will be a government or industry scientist, 2 will be ICERM institute fellows, 5 will be ICERM postdoctoral fellows, and 2 will be postdocs from other institutions; 19 will be graduate students.

Because we have not yet had our first program at ICERM (at the time of this report), we do not have complete data relating to the ethnicity of our participants. From the data that has been collected of our 110 pre-registered distinct visitors (data entered by ICERM staff, unless self-reported): 26 are Asian, 1 is black, 5 are Hispanic, 23 are white, 1 declines to report, and the remaining 54 are unknown.

Anticipated Quantitative Data for 2011-2012 Topical Workshops

ICERM will host three Topical Workshops in 2011-2012. Specific information known to date on each follows:

1. Mathematical Aspects of P versus NP and its Variants

This workshop currently has 31 unique visitors, and from preliminary data we can expect of these 31 that 1 is American Indian, 4 are Asian, and 11 are white, the remaining 15 are unknown at this time.

The field of study for these visitors varies; about $\frac{3}{4}$ of the visitors come from the Mathematical and Statistical Sciences research area (23), the remaining $\frac{1}{4}$ have an engineering (1) or computer science background (7).

ICERM has 3 graduate students who have applied to participate in this workshop and they will be joining 3 postdoctoral fellows along with 25 faculty members.

2. Cluster Algebras and Statistical Physics

This workshop currently has 27 unique visitors, and from preliminary data we can expect of these 27 that 4 are Asian, and 4 are white, the remaining 19 are unknown at this time.

The majority of research areas that these visitors study is Mathematical and Statistical Sciences (24), the remaining 3 are either unknown or from a computer science background (1).

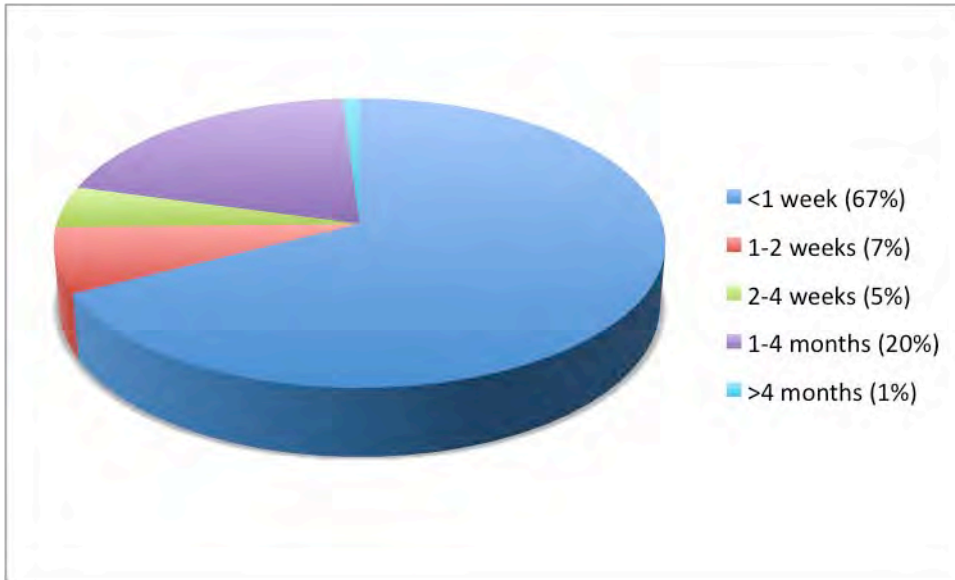
ICERM has accepted 5 graduate students who have applied to participate in this workshop and they will be joining 22 faculty members.

3. Synchronization-reducing and Communication-reducing Algorithms and Programming models for Large-scale Simulations

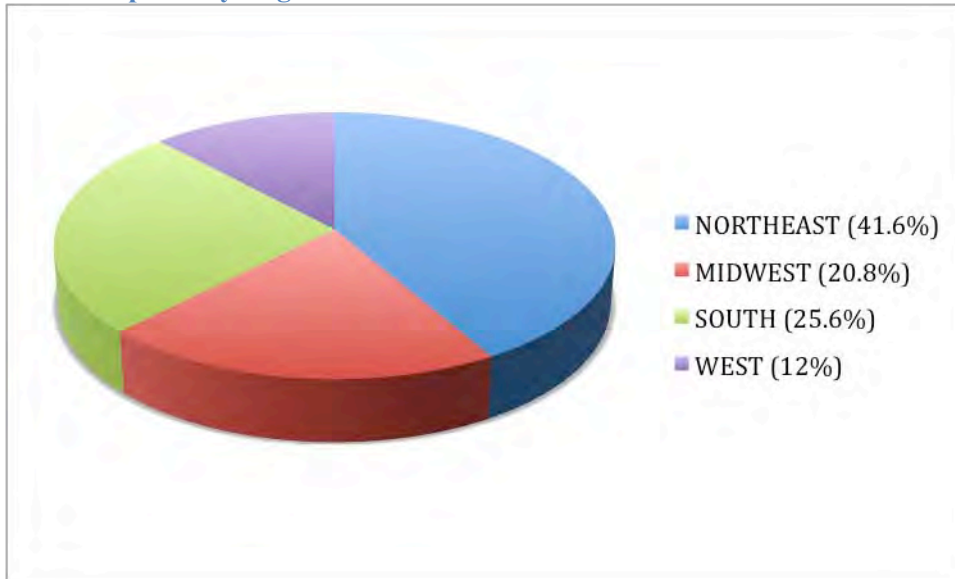
Participant data for this program was not available at time of report.

*Please note that the participant data displayed below is not final, as ICERM's first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use for future annual reports by using the data the institute has for **all** of its pre-registered participants (including organizers) as of June 20, 2011.*

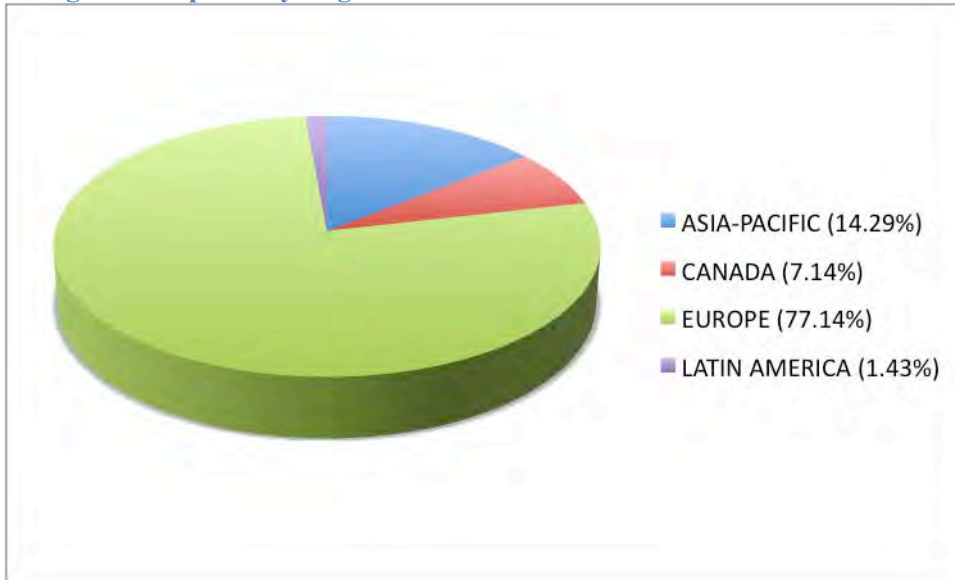
Length of Visits



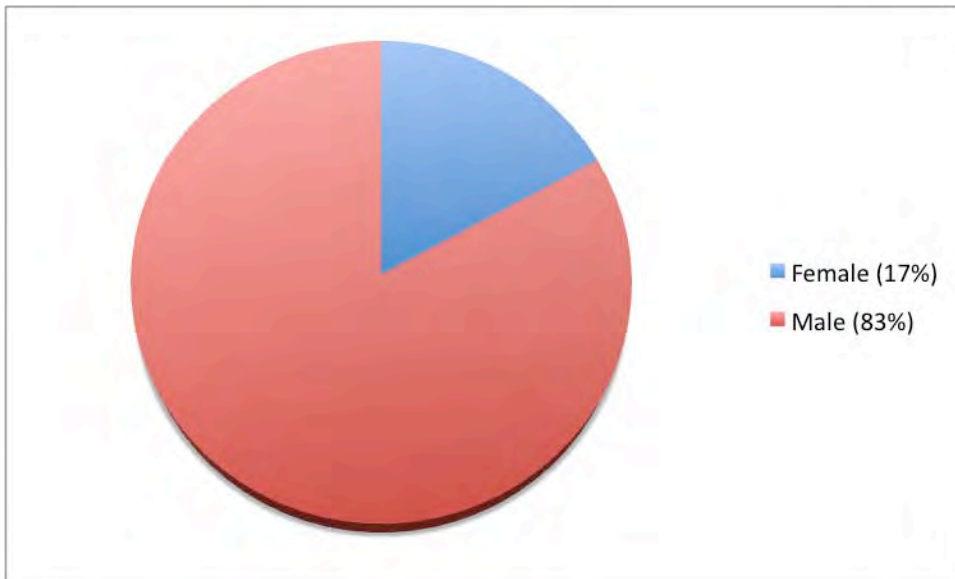
US Participants by Region:



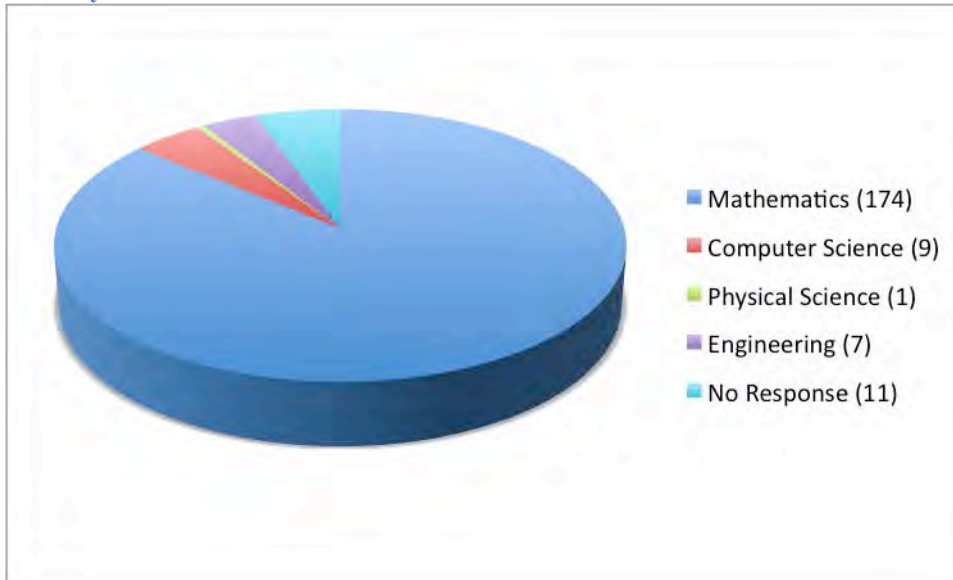
Foreign Participants by Region:



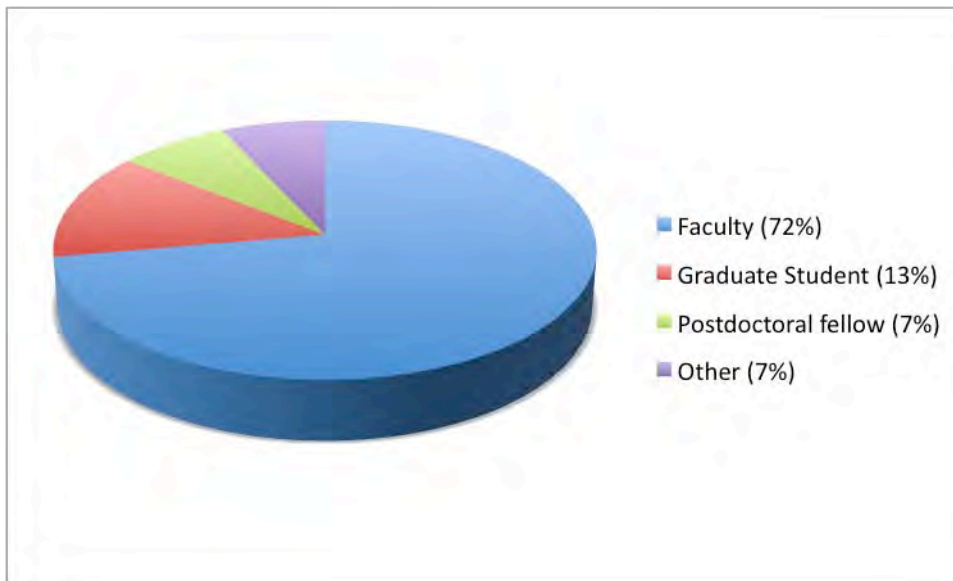
Gender:



Primary Field of Interest:



Academic Breakdown:



Semester Programs

Starting with its first semester program in September 2011, a large portion of the Institute's activity will take place in the context of semester long thematic programs together with their associated workshops. Each program will host a number of long-term visitors (5-10 senior personnel, 4-5 postdoctoral fellows, and 8 graduate students) in addition to workshop participants.

Semester Program Process

In anticipation of the institute award, the ICERM Scientific Advisory Board met by conference call in June 2010 to approve the institute's first year of programs, which were outlined in the original NSF proposal.

In the future, the program selection process will follow these steps:

1. Solicitation of Proposals:

Proposals for semester-long programs consist of 4-7 pages containing:

- a description of the program area/theme (written with a general mathematical audience in mind),
- a list of organizers (normally around 4-7),
- a "high-priority" list of potential participants (6-8)
- a main contact (chair) of organizing committee,
- a description of the proposed workshops (including potential organizers if possible),
- a discussion of the experimental and computational aspects of the program,
- the expected benefits of the proposed program,
- plans for involving and mentoring graduate students, postdocs, and early-career mathematicians,
- an assigned organizer responsible for coordination of mentoring,
- plans for ensuring the participation of underrepresented groups (organizers are expected to work with ICERM directors on diversity issues),
- White paper encouraged

2. Proposal Selection:

The Science Advisory Board (SAB) approves the semester programs. The deadline for proposals is early October, prior to the annual November SAB meeting. Once a proposal is accepted, an ICERM director and members of a SAB subcommittee will be assigned to assist the organizers. Program dates will be scheduled with details posted on the ICERM website and various on-line math organization calendars (SIAM, AMS, European Mathematical Society, National Math Institutes, and Conference Service Mandl). The "high priority" list of scientists are contacted, and invited to participate, immediately upon approval of the program and this list by the SAB.

