

# INSTITUTE FOR MATHEMATICS AND ITS APPLICATIONS

**University of Minnesota**

400 Lind Hall

207 Church Street S.E.

Minneapolis, Minnesota 55455

FAX (612) 626-7370

telephone (612) 624-6066

e-mail: [ima-staff@ima.umn.edu](mailto:ima-staff@ima.umn.edu)

IMA schedules, newsletters, updates and preprints are available at <http://www.ima.umn.edu>

The IMA was founded by and receives major support from the National Science Foundation.

---

## IMA NEWSLETTER # 336

**1–31 October 2004**

2004–2005 Program

### **MATHEMATICS OF MATERIALS AND MACROMOLECULES: MULTIPLE SCALES, DISORDER, AND SINGULARITIES**

See [www.ima.umn.edu/matter](http://www.ima.umn.edu/matter) for a full description of the 2004–2005 program on Mathematics of Materials and Macromolecules: Multiple Scales, Disorder, and Singularities

IMA schedules are subject to revision, particularly during workshops. See [www.ima.umn.edu/~seminar/sched](http://www.ima.umn.edu/~seminar/sched) and [www.ima.umn.edu/newsletters](http://www.ima.umn.edu/newsletters) for the latest scheduling information.

<b>PART I: News and Notes</b>
-------------------------------

#### **Math Matters: IMA Public Lecture Series**

##### **Does Mathematics Rule the World?**

Professor Sir Roger Penrose, FRS OM

October 5 at 7:00 PM in Tate Laboratory of Physics 150

Renowned mathematician, physicist, and author Roger Penrose will be the opening speaker in this year's IMA public lecture series *Math Matters*. Penrose's talk, *Does Mathematics Rule the World?*, will touch on the deepest questions of the relationship between mathematics, the universe, and the human mind: Is there something remarkable about the great precision and subtlety of the mathematical laws that appear to govern, in full detail, the behavior of the physical universe? Or do the perceived laws of physics merely reflect our own attempts to make some order out of the complication of observed physical action? Are all our own actions governed completely by mathematical laws? What does all this have to say about the future of physical theory?

---

PARTICIPATING INSTITUTIONS: Consiglio Nazionale delle Ricerche, Georgia Institute of Technology, Indiana University, Iowa State University, Kent State University, Lawrence Livermore National Laboratory, Los Alamos National Laboratory (LANL), Michigan State University, Mississippi State University, Northern Illinois University, Ohio State University, Pennsylvania State University, Purdue University, Rice University, Sandia National Laboratories, Seoul National University (BK21 Math-SNU), Statistical Research Center for Complex Systems (SRCCS) at Seoul National University, Texas A&M University, University of Chicago, University of Cincinnati, University of Delaware, University of Houston, University of Illinois (Urbana), University of Iowa, University of Kentucky, University of Maryland, University of Michigan, University of Minnesota, University of Notre Dame, University of Pittsburgh, University of Wisconsin, University of Wyoming, Wayne State University.

PARTICIPATING CORPORATIONS: Boeing, Coming, ExxonMobil, Ford, GE, General Motors, Honeywell, IBM, Johnson & Johnson, Lockheed Martin, Lucent, Motorola, Schlumberger, Siemens, Telcordia Technologies, 3M.

## Focus Groups and Materials Seminar

[www.ima.umn.edu/matter/seminars](http://www.ima.umn.edu/matter/seminars)

Focused research groups are a central component of the 2004–2005 IMA Thematic Program “Mathematics of Materials and Macromolecules: Multiple Scales, Disorder, and Singularities”. Three focus groups — Multiscale Modeling and Computing, Singularities, and Soft Matter — have begun meeting. Each group will investigate various physical or biological systems, starting from elementary aspects and progressing to research projects. Talks will typically take place at 11:15 in 409 Lind Hall. See the Materials Seminar page [www.ima.umn.edu/matter/seminars](http://www.ima.umn.edu/matter/seminars) for current information about past and upcoming talks associated with the focus groups.

The Multiscale Modeling and Computing focus group meets on Mondays to work on the development of methods to model and compute phenomena existing on different scales of length and time. (See [www.ima.umn.edu/matter/focus.html](http://www.ima.umn.edu/matter/focus.html) for further information about this focus group.)