From this point on, organizers will be involved in making decisions on postdoc selection; applications for long-term visitors, graduate students, and workshop participants; mentoring of students and postdocs (an institute director will assist organizers with mentor coordination). The chair of the organizing committee (or other designated organizer) will assist ICERM staff by providing appropriate program images for web and print ads, and may be asked to review marketing materials.

3. Selection of Long-term Visitors/Research Fellows

The organizers will propose a ranked list of 15 to 20 research fellows. ICERM directors will approve and/or suggest additions or re-rankings in consultation with assigned SAB members.

4. Offers to Research Fellows

Once the list of research fellows has been finalized and funding determined, an invitation will be sent to each. The invitation will describe the program and outline the support to be provided. Using its Discovery database, ICERM will track demographic information about, and all interactions with, research fellows.

5. Semester Workshops

The semester program proposal should include a list of organizers for each of the three workshops. The organizers will propose a ranked list of 15 to 20 possible speakers. The ICERM directors will approve and/or suggest additions or re-rankings in consultation with assigned SAB members. Formal invitations will be sent to those who indicate they can participate by ICERM staff describing the program and outlining the support to be provided.

The chair of each workshop's organizing committee (or other designated organizer) will assist ICERM staff by providing appropriate program images for the workshop's web and print ads, and may be asked to review marketing materials.

6. Application Process

Once the organizers and directors agree there is enough critical mass in terms of confirmed long-term visitors and/or workshop speakers, the on-line application for that particular program will be opened on the ICERM website. All applications are stored in our Application database. The postdoctoral fellow applicants who were not chosen will either automatically be entered into the online applicant pool, or they will be alerted that these positions have closed and that they should apply online for partial support to attend if they are still interested.

7. Applicant Selection

The Application database will allow program organizers, ICERM directors and staff to view each candidate's application. Every two weeks or so, the organizers will be asked to recommend a ranking of applicants for their program (graduate students, participants). ICERM directors will review the ranked list, re-rank as appropriate and make the final selections, taking into consideration the remaining budget for the program, diversity, participant support requested, and whether or not the applicant has an advisor already participating in the program. ICERM staff will then update the applicant about their status, and any support they are eligible for, as appropriate. This process continues until funds for the program run out.

Financial Decisions for Semester Programs

Financial decisions will be made by ICERM directors based on discussions with organizers. On average, the institute expects to provide partial or full support for 4 semester postdoctoral fellows and 6-10 graduate students per program. There is support for housing and travel support for around 10-15 long-term visitors (including organizers), who stay for 4 months, and around 20-25 short-term visitors, who stay for 1-4 weeks. In addition, there is support for workshop attendees. The institute also has very limited funds for stipends and buyout of teaching. Some funds are reserved for support for uninvited applicants. In general, ICERM will aim to help participants negotiate sabbatical leaves and teaching release from their departments to participate in institute programs.

Opening, "Middle" and Closing Events

Semester program opening and closing events will be tailored to each program. Here is a sample of the Kinetic Theory program's planned events:

Opening event:

- Morning: three lectures
- Afternoon: 15-minute presentations by the postdocs, plus 5-minute presentations by the grad students, designed to get everyone acquainted

Prior to each of the three workshops:

- Tutorials the week before each workshop, 2 hours on each of MWF
- Workshop invited lectures early in the day (MTuWThF)
- Later in the day, on MTuW, break up into smaller, more specialized groups to discuss open problems and new directions
- Later in the day on ThF, all get together to discuss ideas and new directions among all of the workshop participants together.

Non-workshop weeks:

- There would be one day each week with two or more lectures
- Postdocs and grad students would be mentored throughout the program

Final Event:

- To be determined

Upcoming Semester Programs



Front and back of flier advertising 2011-2012 semester programs

Fall Semester 2011: Kinetic Theory: Analysis and Computation

September 7, 2011 - December 9, 2011

Organizing Committee:

- Francis Filbet, Université de Lyons
- Irene Gamba, University of Texas
- Yan Guo, Brown University
- Chi-Wang Shu, Brown University
- Walter Strauss, Brown University

Program Description:

Kinetic theory plays a central role in many areas of mathematical physics, from nanoscales to continuum mechanics. It is an indispensable tool in the mathematical description of applications in physical and social sciences, from its origin in dilute gases, to wide applications such as semi-

conductors, polymers, cells, plasma, galaxies, traffic networking, and swarming. The number of particles is typically more than 10^{20} . On the one hand, kinetic models provide more detailed and accurate description of regimes where hydrodynamic equations are either invalid or simply not available. On the other hand, because modern computers are still inadequate in simulating the molecular or even quantum dynamics in emerging industrial needs in micro- and nanotechnology, kinetic equations provide models that can capture important features of microscopic or quantum phenomena with a manageable computational cost. Kinetic theory is at the core of multiscale modeling, which connects fundamental invisible microscopic models with macroscopic models. Many challenges remain in both the analysis and efficient computational techniques for such problems. This semester-long program in kinetic theory and computation will provide the participants with an introduction to a broad range of analytical and computational aspects of kinetic theory. The program will be centered around three broad topics, for each of which an international workshop will be held.

Workshop 1: Vlasov Models in Kinetic Theory

September 19-23, 2011

Organizing Committee:

Pierre Degond, CNRS Toulouse
Francis Filbet, Université de Lyon
Robert Glassey, Indiana University
Jingmei Qiu, University of Houston
Gerhard Rein, Universität Bayreuth

Confirmed Speakers:

Hakan Andreasson, Chalmers University
Francois Bolley, Université de Paris – Dauphine
Simone Calogero, Universidad de Granada
Jose Carrillo, Universitat Autònoma de Barcelona
Yingda Cheng, University of Texas – Austin
Alina Chertock, North Carolina State University
Andrew Christlieb, Michigan State University
Irene Gamba, University of Texas – Austin
Francois Golse, École Polytechnique, Paris
Hyung Hwang, Pohang University
Reinhard Illner, University of Victoria
Pierre-Emmanuel Jabin, Université de Nice
Mohammed Lemou, CNRS, Rennes
Antoine Mellet, University of Maryland
Phil Morrison, University of Texas – Austin
Alan Rendall, Max-Planck-Institut für Gravitationsphysik
Giovanni Russo, Università di Catania
Jack Schaeffer, Carnegie Mellon University
Eric Sonnendruker, Université de Strasbourg
Cedric Villani, Université de Lyon

Workshop Description:

Vlasov-type models deal with continua of particles where long range forces (such as electrostatic, electromagnetic, or gravitational forces) dominate the collisions among the particles, so that collisions can be ignored. They occur in physical plasmas, including astrophysical plasmas and fusion reactors. There are many examples of astrophysical plasmas of this type, such as the solar

wind. When a fusion reactor is very hot, the relevant times scales are so short that collisions can be ignored. Vlasov theory also models systems where the dominant force is gravity, such as clusters of stars or galaxies. This workshop is part of a semester long program on Kinetic Theory which is at the core of multiscale modeling and connects fundamental microscopic models with macroscopic models.

Workshop 2: Applications of Kinetic Theory and Computation

October 17-21, 2011

Organizing Committee:

Irene Gamba, University of Texas
Axel Klar, Technische Universität
Kaiserslautern
Benoit Perthame, Université Pierre et
Marie Curie
Christian Ringhofer, Arizona State University
Chi-Wang Shu, Brown University

Confirmed Speakers:

Martial Agueh, University of Victoria
Dieter Armbruster, Arizona State University
Vincent Calvez, École Normale
Supérieure de Lyon
Marie Doumic-Jauffret, INRIA
Miguel Escobedo, Universidad del País Vasco
Simone Göttlich, Universität Mannheim
Seung Ha, University of Maryland
Cory Hauck, Oak Ridge National Laboratory
Armando Majorana, Università di Catania
Peter Markowich, University of Cambridge
Lorenzo Pareschi, Università di Ferrara
Vlad Panferov, California State University
Kui Ren, University of Texas
Christian Schmeiser, University of Vienna
Ravi Srinivasan, University of Texas
Eitan Tadmor, University of Maryland
Mengping Zhang, University of Science and
Technology of China

Workshop Description:

There are several new fundamental and broad applications involving kinetic theory and computations. They range from mathematical physics models that may include nano scale device modeling involving kinetic and quantum charged transport, radiative transfer, conservative and dissipative phenomena in rarefied and grain and polymer flows. Novel applications appear in biological and social dynamical models of aggregation, chain supply and traffic dynamics, as well as statistical methods for multi-agent systems in control that have recently been extended to kinetic type models for particle swarms, networks or the dynamics of information.

New approaches to reduced dimensionality via hydrodynamic limits or moment methods are of special interest as well as novel computational techniques in kinetic dynamics and transport. Our

program will focus on recent developments in these areas in an attempt to set basic benchmarks in terms of analytical and numerical methods.

Workshop 3: Boltzmann Models in Kinetic Theory

November 7-11, 2011

Organizing Committee:

Kazuo Aoki, Kyoto University
Yan Guo, Brown University
Shi Jin, University of Wisconsin
Lorenzo Pareschi, University of Ferrara
Laure Saint-Raymond, Université Paris VI

Confirmed Speakers:

Diogo Arsenio, École Normale Supérieure
Laurent Desvillettes, École Normale
Supérieure de Cachan
Raffaele Esposito, Università di L'Aquila
Irene Gamba, University of Texas
Alejandro Garcia, San Jose State University
Cory Hauck, Oak Ridge National Laboratory
Frederic Herau, Université de Nantes
Juhi Jang, New York University
Chan Woo Kim, Brown University
Rossana Marra, Università di Roma 2
Nader Masmoudi, New York University
Stephane Mischler, Université de Paris-Dauphine
Anne Nouri, Université de Provence
Mario Pulvirenti, Università di Roma 1
Robert Strain, University of Pennsylvania
Henning Struchtrup, University of Victoria
Shigeru Takata, Kyoto University
Shih-Hsien Yu, National University of Singapore

Workshop Description:

The celebrated Boltzmann equation is the foundation of the kinetic theory for dilute collections of particles, which undergo elastic binary collisions. The Boltzmann theory is at the center of a series of multi-scaled physical models that connect microscopic multiparticle models to macroscopic fluid models such as the Navier-Stokes equations.

The Boltzmann theory provides a practical tool and machinery for deriving macroscopic models in broad physical applications. Due to its importance, there has been an explosion of mathematical studies, both theoretical and numerical, for the Boltzmann equation. A major open problem that remains is to determine whether or not smooth initial data would lead to a unique global-in-time solution of the Boltzmann equation. Nevertheless, there have been exciting new developments in recent years. As part of a semester long program on Kinetic Theory, this workshop will focus on bringing computational and theoretical people together to investigate problems of fundamental importance.



Posters advertising fall 2011 semester program workshops

Fall 2011 Participants by Length of Stay

Please note that the participant data displayed below is not final, as ICERM's first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use for future annual reports by using the data the institute has for its pre-registered participants (including organizers) as of June 20, 2011.

2011 Fall Semester Program Participants* by Length of Stay

Last Name	First Name	Institution Name	Primary Field of Interest	Anticipated Visit Length
Agueh	Martial	University of Victoria	Mathematical and Statistical Sciences	5
Albi	Giacomo	Universite di Ferrara	Mathematical and Statistical Sciences	34
Alcantara Felix	Jose Antonio	University of Granada	Mathematical and Statistical Sciences	21
Andreasson	Hakan	AAAS	Mathematical and Statistical Sciences	5
Aoki	Kazuo	Kyoto University	Engineering	61
Armbruster	Dieter	Arizona State University	Mathematical and Statistical Sciences	5
Arsenio	Diogo	Eâcole Normale Supérieure	Mathematical and Statistical Sciences	5
Bao	Weizhu	National University of Singapore	Mathematical and Statistical Sciences	34
Barbaro	Alethea	University of California	Mathematical and Statistical Sciences	3
Bardos	Claude	Universite de Paris VII (Denis Diderot)	Mathematical and Statistical Sciences	78
Bolley	Francois	Universite de Paris IX (Paris-Dauphine)	Mathematical and Statistical Sciences	5
Brull	Stephane	Universite de Bordeaux I	Mathematical and Statistical Sciences	6
Calogero	Simone	University of Granada	Mathematical and	14

			Statistical Sciences	
Calvez	Vincent	E�cole Normale Sup�rieure de Lyon		5
Calvo Yague	Juan	University of Granada	Mathematical and Statistical Sciences	6
Carlen	Eric	Rutgers University	Mathematical and Statistical Sciences	5
Carrillo	Jose	Autonomous University of Barcelona	Mathematical and Statistical Sciences	12
Cheng	Yingda	University of Texas	Mathematical and Statistical Sciences	12
Chertock	Alina	North Carolina State University		5
Christlieb	Andrew	Michigan State University	Mathematical and Statistical Sciences	15
Degond	Pierre	Centre National de la Recherche Scientifique (CNRS)	Mathematical and Statistical Sciences	19
Desvillettes	Laurent	E�cole Normale Sup�rieure de Cachan	Mathematical and Statistical Sciences	5
Doumic-Jauffret	Marie	Institut National de Recherche en Informatique Automatique (INRIA)-Lorraine	Mathematical and Statistical Sciences	5
Escobedo	Miguel	Universidad del Pais Vasco	Mathematical and Statistical Sciences	5
Esposito	Raffaele	Universita di L'Aquila	Mathematical and Statistical Sciences	12
Filbet	Francis	Universite de Lyon II	Mathematical and Statistical Sciences	51
G�ttlich	Simone	Universitat Mannheim	Mathematical and Statistical Sciences	5
Gamba	Irene	University of Texas	Mathematical and Statistical Sciences	65
Garcia	Alejandro	San Jose State University	Physical Sciences	5
Glassey	Robert	Indiana University	Mathematical and Statistical Sciences	6
Golse	Francois	E�cole Polytechnique	Mathematical and Statistical Sciences	5
Gualdani	Maria	University of Texas	Mathematical and Statistical Sciences	5
Guo	Wei	Colorado School of Mines	Mathematical and Statistical Sciences	93
Guo	Yan	Brown University	Mathematical and Statistical Sciences	93
Ha	Seung	University of Maryland	Mathematical and Statistical Sciences	5
Hadjiconstantinou	Nicolas	Massachusetts Institute of Technology	Engineering	4
Hauck	Cory	Oak Ridge National Laboratory	Mathematical and Statistical Sciences	8
He	Andong	Pennsylvania State University	Mathematical and Statistical Sciences	273
Herau	Frederic	Universite de Nantes	Mathematical and	5

			Statistical Sciences	
Hu	Jingwei	University of Wisconsin	Mathematical and Statistical Sciences	6
Hwang	Hyung	Pohang University of Science and Technology (POSTECH)	Mathematical and Statistical Sciences	5
Illner	Reinhard	University of Victoria	Mathematical and Statistical Sciences	5
Jabin	Pierre-Emmanuel	Universite de Nice Sophia Antipolis	Mathematical and Statistical Sciences	5
Jang	Juhi	New York University	Mathematical and Statistical Sciences	121
Jin	Shi	University of Wisconsin	Mathematical and Statistical Sciences	5
Johnson	Evan	University of Wisconsin	Mathematical and Statistical Sciences	4
Kim	Chanwoo	Brown University	Mathematical and Statistical Sciences	13
Klar	Axel	Universitat Kaiserslautern	Mathematical and Statistical Sciences	5
Lee	Ji	Korea Advanced Institute of Science and Technology	Mathematical and Statistical Sciences	7
Lee	Ed	Katholieke Universiteit Leuven	Mathematical and Statistical Sciences	25
Lemou	Mohammed	Centre National de la Recherche Scientifique (CNRS)	Mathematical and Statistical Sciences	5
Levermore	David	University of Maryland	Mathematical and Statistical Sciences	60
Levy	Alon	Columbia University	Mathematical and Statistical Sciences	246
Li	Fengyan	Rensselaer Polytechnic Institute	Mathematical and Statistical Sciences	86
Li	Qin	University of Wisconsin	Mathematical and Statistical Sciences	6
Li	Tong	University of Iowa	Mathematical and Statistical Sciences	5
Lin	Zhiwu	Georgia Tech College of Computing	Mathematical and Statistical Sciences	13
Majorana	Armando	Universita di Catania		5
Markowich	Peter	University of Cambridge	Mathematical and Statistical Sciences	5
Marra	Rossana	Universita di Roma La Sapienza	Mathematical and Statistical Sciences	12
Masmoudi	Nader	New York University	Mathematical and Statistical Sciences	5
Mellet	Antoine	University of Maryland	Mathematical and Statistical Sciences	5
Mischler	Stephane	Universite de Paris IX (Paris-Dauphine)	Mathematical and Statistical Sciences	5
Morales	Jose	University of Texas		54
Morrison	Phil	University of Texas	Mathematical and Statistical Sciences	5
Motsch	Sebastien	University of Maryland	Mathematical and	5

			Statistical Sciences	
Mouhot	Clement	University of Cambridge	Mathematical and Statistical Sciences	24
Nouri	Anne	Universite d'Aix-Marseille I (Universite de Provence)	Mathematical and Statistical Sciences	60
Panferov	Vlad	California State University	Mathematical and Statistical Sciences	5
Pankavich	Stephen	University of Texas	Mathematical and Statistical Sciences	6
Pareschi	Lorenzo	Universita di Ferrara	Mathematical and Statistical Sciences	15
Perthame	Benoit	Universite de Paris VI (Pierre et Marie Curie)	Mathematical and Statistical Sciences	5
Pulvirenti	Mario	Universita di Roma La Sapienza	Mathematical and Statistical Sciences	5
Qiu	Jingmei	University of Houston	Mathematical and Statistical Sciences	101
Rambaud	Amelie	Institut Camille Jordan, Universite Lyon 1	Mathematical and Statistical Sciences	91
Rein	Gerhard	Universitat Bayreuth	Mathematical and Statistical Sciences	5
Ren	Kui	University of Texas	Computer Science	5
Rendall	Alan	Max Planck Institute fur Gravitationsphysik, Albert-Einstein-Institut	Mathematical and Statistical Sciences	5
Rey	Thomas	Universite Claude-Bernard (Lyon I)	Mathematical and Statistical Sciences	25
Reyna	Matthew	Rensselaer Polytechnic Institute	Mathematical and Statistical Sciences	97
Ringhofer	Christian	Arizona State University	Mathematical and Statistical Sciences	5
Russo	Giovanni	Universita di Catania	Mathematical and Statistical Sciences	5
Saint-Raymond	Laure	Centre National de la Recherche Scientifique (CNRS)	Mathematical and Statistical Sciences	5
Sanchez	Oscar	University of Granada	Mathematical and Statistical Sciences	7
Schaeffer	Jack	Carnegie-Mellon University	Mathematical and Statistical Sciences	5
Schmeiser	Christian	University of Vienna	Mathematical and Statistical Sciences	5
Shu	Chi-Wang	Brown University	Mathematical and Statistical Sciences	93
Sohinger	Vedran	Pennsylvania State University	Mathematical and Statistical Sciences	5
Sonnendrucker	Eric	Universite de Strasbourg I (Louis Pasteur)	Mathematical and Statistical Sciences	5
Srinivasan	Ravi	University of Texas	Mathematical and Statistical Sciences	5
Strain	Robert	University of Pennsylvania	Mathematical and Statistical Sciences	70
Strauss	Walter	Brown University	Mathematical and Statistical Sciences	93

Struchtrup	Henning	University of Victoria	Engineering	5
Tadmor	Eitan	University of Maryland	Mathematical and Statistical Sciences	5
Takata	Shigeru	Kyoto University	Engineering	5
Tran	Minh-Binh	Universite de Paris XIII (Paris-Nord)	Mathematical and Statistical Sciences	24
Van Vels	Kent	University of Texas	Mathematical and Statistical Sciences	54
Villani	Cedric	Universite de Lyon II	Mathematical and Statistical Sciences	10
Wang	Li	University of Wisconsin	Mathematical and Statistical Sciences	6
Wheeler	Miles	Brown University	Mathematical and Statistical Sciences	53
Xing	Yulong	Oak Ridge National Laboratory		8
Xu	Yang	New York University	Mathematical and Statistical Sciences	5
Yan	Bokai	University of Wisconsin	Mathematical and Statistical Sciences	55
Yang	He	Rensselaer Polytechnic Institute	Mathematical and Statistical Sciences	95
Yano	Takeru	Osaka University	Engineering	6
Yu	Shih-Hsien	National University of Singapore	Mathematical and Statistical Sciences	5
Zhang	Chenglong	University of Texas	Mathematical and Statistical Sciences	61
Zhang	Mengping	University of Science and Technology of China	Mathematical and Statistical Sciences	5
Zhu	Keya	Pennsylvania State University	Mathematical and Statistical Sciences	6

* Includes ICERM Institute and Postdoctoral Fellows

In future years, participant comments will be included.

Spring Semester 2012: Complex and Arithmetic Dynamics

January 30 - May 4, 2012

Organizing Committee:

Rob Benedetto, Amherst College

Laura DeMarco, University of IL/ Chicago

Mikhail Lyubich, SUNY Stony Brook

Juan Rivera-Letelier, Pontificia Universidad Católica de Chile

Joseph Silverman, Brown University

Lucien Szpiro, City University of NY

Michael Zieve, University of Michigan

Program Description:

The goal of this program is to bring together researchers in complex dynamics, arithmetic dynamics, and related fields, with the purpose of stimulating interactions, promoting collaborations, making progress on fundamental problems, and developing theoretical and

computational foundations on which future work will build. Complex dynamics is the study of iteration of holomorphic self-maps of a complex space. Fundamental examples of such maps arise as algebraic self-maps of algebraic varieties. Starting with the fundamental results of Fatou and Julia, complex dynamics has evolved into a well-established field with many deep theorems and many important unresolved questions. Arithmetic dynamics refers to the study of number theoretic phenomena arising in dynamical systems on algebraic varieties. Many global problems in arithmetic dynamics are analogues of classical problems in the theory of Diophantine equations or arithmetic geometry, including for example uniform bounds for rational periodic points, intersections of orbits with subvarieties, height bounds and/or measure-theoretic distributions of dynamically defined sets of special points, and local-global obstructions.

While global arithmetic dynamics bears a resemblance to arithmetic geometry, the theory of p -adic (nonarchimedean) dynamics draws much of its inspiration from classical complex dynamics. As in complex dynamics, a fundamental question is to characterize orbits by their topological or metric properties. Recent progress in p -adic dynamics, especially in dimension one, has benefited from the introduction of Berkovich space into the subject.

Many computational and graphical techniques have been developed for the study of complex dynamics that have been of immense value in the development of the complex theory. Among the goals of the program will be the development of a comprehensive set of tools for studying p -adic and arithmetic dynamics.

Workshop 1: Complex and p -adic Dynamics

February 13-17, 2012

Program Organizers:

Matthew Baker, Georgia Institute of Technology
Rob Benedetto, Amherst College
Charles Favre, Ecole Polytechnique
Kevin Pilgrim, Indiana University
Juan Rivera-Letelier, Pontificia Universidad Catolica de Chile

Program Description:

This workshop will bring together researchers working in classical complex dynamics and in the newer area of p -adic (nonarchimedean) dynamics. Posing several problem sets, it will promote interactions between the two groups by highlighting the similarities and differences between complex and p -adic dynamics. In particular, it will address Berkovich space, whose introduction has greatly enhanced the exchange of ideas between complex and p -adic dynamics.

Workshop 2: Global Arithmetic Dynamics

March 19-23, 2012

Program Organizers:

Xander Faber, University of Georgia
Michelle Manes, University of Hawaii
Lucien Szpiro, City University of New York
Thomas Tucker, University of Rochester
Michael Zieve, University of Michigan

Program Description:

The aim of this workshop is to bring together leading researchers in global arithmetic dynamics and related fields to discuss recent result. In particular, we hope to attract researchers who work in arithmetic geometry, algebraic geometry, model theory, and computational algebra and number theory, with the dual goals of introducing the field of arithmetic dynamics and encouraging interactions among people working in these varied fields.

Workshop 3: Moduli Spaces Associated to Dynamical Systems

April 16-20, 2012

Program Organizers:

Laura DeMarco, University of Illinois at Chicago
 Sarah Koch, Harvard University
 Curt McMullen, Harvard University
 Joseph Silverman, Brown University

Program Description:

The workshop will use a series of problem sets to explore the following: the set of rational self-maps of P^n of degree d , which is denoted Rat_d^n , has a natural structure as an affine variety. The group PGL_{n+1} acts by conjugation on Rat_d^n , and the quotient space is the dynamical moduli space M_d^n .

Spring Participants by Length of Stay

Please note that the participant data displayed below is not final, as ICERM's first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use for future annual reports by using the data the institute has for its pre-registered participants (including organizers) as of June 20, 2011.

2012 Spring Semester Program Participants* by Length of Stay

Last Name	First Name	Institution Name	Primary Field of Interest	Anticipated Visit Length
Baker	Matthew	Georgia Institute of Technology	Mathematical and Statistical Sciences	5
Benedetto	Rob	Amherst College	Mathematical and Statistical Sciences	97
Bonifant	Araceli	University of Rhode Island	Mathematical and Statistical Sciences	69
Buff	Xavier	Universite de Toulouse III (Paul Sabatier)	Mathematical and Statistical Sciences	151
Chatzidakis	Zoe	Universite de Paris VII (Denis Diderot)	Mathematical and Statistical Sciences	45
Cheritat	Arnaud	Universite de Toulouse III (Paul Sabatier)		29
DeMarco	Laura	University of Illinois	Mathematical and Statistical Sciences	97
Faber	Xander	University of Georgia	Mathematical and Statistical Sciences	5
Favre	Charles	Eâcole Polytechnique	Mathematical and Statistical Sciences	5
He	Andong	Pennsylvania State University	Mathematical and Statistical Sciences	273

Kahn	Jeremy	SUNY	Mathematical and Statistical Sciences	95
Levy	Alon	Columbia University	Mathematical and Statistical Sciences	246
Lyubich	Mikhail	SUNY	Mathematical and Statistical Sciences	97
Manes	Michelle	University of Hawaii	Mathematical and Statistical Sciences	95
McMullen	Curt	Harvard University		5
Milnor	John	SUNY	Mathematical and Statistical Sciences	69
Pilgrim	Kevin	Indiana University		5
Rivera-Letelier	Juan	Pontificia Universidad Catolica de Chile	Mathematical and Statistical Sciences	96
Rumley	Robert	University of Georgia	Mathematical and Statistical Sciences	95
Silverman	Joseph	Brown University	Mathematical and Statistical Sciences	97
Szpiro	Lucien	City University of New York (CUNY)	Mathematical and Statistical Sciences	15
Tucker	Thomas	University of Rochester	Mathematical and Statistical Sciences	95
Yoccoz	Jean-Christophe	Royal Institute of Technology (KTH)		12
Zieve	Michael	University of Michigan	Mathematical and Statistical Sciences	97

* Includes ICERM Institute and Postdoctoral Fellows

In future years, participant comments will be included.

Fall Semester 2012: Computational Challenges in Probability

September 5 – December 7, 2012

Organizing Committee:

Paul Dupuis, Brown University
Roger Ghanem, University of Southern California
George Karniadakis, Brown University
Kavita Ramanan, Brown University
Boris Rozovsky, Brown University
Eric Vanden-Eijnden, New York University

Program Description:

The semester-long program in Computational Challenges in Probability aims to bring together leading experts and young researchers who are advancing the use of probabilistic and computational methods to study complex models in a variety of fields. The goal is to identify common challenges, exchange existing tools, reveal new application areas and forge new collaborative efforts. The program will be centered around three topics, for each of which an international workshop will be held.