The focus group on Singularities meets on Wednesdays. Topics will include (but are not restricted to) vortex structures in superconductors, domain walls in micromagnetics, phase transitions in co-polymers, singularities in liquid crystals and blistering patterns in thin films. (See [www.ima.umn.edu/matter/focus3.html](http://www.ima.umn.edu/matter/focus3.html) for more information.)

The focus group on Soft Matter meets on Fridays to work on identifying problems and on developing models and analytic and numerical methods to solve them. Topics addressed by the group during the fall semester may include liquid crystals, ferroelectric materials, elastomers, polymers and gels. (See [www.ima.umn.edu/matter/focus2.html](http://www.ima.umn.edu/matter/focus2.html) for more information.)

## Image Processing and Analysis Working Seminar (IPAWS)

[www.math.umn.edu/~wittman/ipaws](http://www.math.umn.edu/~wittman/ipaws)

In anticipation of the IMA’s 2005–06 thematic program “Imaging”, the Image Processing and Analysis Working Seminar (IPAWS) is meeting weekly. The general topics of this research seminar are imaging, image processing, and vision. The goal is to bring together researchers from various scientific disciplines to share knowledge and make connections across departments. Participants and speakers hail from Computer Science, Electrical Engineering, Mathematics, Psychology, Radiology, and other fields involved in the study of images.

Talks are held Thursdays 12:20–1:10 in 409 Lind Hall, but the seminar room is reserved from 12:00–1:30 to allow time for discussion before and after the presentation. Participants are encouraged to bring a lunch and gather at noon in 409 Lind Hall to discuss their work and dine in an informal, friendly atmosphere. Some refreshments will be provided, courtesy of a generous donation by Prof. Jackie Shen of the Department of Mathematics.

See the IPAWS webpage ([www.math.umn.edu/~wittman/ipaws](http://www.math.umn.edu/~wittman/ipaws)) for the fall schedule of talks. If you would like to obtain more information about the seminar, be added to the IPAWS mailing list, or recommend a speaker, please send an e-mail to the seminar organizer Todd Wittman at [wittman@math.umn.edu](mailto:wittman@math.umn.edu).

### IMA Workshop:

## Singularities in Materials

October 25–29, 2004

Organizers: Fanghua Lin (Courant Institute, New York University),  
Jacob Rubinstein (Indiana University),  
Peter J. Sternberg (Indiana University)

See [www.ima.umn.edu/matter/fall/singularities.html](http://www.ima.umn.edu/matter/fall/singularities.html)

The aim of this workshop is to bring together mathematicians and physicists conducting research on models for superconductors, liquid crystals, micromagnetics, certain optical systems and thin films. The focus here will be on our ability to

capture through these models the most interesting singular structures arising in these different contexts. Such structures include Ginzburg-Landau vortices, Bloch and Neel walls in micromagnetics, phase transition behavior in liquid crystals, optical singularities, folding patterns in thin film blisterings, etc.

Through the workshop, we hope to characterize the similarities and distinctions between these different structures and to compare the analytical tools available for the study of the different models. Emphasis will be placed on identifying physically interesting and mathematically tractable open problems in these areas.

## IMA Website

Comments or suggestions concerning the IMA website may be addressed to [webmaster@ima.umn.edu](mailto:webmaster@ima.umn.edu). In particular, we appreciate any information about World-Wide Web links relevant to current and upcoming IMA programs.

### PART II: Schedule for 1–31 OCTOBER 2004

Friday, October 1

#### Last Day of IMA Workshop “Modeling of Soft Matter”

September 27–October 1, 2004

See [www.ima.umn.edu/matter/fall/softmatter.html](http://www.ima.umn.edu/matter/fall/softmatter.html).