Workshop 1: Bayesian Nonparametrics

September 17-21, 2012

Program Organizers:

Stuart Geman, Brown University

Matthew Harrison, Brown University

Michael Jordan, UC Berkeley

Erik Sudderth, Brown University

Program Description:

Data-rich investigations need advanced tools for allowing data to inform and interact with models. Bayesian Nonparametrics is a rapidly growing subfield of statistics and machine learning that provides a framework for creating complex statistical models that are both expressive and tractable. Recent, successful applications of nonparametric Bayesian models across a variety of domains suggests that these models have the potential for wide use. The challenge of constructing and using models on very high dimensional or even infinite dimensional spaces creates many opportunities for fruitful interactions between mathematicians, statisticians and computer scientists. Areas of interest include prior construction, posterior inference, posterior asymptotics, algorithmic development, and practical applications.

Workshop 2: Uncertainty Quantification

October 8-12, 2012

Program Organizers:

Roger Ghanem, University of Southern California

George Karniadakis, Brown University

Boris Rozovsky, Brown University

Program Description:

Rapid growth in computational resources has heightened the expectation that scientific knowledge can indeed be a driver for societal well-being and betterment. At the same time, our ability to measure the natural and social world around has significantly increased, aided by technological development in sensors, the internet, and other modalities of communication. Science is thus faced, simultaneously, with a complex description of reality at an unprecedented resolution, and the possibility to describe this reality with mathematical models of increasing complexity. Probabilistic formulations of physical problems can be viewed as attempts to adapt rational procedures to this complexity, while tackling the conceptual challenges they inevitably present. As a testament to the significance of this confluence of mathematics, science, and technology, Uncertainty Quantification is arguably one of the fastest growing sub-disciplines in mechanics.

The communities of computational science, stochastic analysis, and statistics have evolved largely along distinct paths. To forge ahead, however, in the direction of transformative scientific impact, requires symbiotic exchange and collaboration. It is the intent of this Workshop on Uncertainty Quantification to bring together leading researchers in these three fields in order to delineate new horizons and forge new synergies that will accelerate the evolution of UQ capabilities to become an enabler of scientific and economic progress.

Workshop 3: Monte Carlo Methods in the Physical and Biological Sciences

October 29-November 2, 2012

Program Organizers:

Bruce Berne, Columbia University
Jimmie Doll, Brown University
Paul Dupuis, Brown University
Eric Vanden-Eijnden, New York University
Hui Wang, Brown University

Program Description:

Monte Carlo methods are one of the main tools used to study the properties of complex physical, chemical and biological systems. Since their introduction in the late 1940s, these methods have undergone a remarkable expansion and are now used in many other fields, including statistical inference, engineering, and computer science. However, the design and theoretical understanding of Monte Carlo methods is still a challenging topic, especially for those problems where rare events play the key role in determining algorithm performance. The aim of the workshop is to bring together specialists in the application areas who understand the specific challenges posed by realistic problems and have developed sophisticated tools to tackle these problems, and mathematicians developing methods for algorithm analysis, abstraction, and optimization.

Please note that at the time of this report's submittal, no participant data had been collected for this event.

In future years, participant comments will be included.

Spring Semester 2013: Automorphic Forms, Combinatorial Representation Theory and Multiple Dirichlet Series

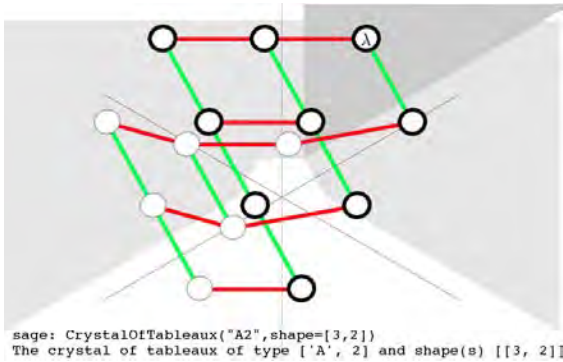
January 28 – May 3, 2013

Organizing Committee:

Sara Billey, University of Washington
Ben Brubaker, MIT
Daniel Bump, Stanford University
Gautam Chinta, City College of New York
Sol Friedberg, Boston College
Dorian Goldfeld, Columbia University
Jeff Hoffstein, Brown University
Anne Schilling, UC Davis
Nicolas Thiery, Université Paris Sud

Program Description:

This semester-long program will explore this interface between automorphic forms and combinatorial representation theory, and will develop computational tools for facilitating investigations. On the automorphic side, Whittaker functions on p -adic groups and their covers are the fundamental objects. Whittaker functions and their relatives are expressible in terms of combinatorial structures on the associated L -group, its flag variety, or Schubert varieties. In the combinatorial theory crystal graphs, Demazure characters, the Schubert calculus and Kazhdan-Lusztig theory all enter. The program will be centered around three topics, for each of which an international workshop will be held.



Composite image represents the three aspects of the program, analytic, algebraic and computational. Image shows the analytic continuation of a double Dirichlet series from the region of absolute convergence (dark gray) to the 2-dimensional complex domain by application of Bochner's convexity principle. Superimposed on this is a Demazure character on a crystal graph, and the Sage command that creates the crystal. [Courtesy of D. Bump]

Workshop 1: Sage Days: Multiple Dirichlet Series, Combinatorics, and Representation Theory

February 11-15, 2013

Program organizers and description for this workshop are to be determined.

Workshop 2: Crystals and Whittaker Functions

March 11-15, 2013

Program organizers and description for this workshop are to be determined.

Workshop 3: Combinatorics, Multiple Dirichlet Series and Analytic Number Theory

April 15-19, 2013

Program organizers and description for this workshop are to be determined.

Please note that at the time of this report's submittal, no participant data had been collected for this event.

In future years, participant comments will be included.

Topical Workshops

At its November 2010 meeting, the Scientific Advisory Board selected three workshops, among the five proposals presented.

1. Solicitation of Topical Workshop Proposals:

Proposals for topical workshops contain:

- a description of the program area/theme (written with a general mathematical audience in mind),
- a list of organizers (normally around 4-7),
- a main contact (chair) of organizing committee,
- a discussion of the experimental and computational aspects of the program,

- the expected benefits of the proposed program,
- plans for ensuring the participation of underrepresented groups (organizers are expected to work with ICERM directors on diversity issues),
- White paper encouraged

2. Proposal Selection:

The Science Advisory Board (SAB) approves the topical workshops. The deadline for proposals is early October, prior to the annual November SAB meeting. Program dates will be scheduled with details posted on the ICERM website and various on-line math organization calendars (SIAM, AMS, European Mathematical Society, National Math Institutes).

From this point on, applications for graduate students and workshop participants will be considered; the chair of the workshop organizing committee (or other designated organizer) will assist ICERM staff by providing appropriate program images for web and print ads, and may be asked to review marketing materials.

3. Recommendation of Speakers

The organizers will propose a ranked list of 15 to 20 speakers, which the ICERM directors will approve and/or suggest additions or re-rankings in consultation with SAB members.

4. Invitations to Speakers

Once the list of workshop speakers has been finalized and funding determined, an invitation will be sent to each. The invitation will describe the workshop and outline the support to be provided. Using its Discovery database, ICERM will track demographic information about, and all interactions with, speakers.

5. Application Process

Once the organizers and directors agree there is enough critical mass in terms of confirmed speakers, the on-line application for that particular workshop will be opened on the ICERM website. All applications will automatically be synced with ICERM's Discovery database.

6. Applicant Selection

The Discovery database will allow workshop organizers, ICERM directors and staff to view each candidate's application. Every two weeks or so, the organizers will be asked to recommend a ranking of applicants for their program (graduate students, participants). ICERM directors will review the ranked list, re-rank as appropriate and make the final selections, taking into consideration the remaining budget for the program, diversity, participant support requested. ICERM staff will then update the applicant about their status, and any support they are eligible for, as appropriate. This process continues until funds for the program run out.

Financial Decisions for Topical Workshops

Financial decisions will be made by ICERM directors based on discussions with organizers. There is support for housing and travel support for around 20-25 speakers (including organizers), who stay for 1 week. The institute reserves some funds to support uninvited applicants.

Upcoming Topical Workshops

ICERM will host 3 workshops in 2011-2012. They focus on topics of current interest in the mathematical sciences.

ICERM
Institute for Computational and Experimental Research in Mathematics

Mathematical Aspects of P versus NP and its Variants
TOPICAL WORKSHOP • AUGUST 1-5, 2011

Organizing Committee
Saugata Basu, Purdue University
JM Landsberg, Texas A&M
J. Maurice Rojas, Texas A&M

Description
This workshop will bring together computer scientists and mathematicians to examine the P v. NP problem and its variants from the perspectives of algebra, geometry, and number theory, and to introduce the mathematical aspects of these questions to a larger audience. Diverse researchers working on different aspects of these problems will clarify connections between different approaches.

Confirmed Invited Participants

Eric Bach, University of Wisconsin	Peter Scheiblechner, Purdue University
Lenore Blum, Carnegie Mellon University	Michael Shub, University of Toronto
Jin Cai, University of Wisconsin	Andrew Snowden, Massachusetts Institute of Technology
Kirsten Eisenträger, Pennsylvania State University	Milind Sohoni, Indian Institute of Technology
John Grochow, University of Chicago	Luca Trevisan, Stanford University
Leonid Gurvits, Los Alamos National Laboratory	Leslie Valiant, Harvard University
Pascal Koiran, École Normale Supérieure de Lyon	Jerzy Weyman, Northeastern University
Shrawan Kumar, University of North Carolina	Ke Ye, Texas A & M University
Jeffrey Lagarias, University of Michigan	Thomas Zick, Louisiana State University
Jason Morton, Pennsylvania State University	

<http://icerm.brown.edu>

Topical Workshop #1: Mathematical Aspects of P versus NP and its Variants
August 1-5, 2011

Organizing Committee:
Saugata Basu, Purdue University
JM Landsberg, Texas A&M
J. Maurice Rojas, Texas A&M

Description:
This workshop will bring together computer scientists and mathematicians to examine the P v. NP problem and its variants from the perspectives of algebra, geometry, and number theory, and to introduce the mathematical aspects of these questions to a larger audience. Diverse researchers working on different aspects of these problems will clarify connections between different approaches.

There will be two main topics: Analogues of P v. NP (e.g., Valiant's conjectures, the Mulmuley-Sohoni Conjecture, the BSS model, and other computational models); and Algebraic, Number Theoretic, and Geometric Aspects of P v. NP (e.g., Holographic algorithms, characterizations of NP in terms of sheaf cohomology, sparse polynomials, and other arithmetic approaches).

The workshop will emphasize the “work” aspect, so there will be few scheduled lectures, with extensive discussion periods, and follow-up lectures scheduled impromptu as needed.

Confirmed Speakers and Invited Participants:

- Eric Bach, University of Wisconsin
- Lenore Blum, Carnegie Mellon University
- Jin Cai, University of Wisconsin
- Kirsten Eisenträger, Pennsylvania State University
- John Grochow, University of Chicago
- Leonid Gurvits, Los Alamos National Laboratory
- Pascal Koiran, École Normale Supérieure de Lyon
- Shrawan Kumar, University of North Carolina
- Jeffrey Lagarias, University of Michigan
- Jason Morton, Pennsylvania State University
- Peter Scheiblechner, Purdue University
- Michael Shub, University of Toronto
- Andrew Snowden, Massachusetts Institute of Technology
- Milind Sohoni, Indian Institute of Technology
- Luca Trevisan, Stanford University
- Leslie Valiant, Harvard University
- Jerzy Weyman, Northeastern University
- Ke Ye, Texas A & M University

Topical Workshop (P vs NP) Participants by Length of Stay

Please note that the participant data displayed below is not final, as ICERM’s first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use

for future annual reports by using the data the institute has for its pre-registered participants (including organizers) as of June 20, 2011.

Last Name	First Name	Institution Name	Primary Field of Interest	Anticipated Visit Length
Bach	Eric	University of Wisconsin	Computer Science	5
Basu	Saugata	Purdue University	Mathematical and Statistical Sciences	5
Blum	Lenore	Carnegie-Mellon University	Computer Science	5
Cai	Jin Yi	University of Wisconsin	Computer Science	5
Chattopadhyay	Arkadev	University of Toronto	Mathematical and Statistical Sciences	5
Cheng	Qi	University of Oklahoma	Computer Science	5
Eisentrager	Kirsten	Pennsylvania State University	Mathematical and Statistical Sciences	5
Grochow	Josh	University of Chicago	Mathematical and Statistical Sciences	5
Gurvits	Leonid	Los Alamos National Laboratory	Mathematical and Statistical Sciences	5
Hallgren	Sean	Pennsylvania State University	Computer Science	5
Kadish	Harlan	University of Michigan	Mathematical and Statistical Sciences	6
Kahrobaei	Delaram	City University of New York (CUNY)	Mathematical and Statistical Sciences	6
Koiran	Pascal	Ecole Normale Supérieure de Lyon	Mathematical and Statistical Sciences	5
Krul	Michael	University of Rhode Island	Mathematical and Statistical Sciences	4
Kumar	Shrawan	University of North Carolina	Mathematical and Statistical Sciences	5
Lagarias	Jeffrey	University of Michigan	Mathematical and Statistical Sciences	5
Landsberg	Joseph	Texas A & M University	Mathematical and Statistical Sciences	5
Morton	Jason	Pennsylvania State University	Mathematical and Statistical Sciences	5
Rojas	J. Maurice	Texas A & M University	Mathematical and Statistical Sciences	5
Rusek	Korben	Texas A & M University	Mathematical and Statistical Sciences	5
Scheiblechner	Peter	Purdue University	Mathematical and Statistical Sciences	5
Shub	Michael	University of Toronto	Mathematical and Statistical Sciences	5
Snowden	Andrew	Massachusetts Institute of Technology	Mathematical and Statistical Sciences	5
Sohoni	Milind	Indian Institute of Technology	Engineering	5
Teitelbaum	Jeremy	University of Connecticut	Mathematical and Statistical Sciences	4
Thoma	Lubos	University of Rhode Island	Mathematical and	4

			Statistical Sciences	
Trevisan	Luca	Stanford University	Computer Science	5
Valiant	Leslie	Harvard University	Computer Science	5
Weyman	Jerzy	Northeastern University	Mathematical and Statistical Sciences	5
Ye	Ke	Texas A & M University	Mathematical and Statistical Sciences	5
Zell	Thierry	Lenoir-Rhyne	Mathematical and Statistical Sciences	5

In future years, participant comments will be included.

ICERM
Institute for Computational and Experimental Research in Mathematics

Cluster Algebras and Statistical Physics
TOPICAL WORKSHOP • AUGUST 15-19, 2011

Organizing Committee
Lauren Williams, UC Berkeley
David Wilson, Microsoft Research

Description
Cluster algebras are commutative algebras with a distinguished set of generators grouped into overlapping subsets of fixed cardinality; the generators and the relations among them are not given from the outset, but are produced by an iterative process of successive mutations. These algebras were developed in an attempt to create an algebraic framework for dual canonical bases and total positivity in semisimple groups. Another motivation came from the “Laurent phenomenon,” in which certain a priori rational functions defined by “exchange relations” turn out to always be Laurent polynomials. Cluster algebras encode a surprisingly widespread range of phenomena in settings as diverse as quiver representations, Teichmüller theory, invariant theory, tropical calculus, Poisson geometry, and polyhedral combinatorics. This workshop will explore the connection between cluster algebras and various topics in statistical physics, including the dimer model on surfaces, integrable systems such as the KP equation, and certain dynamical systems (Y- and Q-systems) which play an important role in the theory of the thermodynamic Bethe Ansatz.

Confirmed Speakers
Sergey Fomin, University of Michigan
Philippe di Francesco, Saclay (CEA)
Michael Gekhtman, University of Notre Dame
Max Glick, University of Michigan
Andrew Hone, University of Kent at Canterbury
Rinat Kedem, University of Illinois at Urbana-Champaign
Bernhard Keller, Université de Paris VII (Jussieu)
Richard Kenyon, Brown University
Yuji Kodama, Ohio State University
Kyoungsook Lee, University of Connecticut
Karim Mészáros, MIT/University of Michigan
Jon Morrow, University of Washington
Greg Musiker, University of Minnesota
James Propp, University of Massachusetts
Ralf Schilling, University of Connecticut
Michael Shapiro, Michigan State University
Kelli Taniaka, University of California, Berkeley
Dylan Thurston, Columbia University
Andrei Zelevinsky, Northeastern University

Participation: Most ICERM workshops are aimed at students who have, or are pursuing, a doctoral degree and are actively involved in the topic of the workshop. To request an invitation to an ICERM workshop, please e-mail us at icerm@brown.edu. Support for travel expenses may be provided. Students should include applications and transcripts with their request. ICERM requests resumes and members of undergraduate societies to apply. More information and an application form are available on our website.

About ICERM: The Institute for Computational and Experimental Research in Mathematics (ICERM) is a National Science Foundation Math Preceptor Group at Brown University of Providence, RI. Its mission is to conduct the advanced research, education and computation, to assist the use of computational and experimental methods in mathematics, to attract talented students, and to provide a supportive and address problems posed by the mathematical use of the computer through the use of research, teaching and outreach. For more information, visit our website at <http://www.icerm.brown.edu>.

<http://icerm.brown.edu>

Topical Workshop #2: Cluster Algebras and Statistical Physics

August 15-19, 2011

Organizing Committee:

Lauren Williams, UC Berkeley

David Wilson, Microsoft Research

Description:

Cluster algebras are commutative algebras with a distinguished set of generators grouped into overlapping subsets of fixed cardinality; the generators and the relations among them are not given from the outset, but are produced by an iterative process of successive mutations. These algebras were developed in an attempt to create an algebraic framework for dual canonical bases and total positivity in semisimple groups. Another motivation came from the “Laurent phenomenon,” in which certain a priori rational functions defined by “exchange relations” turn out to

always be Laurent polynomials. Cluster algebras encode a surprisingly widespread range of phenomena in settings as diverse as quiver representations, Teichmüller theory, invariant theory, tropical calculus, Poisson geometry, and polyhedral combinatorics. This workshop will explore the connection between cluster algebras and various topics in statistical physics, including the dimer model on surfaces, integrable systems such as the KP equation, and certain dynamical systems (Y- and Q-systems) which play an important role in the theory of the thermodynamic Bethe Ansatz.

Confirmed Speakers:

Sergey Fomin, University of Michigan

Philippe di Francesco, Saclay (CEA)

Michael Gekhtman, University of Notre Dame

Max Glick, University of Michigan

Andrew Hone, University of Kent at Canterbury

Rinat Kedem, University of Illinois at Urbana-Champaign

Bernhard Keller, Université de Paris VII (Jussieu)

Richard Kenyon, Brown University

Yuji Kodama, Ohio State University

Karola Mészáros, MIT/University of Michigan
 Jim Morrow, University of Washington
 Gregg Musiker, University of Minnesota
 James Propp, University of Massachusetts
 Ralf Schiffler, University of Connecticut
 Kelli Talaska, University of California, Berkeley
 Dylan Thurston, Columbia University
 Andrei Zelevinsky, Northeastern University

Topical Workshop (Cluster Algebras) Participants by Length of Stay

Please note that the participant data displayed below is not final, as ICERM's first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use for future annual reports by using the data the institute has for its pre-registered participants (including organizers) as of June 20, 2011.

Last Name	First Name	Institution Name	Primary Field of Interest	Anticipated Visit Length
Chan	Melody	University of California	Mathematical and Statistical Sciences	4
di Francesco	Philippe	Commissariat Eénergie Atomique (CEA)	Mathematical and Statistical Sciences	5
Fomin	Sergey	University of Michigan		5
Gekhtman	Michael	University of Notre Dame	Mathematical and Statistical Sciences	5
Glick	Max	University of Michigan	Mathematical and Statistical Sciences	5
Hone	Andrew	University of Kent at Canterbury	Mathematical and Statistical Sciences	4
Jang	Juhi	New York University	Mathematical and Statistical Sciences	121
Kassel	Adrien	Ecole Nationale Supérieure de Telecommunications (ENST)	Mathematical and Statistical Sciences	4
Kedem	Rinat	University of Illinois at Urbana-Champaign		5
Keller	Bernhard	Université de Paris VII (Denis Diderot)	Mathematical and Statistical Sciences	5
Kenyon	Richard	Brown University	Mathematical and Statistical Sciences	5
Kodama	Yuji	Ohio State University	Mathematical and Statistical Sciences	5
Lee	Kyungyong	University of Connecticut	Mathematical and Statistical	5

			Sciences	
Meszaros	Karola	Massachusetts Institute of Technology	Mathematical and Statistical Sciences	5
Morrow	Jim	University of Washington	Mathematical and Statistical Sciences	5
Musiker	Gregg	University of Minnesota Twin Cities	Mathematical and Statistical Sciences	5
Nakanishi	Tomoki	Nagoya University	Mathematical and Statistical Sciences	5
Oh	Su Ho	Massachusetts Institute of Technology	Mathematical and Statistical Sciences	4
Propp	James	University of Massachusetts	Mathematical and Statistical Sciences	4
Schiffler	Ralf	University of Connecticut	Mathematical and Statistical Sciences	5
Shapiro	Michael	Michigan State University	Mathematical and Statistical Sciences	5
Sheffield	Scott	Massachusetts Institute of Technology	Mathematical and Statistical Sciences	5
Talaska	Kelli	University of California	Mathematical and Statistical Sciences	5
Thurston	Dylan	Columbia University	Mathematical and Statistical Sciences	5
Williams	Lauren	University of California	Mathematical and Statistical Sciences	5
Wilson	David	Microsoft Research	Computer Science	5
Zelevinsky	Andrei	Northeastern University	Mathematical and Statistical Sciences	5

In future years, participant comments will be included.

Topical Workshop #3: Synchronization-reducing and Communication-reducing Algorithms and Programming models for Large-scale Simulations

January 9-13, 2012

Organizing Committee:

David Keyes, KAUST and Columbia University

Matthew Knepley, The University of Chicago

Katherine Yelick, University of California at Berkeley and NERSC

Program Description:

Twin motivations for this interdisciplinary workshop are the necessities of taking scientific simulations beyond their contemporary high-water marks of concurrency and of porting them to execution environments of less scheduling reliability.

As concurrency in scientific computing pushes beyond a million threads towards a billion, and as the performance of individual threads becomes less reliable for hardware-related reasons, attention must focus on communication and synchronization bottlenecks in contemporary simulation codes. A fine-grained partial ordering on computational tasks based on the availability of input arguments is imposed by physical causality, but much communication overhead in the form of start-up latency and synchronization delay in popular algorithms is artifactual. Attempts to ameliorate inefficiency due to communication range from increased message aggregation in tightly scheduled algorithms to a fine-grained separation of computational tasks into execution priority ranks, allowing those that are on the critical path to execute whenever their operands are ready, and rebalancing or deferring other tasks for times when tasks on the critical path are waiting, or until the consequences of further deferral are algorithmically detrimental. The evolution of today's simulation codes from the infra-petascale to the ultra-exascale requires importing ideas from other areas of computer science into numerical algorithms, possibly inventing some new ones, and generalizing programming models.

Please note that at the time of this report's submittal, no participant data had been collected for this event.

In future years, participant comments will be included.

Semester Program and Topical Workshop Promotion

In addition to posting details about upcoming programs on the ICERM website, and various on-line math organization calendars (SIAM, AMS, European Mathematical Society, National Math Institutes, and Conference Service Mandl), ads for the 2011-2012 semester programs were placed in the April 2011 issue of Notices of the AMS (American Mathematical Society), and the May 2011 issue of SIAM News (Society for Industrial and Applied Math, Fall KTC program). Mailing labels to 899 higher education math programs was purchased from the AMS and posters advertising the fall semester program the topical workshops were mailed out.

All program advertising will continue to emphasize diverse participation and use language encouraging minority and under-represented students to apply

Organization/Infrastructure

ICERM's governing body is a Board of Trustees. The Scientific Advisory Board, or SAB (formerly referred to as the Science Board) oversees all scientific activities of the Institute and selects the scientific programs. The Education Advisory Board, or EAB (formerly referred to as the Education Advisory Committee) will coordinate the oversight of educational activities at all levels at ICERM.

Board of Trustees

The Board of Trustees (BoT) oversees budget, appoints directors and board members, approves appointments of associate directors, sets policy and priorities, and assists in fundraising.

Terms of appointment will be three to five years initially, and appointments will be staggered.

Future appointments of the board will be for three years. The board will meet in person once a year. There may be additional conferences and consultation.

ICERM Board of Trustees

Name	Institution
Barbara Keyfitz (Chair)	Ohio State University
Sir John Ball	University of Oxford
Jennifer Chayes	Microsoft Research
Peter Jones	Yale University
David Keyes	Columbia University/KAUST
David McLaughlin	New York University
David Mumford	Brown University
Srinivasa Varadhan	New York University

The Board of Trustees minutes (Appendix A) contains details about the selection process for new members of all the boards.

Scientific Advisory Board

The Scientific Advisory Board (SAB) is responsible for approving the programs and scientific activities of the Institute. In addition, through direct communication with the Directors, Science Board members will be involved in shaping the direction of the scientific enterprise through specific suggestions of thematic programs, program organizers and participants.

Terms will be three years, staggered for the initial appointments. Three of the seats on this Board are reserved for senior representatives of Google Research, IBM, and Microsoft Research.

ICERM Scientific Advisory Board

Name	Institution
Andrea Bertozzi (Chair)	University of California at Los Angeles
Henry Cohn	Microsoft Research
Tom Dean	Google
Brenda Dietrich	IBM
David Gabai	Princeton University
Richard Kenyon	Brown University
Jun Liu	Harvard University
Juan Meza	University of California at Merced
Andrew Odlyzko	University of Minnesota
Robert Pego	Carnegie Mellon University
George Papanicolaou	Stanford University
Donald Saari	University of California at Irvine
Bernd Sturmfels	University of California at Berkeley
Eli Upfal	Brown University

A subcommittee of the SAB will forward nominations of new members to the Board of Trustees.

See Appendix B for the minutes of the November 12-13, 2010 SAB meeting.

Education Advisory Board

The institute directors believe that ICERM will eventually be well placed to facilitate the creation of stronger connections between research in mathematics and computation and K-12 education professionals and students, through its visibility and through the relationships, which they and Brown University have with the K-12 community. To facilitate this, an Education Advisory Board (EAB) has been formed.

The Educational Advisory Board (EAB) is charged with the oversight of educational activities at all levels at ICERM and with dissemination and evaluation of these activities. Principally, the EAB will have oversight of (a) the undergraduate summer research programs, (b) professional development of the graduate students attending semester programs and (c) other activities related to the integration of research and education pertaining to undergraduates, secondary and primary school students, teachers in STEM fields, and the community at large.

ICERM Education Advisory Board

Name	Institution
Thomas Banchoff (Chair)	Brown University
Karen Haberstroh	Brown University
Irina Mitrea	Institute for Mathematics and its Applications
Frank Morgan	Williams College
David Mumford	Brown University
Mary Ann Snider	Rhode Island Department of Education
Philip Uri Treisman	University of Texas
Kenneth Wong	Brown University

Minutes from the May 25, 2011 EAB meeting can be found in the Appendix C.

Postdoctoral Program

ICERM's postdoctoral program brings early career mathematicians to the institute in order to support and expand their research and to create lasting career collaborations and connections. ICERM supports postdoctoral researchers in two different ways: postdoctoral fellows, who participate in a single semester program and are supported by a stipend, and a smaller number of institute fellows, who stay at ICERM for one year and are supported by a salary for 9 months with the possibility of additional summer support.

Recruiting and Selection:

ICERM's postdoctoral positions were widely advertised using MathJobs.org, the Society for Industrial and Applied Mathematics News, Notices of the American Mathematical Society, the Association of Women in Mathematics, with the Society for the Advancement of Chicanos and Native Americans in Science, and on the ICERM website. These positions were also advertised at the NSF Institute Reception at the joint meetings of the AMS/MAA in January 2011.

ICERM conducted its search via Mathjobs.org, an online job application service provided by the American Mathematical Society. Note that most applicants applied for both ICERM's postdoctoral fellowship and the institute fellowship positions.

The total number of applicants in the pool below included many who were not qualified *in the sense that their research field did not fit within the research parameters of the semester program*. The directors reviewed the list of applicants and determined that 48 applicants were fully qualified for the KTC program. Of those, 17 applied for both the institute fellow and

postdoctoral positions, 22 applied just for the institute fellow position, and 9 applied for just the postdoctoral fellow position. In addition, 28 applicants were judged to be fully qualified for the CAD program. Of those, 17 applied for both the institute fellow and postdoctoral fellow position, 8 applied just for the institute fellow position, and 3 applied for just the postdoctoral fellow position.

Postdoctoral Fellows

In all written material sent out, it was emphasized that Brown is an EEO/AA Employer and that ICERM is interested in women and minority candidates. 22.09% of the applicant pool were women. This is comparable to the ratio of women to men math PhDs in the United States. We strongly encouraged applications from women and minorities, and gave them careful consideration.

Total number of applicants for the fall 2011 and spring 2012 positions together: **86**. Based on available information, the applicant pool broke down as follows:

	<i>male</i>	<i>female</i>	<i>TOTAL</i>
Black	1	0	
Hispanic	0	0	
American Indian/Alaskan Native	0	1	
Asian/Pacific Islands	23	7	
White	36	10	
Other	0	0	
Unknown*	<u>5</u>	<u>1</u>	
GRAND TOTAL	65	19	= 84

*** 2 additional applicants did not identify race or gender = 86**

The search committee consisted of the ICERM semester program organizers for its fall “Kinetic Theory and Computation” (KTC) program: Francis Filbet (University of Lyon, Irene Gamba (University of Texas), Yan Guo (Brown University), Chi-Wang Shu (Brown University), Walter Strauss (Brown University), and the ICERM semester program organizers for its spring “Complex and Arithmetic Dynamics” (CAD) program: Rob Benedetto (Amherst College), Laura DeMarco (University of Illinois at Chicago), Mikhail Lyubich (SUNY Stony Brook), Juan Rivera-Letelier (Pontificia Universidad Catolica de Chile), Joseph Silverman (Brown University), Lucien Szpiro (City University of New York), Michael Zieve (University of Michigan). ICERM directors, Jeff Brock (affirmative action representative), Jill Pipher (chair), Jan Hesthaven and Bjorn Sandstede made up the rest of the committee.

The program organizers reviewed all of the applications and provided a rank-ordered list to the ICERM directors who then reviewed and approved the selections.

The ranked list of 2011 fall program (Kinetic Theory: Analysis and Computation) postdoctoral fellows is below:

1. Haack, Jeffrey
2. Esenturk, Emre
3. Zhang, Xiangxiong
4. Xu, Da
5. Hu, Jingwei

6. Larios, Adam
7. Yan, Bokai
8. Ben-Artzi, Jonathan
9. Chen, Qiang
10. Tonon, Daniela
11. Lam, King-Yeung
12. Kaffel, Ahmed

For the fall 2011 postdoctoral fellows positions, the committee made offers in rank order. Emre Esenturk, Jeffrey Haack, Ahmed Kaffel, and Daniela Tonon accepted the offers. The institute was also able to offer a postdoctoral fellowship to Dongming Wei (after the search was closed) due to the fact that the postdoctoral fellows budget for fall 2011 allowed for one additional position.

The ranked list of 2012 spring program (Computational and Arithmetic Dynamics) postdoctoral fellows is below:

1. Bhatnagar, Anupam
2. Viray, Bianca
3. Wang, Xiaoguang
4. Armana, Cecile
5. Trucco, Eugenio
6. Lindahl, Karl-Olof
7. Malmskog, Beth
8. Ostapyuk, Olena

For the Spring 2012 postdoctoral fellows positions, the committee made offers in rank order. Cecile Armana, Anupam Bhatnagar, Bianca Viray and Xiaoguang Wang accepted the offers.

Based on available information, the ranked list (combined fall 2011 and spring 2012 programs) broke down as follows:

	<i>Male</i>	<i>Female</i>
Black	0	0
Hispanic	0	0
American Indian/Alaskan Native	0	1
Asian/Pacific Islands	7	1
White	6	4
Other (specify)	0	0
Unknown	1	0

Based on available information, the postdoctoral fellow hires (combined fall 2011 and spring 2012 programs) broke down as follows:

	<i>Male</i>	<i>Female</i>
Black	0	0
Hispanic	0	0
American Indian/Alaskan Native	0	1
Asian/Pacific Islands	3	1
White	3	1
Other (specify)	0	0

Postdoctoral Fellows (3 months; funds for travel to and from institute)

Name	Previous Institution	Field of Study*	Semester
Emre Esenturk	University of Pittsburgh	Statistical mechanics, structure of matter	Fall KTC
Jeffrey Haack	University of TX-Austin	Numerical analysis	Fall KTC
Ahmed Kaffel	Virginia Tech	Fluid mechanics	Fall KTC
Daniela Tonon	SISSA-ISAS	Partial differential equations	Fall KTC
Dongming Wei	University of Wisconsin-Madison	Number Theory	Fall KTC
Cécile Armana	Max-Planck-Institut für Mathematik	Number Theory	Spring CAD
Anupam Bhatnagar	City University of New York	Algebraic geometry	Spring CAD
Bianca Viray	Brown University	Number Theory	Spring CAD
Xiaoguang Wang	LAREMA, Université d'Angers	Dynamical systems and ergodic theory	Spring CAD

*Field of study based on 2010 Mathematics Subject Classification (MSC) claimed on original application to ICERM.

Institute Fellows

As in the hiring of the postdoctoral fellows, all written material for the institute fellow positions emphasized that Brown is an EEO/AA Employer and that ICERM is interested in women and minority candidates. 18.87% of the applicant pool were women. We strongly encouraged applications from women and minorities, and gave them careful consideration.

Total number of applicants for position: **116**. Based on available information, the applicant pool broke down as follows:

	<i>male</i>	<i>female</i>	<i>TOTAL</i>
Asian/Pacific Islands	43	10	
Black	1	0	
Other	0	0	
White	40	12	
Hispanic	0	0	
American Indian/Alaskan Native	0	0	
Declined	2	0	
Unknown*	<u>5</u>	<u>1</u>	
GRAND TOTAL	91	23	= 114

*** 2 additional applicants did not identify race or gender = 116**

The search committee consisted of the ICERM semester program organizers for its “Kinetic Theory and Computation” (KTC) program: Francis Filbet (University of Lyon, Irene Gamba (University of Texas), Yan Guo (Brown University), Chi-Wang Shu (Brown University), Walter Strauss (Brown University), and the ICERM semester program organizers for its “Complex and Arithmetic Dynamics” (CAD) program: Rob Benedetto (Amherst College), Laura DeMarco (University of Illinois at Chicago), Mikhail Lyubich (SUNY Stony Brook), Juan Rivera-Letelier (Pontificia Universidad Católica de Chile), Joseph Silverman (Brown University), Lucien Szpiro

(City University of New York), Michael Zieve (University of Michigan). ICERM directors, Jeff Brock (AA Representative), Jill Pipher (chair), Jan Hesthaven and Bjorn Sandstede made up the rest of the committee.

The program organizers reviewed all of the applications and provided a rank-ordered list to the ICERM directors who then reviewed and approved the selections.

The ranked list of 2011 fall program (Kinetic Theory: Analysis and Computation) institute fellows is below:

1. Wadhar, Hem
2. He, Andong
3. Ding, Qian
4. Demirkaya, Aslihan

For the fall 2011 institute fellow position, the committee made offers in rank order. Andong He accepted.

The ranked list of 2012 spring program (Computational and Arithmetic Dynamics) institute fellows is below:

1. Levy, Alon
2. Selinger, Nikita

For the spring 2012 institute fellow position, the committee made offers in rank order; Alon Levy accepted the offer.

Based on available information, the ranked list (combined fall 2011 and spring 2012 programs) broke down as follows:

	<i>Male</i>	<i>Female</i>
Black	0	0
Hispanic	0	0
American Indian/Alaskan Native	0	0
Asian/Pacific Islands	1	1
White	1	0
Other (specify)	0	0
Unknown	3	0

Based on available information, the institute fellow hires (combined fall 2011 and spring 2012 programs) broke down as follows:

	<i>Male</i>	<i>Female</i>
Black	0	0
Hispanic	0	0
American Indian/Alaskan Native	0	0
Asian/Pacific Islands	1	0
White	1	0
Other (specify)	0	0

Institute Fellows (9 months w/benefits; summer support may be available)

Name	Previous Institution	Field of Study*	Semester
Andong He	Penn State University	Fluid Mechanics	Fall KTC
Alon Levy	Columbia University	Dynamical systems and ergodic theory	Spring CAD

*Field of study based on 2010 Mathematics Subject Classification (MSC) claimed on original application to ICERM.

Graduate Students

One special focus of this institute is early career training and mentorship. Therefore, the addition of postdoctoral fellows (as described above) and graduate students will be essential to the success of these programs. Participation from graduate students is targeted at ten to twelve for each program, some of whom will be provided funding from the institute, with this funding awarded via a competitive application process. ICERM support for graduate students in 2011/2012 consists of travel or partial support of housing costs. Subsequent years of the grant contain more funds for graduate student support, including a stipend for the semester. The availability of a stipend for graduate student support will enable students to be absent from teaching or departmental responsibilities at their home institutions. Program organizers will make a ranked list, and may also nominate students. The directors and program organizers will make decisions. There will also be an open application process to encourage broad participation. When a student has financial support from the home institution, the student will be given nominal support from the institute in the form of computing and building access as a participating program member. sector).

Importance of Mentorship

A special focus of the operations of the institute will be the training and mentorship of younger and early career mathematicians, through specific outreach programs and directed opportunities for connections between mathematicians at different stages in their career. This will include ICERM's postdoctoral program, integration and support of graduate students in the context of semester programs, summer research programs for undergraduates, and IdeaLabs.

Preparing Senior Faculty Mentors

Before ICERM runs its first semester program in September 2011, the institute will provide all senior mentors with written guidelines that will spell out their responsibilities and those of mentees. The institute will also provide mentors and mentees with the AAMC Compact and the FASEB Individual Development Plan (IDP) to help them clarify mutual expectation and guide them in developing and setting goals for the mentees. Associate Director Bjorn Sandstede will coordinate these efforts and work with the member of the Program Organizing Committee assigned to be responsible for mentorship.

In addition, at the beginning of the semester programs, there will be a mentor/mentee introductory meeting. This meeting will emphasize the idea that mentors should help mentees start to build a research cohort within a field, and help them create contacts and resources which will persist beyond the program and are important for their professional development.

To prepare graduate students and postdocs better for their future careers, the institute will also

organize a regular roundtable discussion with long-term visitors and Brown faculty that, in the course of each semester, will cover the following topics:

- Preparing job applications
- Writing and submitting papers
- Writing grant proposals
- Ethics in research
- Job opportunities in industry and government labs

Assigning Postdoctoral Mentors

Incoming ICERM postdocs and senior long-term visitors are asked with whom they wished to be matched. Bjorn worked closely with them to ensure that each match was appropriate, taking into consideration the background of mentees and mentors. The mentors of the two institute fellows Andong He and Alon Levy, who will be at ICERM for the academic year 2011-2012, are faculty at Brown and agreed to serve as mentors for the entire academic year. In general, the mentors of the institute postdocs during their non-program semester may not be local faculty. In that case, ICERM will facilitate their interaction by providing support for travel if necessary.

2011-2012 Postdoc Mentor Assignments

Postdoc	Mentor	Program
Andong He	Walter Strauss Kazuo Aoki	KTC (institute fellow)
Emre Esenturk	Walter Strauss	KTC (fall)
Jeffrey Haack	Irene Gamba	KTC (fall)
Ahmed Kaffel	Chi-Wang Shu	KTC (fall)
Daniela Tonon	Yan Guo Constantine Dafermos	KTC (fall)
Dongming Wei	Chi-Wang Shu David Levermore	KTC (fall)
Alon Levy	Joe Silverman	CAD (institute fellow)
Cécile Armana	Michael Zieve	CAD (spring)
Anupam Bhatnagar	Michael Zieve	CAD (spring)
Bianca Viray	Joe Silverman	CAD (spring)
Xiaoguang Wang	TBD	CAD (spring)

Assigning Graduate Student Mentors

A similar mentor matching process will be implemented for those graduate students who stay for more than 10 days at ICERM. Many graduate students will attend the program with their advisor; in these cases the mentor/mentee relationship will already exist. For those graduate students attending without an advisor, Bjorn will work closely with the program organizers and the students' advisors to make an appropriate mentor/mentee match.

Please note that the participant data displayed below is not final, as ICERM's first programs will occur in August 2011, after this report is submitted. We demonstrate below the format we will use for future annual reports by using the data the institute has for its pre-registered participants (including organizers) as of June 20, 2011.

2011-2012 Graduate Student Mentor Assignments

Graduate Student	Mentor
Giacomo Albi	Lorenzo Pareschi*
Jose Alcantera Felix	Simone Calogero*
Wei Guo	Jing-Mei Qiu*

Ed Lee	TBD
Jose Morales	Irene M. Gamba*
Amelie Rambaud	Francis Filbet*
Thomas Rey	Francis Filbet*
Matthew Reyna	Fengyan Li*
Minh-Binh Tran	TBD
Kent Van Vels	Irene Gamba*
Miles Wheeler	Walter Strauss*
Bokai Yan	Shi Jin*
He Yang	Fengyan Li*
Chenglong Zhang	Irene Gamba*

* Student's current advisor also attending program

ICERM will also match each graduate student with a postdoc to provide an additional layer of peer-to-peer mentoring. To prepare postdocs for this activity, the institute will offer an orientation meeting based on the Facilitating Effective Research (FER) program that the Sheridan Center at Brown University offers.

Graduate Students and Postdocs as Mentors

Starting the summer of 2012, some of the graduate students and postdocs may play an integral part in the Summer Undergraduate programs by supporting faculty in working with the undergraduate participants. Specifically, there is summer support in the grant available for institute postdoctoral fellows who wish to assist in the summer undergraduate programs. To foster effective research and advising relationships between undergraduates on the one hand and the graduate students and postdocs on the other hand, the institute will provide a 1-2 day training workshop to graduate students and postdocs prior to each summer undergraduate program to prepare them for their role. This workshop will be based on the same Facilitating Effective Research (FER) program mentioned above.

Plans for Summer Undergraduate Research

ICERM intends to support an active undergraduate research summer program starting the summer of 2012. The five-year goal is to provide summer programs serving about 25 undergraduates working in teams of 4-5 on each project. Undergraduates will apply to the program and will receive a stipend, travel funds, and meals and accommodation in a Brown dormitory. ICERM will also explore additional sources of funding for the undergraduate programs. One such program, the Leadership Alliance (<http://www.theleadershipalliance.org>), supports minority participation in research projects at several dozen universities and colleges including Brown.

The institute will solicit and recruit proposals from faculty nationwide. The faculty would spend a period of 8 weeks in Providence during the summer, teaching or co-teaching groups of up to 8-10 undergraduates. The larger groups would then split in to subgroups of 4-5 during the project development/research phase of the program. Each team of 4-5 would have a faculty mentor. Graduate students would provide additional support. Programs would be selected from proposals submitted to ICERM in an open competition. Successful programs would typically have a significant computational component. Summer research programs which pair with the semester programs will be especially encouraged, but not required.

Each faculty member supervising 4-5 students for 8 weeks will receive either salary or expenses, or some combination of the two. Both regular faculty members and senior postdoctoral

researchers will be eligible to serve as faculty mentors. An institute postdoc who wishes to participate in the summer program can receive summer support. Each graduate student supporting a program would receive a stipend commensurate with a summer teaching stipend.

A subcommittee of the EAB and an Associate Director will vet proposals. External evaluations of proposals will be solicited. Preliminary decisions on summer programs will be made by the directors and must be approved by the Scientific Advisory Board. Undergraduate participants will be selected by instructional staff of the summer research program and the selections will be finalized by ICERM director(s). At all stages of recruitment, solicitation, and selection, committees will be instructed about the diversity goals of the National Science Foundation, and ICERM in particular.

The Education Advisory Board further recommended (at the May 25, 2011 meeting) that a timetable be set for the student application process. ICERM will advertise its summer undergraduate program by early November; the application deadline will be no later than early February. To ensure a diverse group of applicants, ICERM will advertise and recruit from minority serving organizations.

Planned Methods for Surveys and Evaluation

Faculty members in the Education Department at Brown, including Professor Kenneth Wong (Walter and Lenore Annenberg Chair for Education Policy and Chair of the Department), and Professor John Tyler are leading the institute's internal initial evaluation component. The ICERM directors will hire an external evaluator to review and certify the methodology of the institute's internal process.

Evaluation Design and Types

Throughout this ramp-up year the ICERM directors have met with Professors Tyler and Wong to determine the types of surveys the institute will utilize. At the time of this report, the evaluation team was formalizing the format for each of the following categories:

Pre-surveys

Pre-surveys (for long-term programs only) will help determine any collaborations that existed prior to the program start, will ask what made the participant choose to come to ICERM, and will ask what the participant's expectations are of the program. This will be distributed electronically via e-mail approximately one week prior to the beginning of the program. The survey will be anonymous, but will include questions on the participants' education background and career experience.

Exit Surveys

Exit surveys will be distributed on or near the last day of any research and training activity at the institute. The evaluation team agreed these surveys should be kept short and to the point. The surveys will be anonymous, but will include questions on the participants' education background and career experience.

The exit survey will be designed to answer the following questions:

- *Connections made:* Have you made any new connections that you anticipate will become a part of your professional network? A scale of 1-5 will be provided to allow the respondents to specify the number of new connections.
- *Learn something new:* Did you learn something new? A scale of 1-5 will be provided to allow the respondents to specify the importance of the new skills and new knowledge in

her/his field.

- *Topic or person you would have preferred to be included in the activity:* Given the topic, did the scientific program meet your expectations? If not, what would you have liked to have seen added?
- *Time allocation appropriateness:* Were you satisfied with the:
 - a) Length of talks
 - b) Opportunities to collaborate
 - c) Free time
 - d) Opportunities to ask questions

In addition, postdocs, graduate students (and eventually undergraduate and IdeaLab participants) will be surveyed about their ICERM experience. The survey will ask about the rigor and the coherence of ICERM's research opportunities, impressions of the program's usefulness, and suggestions for improvement.

These exit surveys will be presented in a paper format, but may eventually transition to an on-line format as part of a formal checkout process.

Follow-up Surveys

Follow-up surveys will be distributed two years following the completion of each semester program. As part of the database for the within-group evaluation, the on-line follow-up survey would longitudinally track college junior cohorts and researchers' scholarly activities, such as applications and success rates for grant competition, engagement in professional networks at the regional and national level, and connection with federal program directors. A longer-term measure may consider the quality of the publications and the impact of the published research. One survey method being considered is sending an email that would, ideally, outline a participant's list of recent papers, and ask them to indicate how many of the listed publications they can attribute to their time at ICERM.

Organizer Questionnaires

Organizer questionnaires will measure the experience with ICERM for each specific activity. The questionnaires will pay particular attention to several issues, including:

- *New Connections made:* What has been the experience in working with ICERM? A scale of 1-5 will be provided to allow the respondents to specify the number of new connections made.
- *Time Allocation:* Was the time allocation to topic, presentation and Q and A appropriate.
- *Topic Selection:* Did the organizer feel that the key topics were sufficiently covered? Did the organizer provide the participants with sufficient amount of information?
- *Future Collaboration:* Was the organizer satisfied with the experience with ICERM? Would the organizer propose future events to ICERM?

Control Groups for Longitudinal Analysis of Program Participants

The evaluation design will use two comparison groups against which the outcomes of the program participants will be compared. The first comparison group will be composed of the top postdoctoral applicants who were accepted but declined the institute's offer. A second comparison group will be comprised of the top three applicants who were just below the acceptance cutoff. Using this last group, in comparison to the three applicants just above the cutoff who were accepted into the program approximates a "regression discontinuity" design in a small sample, qualitative setting. The institute staff will make substantial efforts to make connections with the approximately six comparison group members annually in order to increase the probability that these individuals would be willing to contribute to the evaluation efforts. The

plans are to track each comparison group's career path (for example, through on-line searches looking for promotions and getting counts of their publications, and in the ideal, through direct communication). At set intervals, the institute may also survey each person in the comparison groups using a personalized approach (such as phone calls). Ultimately, the institute will attempt to compare the career growth of the comparison groups with those of the hired ICERM postdocs. This same methodology would be used to track the impact of ICERM programs on graduate and undergraduate student participants.

The Evaluation Process

The Evaluation Process will occur as follows:

- The institute's external evaluator will be consulted in year one to review the internal evaluations, the design of the questionnaires and surveys, and advise on the construction of the results database. Anticipated consulting time is 2-3 days.
- The external evaluator will return for a consultation in subsequent years to review data and assist in the preparation of a report for the renewal proposal.
- The Board of Trustees will annually provide a short written evaluation of ICERM based on its own observations as well as on the data collected by the institute.

Once ICERM begins its programs in August 2011, professors Wong and Tyler will help ICERM directors and staff coordinate the ongoing use of the data collected.

Archival Records

The evaluation team will have access to organizational information and programmatic initiatives beginning with the start up phase. The collection of records may include minutes of board and management meetings, research collaborative agreements, and staffing patterns. The archival records will be useful for the analysis on the process of building and sustaining the institute.

Plans for Corporate and Academic Collaboration

Several math institutes currently funded by the NSF employ corporate and university sponsored programs with tiered memberships. ICERM is in the process of developing a plan for academic partnerships and sponsorship modeled after existing programs at other NSF Institutes. However, to attract industry sponsorship, ICERM will try a different approach.

In light of the current economic climate, as corporations are pulling back from tiered membership programs, the institute drafted an "a la carte" corporate sponsorship menu with a minimal membership fee providing basic privileges and access to the entire menu.

The draft of the corporate sponsorship menu can be found in Appendix D of this report.

Focus Group

The directors worked closely with Brown University's Corporate and Foundation Relations (within Brown's Advancement department) to develop a list of local industries whose research and business interests align closely with ICERM's mission. Senior scientific representative were invited to a focus-group luncheon at ICERM. The goal of the focus group was to discover if ICERM's corporate partnership model was palatable to industry leaders, get their feedback on the menu offerings, and discuss the best price points.

The following businesses and their representatives were invited to the focus group luncheon:

COMPANY	BUSINESS TYPE	CONTACT	TITLE
38 Studios	Entertainment/IP	Derek Dupras	Lead Engineer, Platform Team
Akamai	Web Applications	Tom Leighton	Co-founder/Chief Scientist
Akamai	Web Applications	Robert (Bobby) Blumofe	Senior VP of Network & Operations
Fidelity	Financial Advising	Hamid Benbrahim	VP Applied Complexity Research
GTECH	Information Tech	Don Stanford	Chief Technology Officer
IBM	Computing Tech	Brenda Dietrich	VP Research
IBM	Global Tech	Anne Jackson	Strategy Consultant
MathWorks	Tech Software Developer	Loren Shure	MATLAB Developer
MathWorks	Founder	Cleve Moler	Chief Scientist/Founder
Red Hat	Open Source Tech	Brian Stein	Engineering Mgr/New Tech
Simulia	Engineering Simulation	David Fox	Dir. Mechanics Tech
Simulia	Tech Officer	Bruce Engelmann	VP/Chief Technology Officer
D.E. Shaw	Global Investment/Tech	Cristian Predescu	Research Scientist (Comp Chem)

The following attended: Derek Dupras, Bobby Blumofe, Don Stanford, Anne Jackson, David Fox and Cristian Predescu. Also in attendance were Wendy Lawton and Catherine Nellis from Brown's Corporate and Foundation Relations office, ICERM directors Jill Pipher, Jan Hesthaven, Jeff Brock, Bjorn Sandstede, and assistant director Ruth Crane.

Focus Group Summary

The ICERM directors were pleased with the participation and enthusiasm shown by the participating companies. Their interest was genuine, and their feedback honest. The fact that several individuals asked when they could write their membership check indicates that ICERM's proposed Corporate Collaboration program is on target.

External Support

The institute staff will continue to aggressively work to develop new sources of support for its programs. Assistant director, Ruth Crane, has duties which include managing both public and private grants, finding new opportunities, managing the proposal process and ensuring that follow-up reporting is completed. Ruth also manages relations with the institute's sponsoring corporations and serves as a liaison to Brown's Division of Advancement which unites Alumni Relations, Development, and International Advancement in a single, focused organization.

In addition to the funding provided by the NSF, ICERM receives substantial in-kind financial support from Brown University. The director is released from teaching, and two Associate Directors are released from half of their teaching responsibilities. The cost of replacing the latter by junior faculty is covered by Brown. In addition, ICERM is not charged for the use of its building or for custodial care which Brown values at \$670,500. Brown covered the substantial cost of the renovation of the 10th and 11th floors of 121 S. Main Street in Providence, RI, provided substantial support for the cost of audio-visual equipment, and provided an annual seed fund from the office of Vice President of Research.

Other Funding Support 2010-2011

<i>Federal Grants</i>	<u>Year</u>	<u>Amount</u>
N/A	2010-2011	\$0.00
Sub-total		\$0.00
<i>University Funding Support</i>		
VP or Research Support (Seed Fund)	2010-2011	\$40,000.00
Sub-total		\$40,000.00
<i>Corporate Collaborator Support</i>		
N/A	2010-2011	\$0.00
Sub-total		\$0.00
<i>Gifts</i>		
Microsoft	2010-2011	\$5,000.00
Sub-total		\$5,000.00
TOTAL		\$45,000.00

Outreach/Diversity

Once ICERM had critical mass in terms of staff, and official office space, the group could begin to explore opportunities for outreach.

Creating Community Awareness

Throughout its first year, ICERM directors and staff initiated and participated in several local events to help create awareness about the institute.

- ICERM co-sponsored the Brown University Symposium for Undergraduates in the Mathematical Sciences (SUMS).
- Brown University hosted a gathering of leaders from Brown University and representatives from the National Science Foundation, local and federal government, and corporations to celebrate the new institute (over 100 in attendance).
- Associate director Jeff Brock met with local K-12 mathematics teachers.
- Associate director Jan Hesthaven was invited to make a presentation to the “Providence Geeks” group (over 100 in attendance).
- The ICERM directors held ICERM information brown-bag lunches at local university and college math and computer departments.
- The ICERM directorate and David Mumford (EAB member) participated in Brown University’s Commencement Forum Series to present “Brown’s Vision of Mathematics in Our Society”.

- ICERM held an open-house reception for faculty from Brown University's mathematics, applied mathematics, and computer science departments.
- ICERM hosted a corporate sponsors focus group luncheon.

Diversity

AWM 40 years and counting: conference at Brown University in September 2012

ICERM is one of the sponsors of this international conference, with 200 expected to attend. ICERM is providing financial support for one of the plenary speakers, and ICERM staff is helping to coordinate the logistics, including all local arrangements for visitors. Information about the conference resides on the ICERM web site and is updated regularly.

SACNAS conferences, 2010 and 2011

Jeff Brock attended SACNAS in California in 2010 and gave a presentation about ICERM. He will attend in 2011, along with Jose Blanchett who will give a presentation about the Computational Challenges in Probability program in Fall 2012. We will use this opportunity to advertise our upcoming summer research programs for undergraduates.

Blackwell-Tapia Conference 2012

ICERM will host the 7th Blackwell-Tapia conference, which will take place November 9-10, 2012 at ICERM. This series of biannual conferences honors David Blackwell and Richard Tapia, two seminal figures who inspired a generation of African-American, Native American and Latino/Latina students to pursue careers in mathematics. Carrying forward their work, this one and a half day conference will

- recognize and showcase mathematical excellence by minority researchers
- recognize and disseminate successful efforts to address under-representation
- inform students and mathematicians about career opportunities in mathematics, especially outside academia
- provide networking opportunities for mathematical researchers at all points in the higher education/career trajectory

The conference will include a mix of activities including scientific talks; poster presentations; panel discussions; and ample opportunities for discussion and interaction.

One of the Associate Directors (Bjorn Sandstede) attended the 6th Blackwell-Tapia conference in November 2010 at the MBI to see how the conference works and to establish personal contacts with some of the leading people behind this series. In January/February 2011, we put together the organizing committee of the 7th Blackwell-Tapia conference, which consists of

- Alejandro Aceves (Southern Methodist University)
- Edray Goins (Purdue University)
- Trachette Jackson (University of Michigan)
- Juan Meza (Lawrence Berkeley National Laboratory)
- Jill Pipher (ICERM)
- Bjorn Sandstede (ICERM)

Administration and Staff

ICERM Directors funded by the grant are: Jeffrey Brock, Jan Hesthaven, Jill Pipher, and Bjorn Sandstede. Jeff Brock and Jan Hesthaven are committing 50% time to the institute, Jill

Pipher is 100% time and Bjorn Sandstede receives one month of salary support from the grant for special projects. Jeff Hoffstein (the fifth PI on the grant) receives no financial support from the grant and volunteers his time for special projects at ICERM.

The ICERM staff includes:

Ruth Crane, Assistant Director (hired in November 2010): the outward face of ICERM; responsibilities include coordination and administrative aspects of all research programs of the Institute; supervision of institute staff; development and implementation of policies and procedures; external communications with various academic units, companies, and individuals; coordination of fundraising activities and grant proposals including proposal writing; organization of board meetings; assistance with reporting functions; oversight of web content; advertising management; oversight of functional aspects of undergraduate programs; and coordination of community outreach activities.

Mathew Borton, IT manager (hired in December 2011): responsible for all daily IT/technology related operational activities in the institute; oversees all technical development and IT related service offerings; oversees IT staff management, ensures operational security and stability, provides service development, and continuity of the institute activities; acts as liaison to the institutional IT community, provides assistance with longer-term planning and resource development, and has continued awareness of external activities and resources of relevance to the mission of ICERM. Besides support of the scientific activities in the institute, the responsibilities include support of administrative IT and A/V equipment, and development and support of web interfaces and databases.

Lauren Barrows, program coordinator (hired in February 2011): has administrative support responsibility for planning and operation of ICERM programs, works closely with ICERM's directors and scientific organizing committees; is main point of contact with program participants, including scholars, students and visitors. Major responsibilities include coordinating the housing, arrival and orientation of long-term and short-term visitors; assisting with speaker invitations and tracking responses; assisting with creating a program schedule; assisting with creating marketing materials for distribution; organizing catering, banquet and shuttle services; maintaining participant data on ICERM's customized database; and solving problems as they arise.

Shaun Wallace, web application developer (hired in March 2011): works under the direction of the IT Manager, the Web Application Developer designs, implements and maintains websites and web based applications used to support and promote ICERM and its activities. The Web Application Developer assists the IT support team in routine maintenance and support as needed.

Isani Cayetano, technical support coordinator (starting in July 2011): works under the direction of the IT Manager, the Technical Support Coordinator supports and facilitates the technological needs of ICERM staff, visiting researchers, postdocs and guests (50-100 end-users). Besides support of the scientific research activities at the Institute, the Systems Specialist's responsibilities include support of administrative IT and A/V equipment.

Juliet Duyster, financial manager, (starting in August 2011): works under the direction of the Assistant Director to provide high-level administrative support and financial management to ICERM; sets policy and creates spending guidelines in accordance with Brown's Office of Sponsored Projects (OSP) and the Brown Accounting Office; oversees financial processes and administration; Prepare budget for multiple programs and workshops of ICERM; works with

Director and Assistant Director to prepare contract and grant proposal budgets; provides data trend analysis for budget projection and prepare monthly and annual financial reports on multiple funding sources; approves high volume of Travel Express vouchers, purchase orders, subcontract agreements, intra-departmental, intercampus fund transfers and other financial transactions (endowment, gift funds, etc.); provides financial analyses and various reports on the status of the institute's operating funds required.

A financial coordinator and an additional program coordinator will be hired in the next several months.

Director Biographies:



Jill Pipher is a Professor of Mathematics at Brown University, and Director of the Institute for Computational and Experimental Research in Mathematics (ICERM). She served as Chair of the Mathematics Department 2005-2008. Jill received her Ph.D. from UCLA in 1985, and came to Brown as an Associate Professor in 1990 from the University of Chicago. Her research interests include harmonic analysis, partial differential equations and cryptography. She has published papers in each of these areas of mathematics, co-authored a cryptography textbook, and jointly holds four patents for the NTRU encryption and digital signature algorithms. She was a co-founder of Ntru Cryptosystems, Inc, now merged with Security Innovation, Inc. Her awards include an NSF Postdoctoral Fellowship, Presidential Young Investigator Award, Mathematical Sciences Research Institute Fellowship, and an Alfred P. Sloan Foundation Fellowship. Her research in harmonic analysis is currently supported by NSF, and she has recently received funding from the American Institute of Mathematics and from Banff International Research Station for her team research projects. In February 2011, she became the President of the Association for Women in Mathematics. She is a PI or co-PI on four grants awarded in 2011 from DOE, NSA, NSF, and ONR for AWM activities and events.



Jeffrey Brock is a Professor of Mathematics at Brown University, and an Associate Director of the Institute for Computational and Experimental Research in Mathematics. Jeff's research focuses on low-dimensional geometry and topology, particularly on spaces with hyperbolic geometry. He received his undergraduate degree in mathematics at Yale University and his Ph.D. in mathematics from U.C. Berkeley, where he studied under Curtis McMullen. After holding postdoctoral positions at Stanford University and the University of Chicago, he came to Brown as an associate professor. He was awarded the Donald D. Harrington Faculty Fellowship to visit the University of Texas, and has had continuous National Science Foundation support since receiving his Ph.D. He was recently awarded a John S. Guggenheim Foundation Fellowship.



Jan Hesthaven is a Professor of Applied Mathematics at Brown University, and an Associate Director of the Institute for Computational and Experimental Research in Mathematics. He received a M.Sc. in computational physics from the Technical University of Denmark (DTU) in August 1991 and a Ph.D. Following graduation in August 1995, he was awarded an NSF Postdoctoral Fellowship in Advanced Scientific Computing and was appointed Visiting Assistant Professor in the Division of Applied Mathematics at Brown University. In December of 1996, he was appointed

consultant to the Institute of Computer Applications in Science and Engineering (ICASE) at NASA Langley Research Center (NASA LaRC). In September 2000 he was awarded an Alfred P. Sloan Fellowship, in July 2001 he was awarded a Manning Assistant Professorship, and in March 2002, he was awarded an NSF Career Award. In May 2004, Jan was awarded the Philip J. Bray Award for Excellence in Teaching in the Sciences. In October 2006 he was appointed Director of the Center for Computation and Visualization (CCV). From 2006 to 2009, Jan also served as Associate chair of the Division of Applied Mathematics. He is on the editorial board of Journal of Scientific Computing (2003-) and the SIAM Journal of Scientific Computing (2005-). He is a permanent member of the scientific committee of several international conferences and serves as a reviewer for numerous journals and for both national and international funding agencies.



Jeffrey Hoffstein is Professor and Chair of Mathematics at Brown University, and an Associate Director of the Institute for Computational and Experimental Research in Mathematics. He received his PhD in mathematics from MIT in 1978. After holding postdoctoral positions at the Institute for Advanced Study, Cambridge University, and Brown University, he was an Assistant and Associate Professor at University of Rochester. He came to Brown as a Full Professor in 1989. His research interests are number theory, automorphic forms, and cryptography. Jeff has written over fifty papers in these fields, co-authored an undergraduate textbook in cryptography, and jointly holds seven patents for his cryptographic inventions. He was a co-founder of Ntru Cryptosystems, Inc, now merged with Security Innovation, Inc.



Bjorn Sandstede is Professor and Chair of Applied Mathematics at Brown University, and an Associate Director of the Institute for Computational and Experimental Research in Mathematics. He studied Mathematics at the University of Heidelberg and received his PhD in 1993 from the University of Stuttgart. After holding postdoctoral positions at the Weierstrass Institute in Berlin and at Brown University, he was a faculty member at the Ohio State University from 1997-2004, before moving in 2004 to the University of Surrey in England. In 2008, he joined the Division of Applied Mathematics at Brown University. He received an Alfred P Sloan Research Fellowship in 2000, was awarded the first JD Crawford Prize of the SIAM Activity Group on Dynamical Systems in 2001, and received a Royal Society Wolfson Research Merit Award in 2004. He is currently the Director of the Lefschetz Center for Dynamical Systems and will become the editor-in-chief of the SIAM Journal on Applied Dynamical Systems in January 2012.

Facilities

ICERM is located on the 10th and 11th floors of 121 S. Main Street, in a Brown owned building in downtown Providence, RI. Visitors to ICERM are within 10-minute walking distance of the Brown campus, the train station, major hotels, and a variety of restaurants and historic sites.

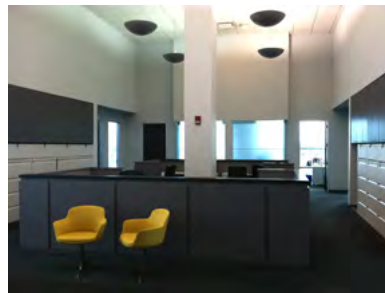
The space includes a 100-seat lecture hall, a 20-seat seminar room, a 20-seat conference room, an administrative suite, office space for 40-45 visitors, kitchen, and three large collaborative areas. All furnishings and equipment are new. Photos of this extraordinary space are shown below:



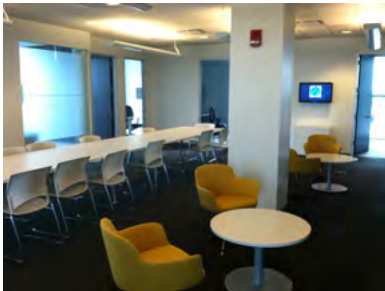
Collaborative space on 11th floor



Collaborative space on 11th floor



Administrative suite



10th floor collaborative space ...



Databases, Records, and Website

To keep track of all visitor-related data, ICERM uses a customized version of the Discovery database that was developed at the IMA and whose underlying design and web-interface was generously offered to us by the IMA. This database stores data for each person (names, degree data, gender, ethnicity, current email address, primary interest, ...), each visit of a person to ICERM (address, countries of citizenship and residence, visit dates, visit roles, ...), and all event-related data (which visit of which person is associated with what event, and in which capacity did the person participate). ICERM keeps track of the position of each visitor and other relevant information (such as whether the person is from an EPSCOR state or not) at the time when they attend. As a caveat, changes to person data (eg gender or ethnicity of a person) currently affect all past visits. Participants can select multiple boxes for race/ethnicity. We record whether these data were entered by ICERM staff or are self-reported by the participant; participants are asked to confirm or edit their records when attending ICERM events.

Electronic application forms for long-term visitors, workshop participants, and graduate students are available on ICERM's website. Applications are stored, and permanently kept, in a separate Application database. Once an application is approved, the relevant application record is copied to the Discovery database; the latter therefore contains data of all persons who were invited or accepted as participants, including those who were invited but declined. Applications for postdocs are handled through Mathjobs. ICERM keeps a complete snapshot of all applications, including diversity information.

ICERM's current website is a placeholder for our new website that is currently in development and will be deployed in August 2011. The new website draws its content dynamically from the Discovery database and from a content-management system that can be used by ICERM staff. It will also incorporate a calendar and event-scheduling tool that can be used by ICERM staff and visitors.

IT Resources

ICERM's information technology group's mission is to provide the necessary tools for research, collaboration, and information dissemination required by the institute's participants and to support the administrative staff. This will be accomplished by providing flexible systems that can be quickly reconfigured to meet research needs and efficient administrative tools that allow the institute's staff to maintain high levels operational excellence.

Work Stations

ICERM will provide virtual desktop systems to all semester program participants using Virtual Bridges on Redhat Linux systems. The host operating system will be Redhat Linux Server, the guests will use Redhat Linux workstation or Windows 7, and the client machines will be thin clients using a native thin OS (to be determined). Applications will be distributed as needed. It is anticipated that the application need will differ from program to program and researcher to researcher. Individuals will have administrative control over their own thin client desktops. Each user will be provided with a thin client terminal. Researchers will also be free to provide their own equipment (use their own laptop). The majority of the applications provided to laptop users will leverage existing Brown license agreements

Web Based Tools

ICERM will provide several web based tools for collaboration and to assist research. The institute will host blog space, forums, and wikis for researcher use during the programs. All previous talks and papers generated in the course of semester programs will be archived and available for review. A software repository will be maintained, containing open source tools for research, and separate, secure code repository will be available projects in development.

Multimedia Resources

ICERM will have state of the art audio/visual capabilities. The 100-seat lecture hall will feature dual projection screens, a centrally controlled AV system capable of displaying multiple media types, and a lecture capture system for recording presentations and streaming to the web. A smaller seminar room will be equipped with a video conferencing system and include a digital media projection system. A meeting room on the 10th floor will also provide basic multimedia presentation capability. Digital signage screens throughout the institute can be used to display presentations occurring in the lecture hall or independently used as a peripheral display from a laptop.

Publications

The institute has discussed opportunities to publish workshop proceedings with AMS and Springer. In both cases, the publishers are especially interested in monographs which include an expository introduction to the field or area, and develop the subject. ICERM has shared this information with its program and workshop organizers, encouraging those interested in publishing to have a scribe and designate one or more senior people to take responsibility for producing a manuscript or whitepaper.