9:00	<b>Coffee</b>	Reception Room EE/CS 3-176
9:30	<b>Robert Meyer</b> Brandeis University	Electrically and Mechanically Driven Instabilities in Thin Layers of Nematic Liquid Crystal Gel

*Abstract:* A layer of nematic liquid crystal is aligned as a single crystal between rigid plates, and gelled into a soft solid by formation of a crosslinked polymer network within the nematic phase. Changing the temperature produces changes in the nematic order parameter, resulting in stresses in the gel, due to its confinement. Likewise, an applied electric field produces a torque on the nematic director, either stabilizing or destabilising its initial orientation. The combination of elastic and electric stresses leads to buckling instabilities in the sample, which are observed by polarized light microscopy. Experimental results and theoretical analysis will be presented.

10:20	<b>Discussion and Coffee</b>	
11:00	<b>Cheng-Cher Huang</b> University of Minnesota	Experimental and Theoretical Studies of Liquid Crystal SmC* Variant Phases

*Abstract:* In 1989, the discovery of antiferroelectric response in a liquid crystal mesophase (SmCA\*) is an important landmark in soft condensed matter physics. Soon after, at least, three new mesophases (i.e. SmC\*, SmCFI2\*, and SmCFI1\*) were identified. Collectively, all these four new mesophases and SmC\* are called SmC\* variant phases. Since then, enormous experimental and theoretical effort has been aimed at addressing the following two important questions. Experimentally, our research group has accomplished remarkable tasks to identify the molecular arrangements in the SmC\* variant phases [1]. Theoretically, one would like to figure out the origin or mechanism of such a rich phase sequence within a temperature window less than 50K. As a starting point, a phenomenological model based on mean-field approaches will be presented [2].

1. A. Cady, et al., Phys. Rev. E 64, 050702 (2001) and Ref found therein.
2. D. A. Olson, et al., Phys. Rev. E 66, 021702 (2002).





with a macroscopic model (continuum mechanics). We provide here a theoretical analysis for such a coupling in a one-dimensional setting. We study both the general case of a convex energy and a specific example of a nonconvex energy, the Lennard-Jones case. In the latter situation, we prove that the discretization needs to account in an adequate way for the coexistence of a discrete model and a continuous one. Otherwise, spurious discretization effects may appear.

**Tuesday, October 12**

**IMA POSTDOC SEMINAR, 409 Lind Hall**

11:15            **TBA**

**Thursday, October 14**

**IMAGE PROCESSING AND ANALYSIS WORKING SEMINAR, Lind Hall 409**

12:20            **Alberto Bartesaghi**                            3D Segmentation of Cellular Tomograms Obtained Using  
Electrical Engineering, U of Minnesota        Electron Microscopy and its Application to HIV Research

**Friday, October 15**

**IMA/MCIM INDUSTRIAL PROBLEMS SEMINAR, 570 Vincent Hall**

1:25            **Chai Wah Wu**                                    Halftoning, Watermarking and Scheduling: Some Appli-  
IBM Research, Yorktown Heights                cations of the Error Diffusion Algorithm

*Abstract:* Since all modern printers use a small number of inks, halftoning is needed to produce images with many colors. Error diffusion is a popular high speed technique for producing high quality halftoned images. From a mathematical point of view, error diffusion can be considered as a nonautonomous discrete-time dynamical system. In the first part of this talk, I will describe some recent stability results concerning this dynamical system. In particular, error diffusion is shown to be bounded-input-bounded-state stable if and only if the input color gamut is inside the convex hull of the output colors. In the second part of this talk, I will describe several applications of error diffusion beyond digital halftoning. In particular, I will discuss applications to digital watermarking and steganography, enhancement of LCD displays and optimal online scheduling of tasks on limited resources.

**Tuesday, October 19**

**IMA POSTDOC SEMINAR, 409 Lind Hall**

11:15            **TBA**

**Thursday, October 21**

**IMAGE PROCESSING AND ANALYSIS WORKING SEMINAR, 409 Lind Hall**

12:20            **Erik Schlicht**                                    Statistical Decision Theory for Human Perception-Action  
Psychology, U of Minnesota                        Cycles

*Abstract:* Statistical Decision Theory (SDT) has traditionally been used for economic modeling and game theory. More recent applications of SDT include pattern recognition, robotics, and computer vision. This talk attempts to demonstrate that SDT has utility for describing human perception-action cycles. First, the talk will provide psychophysical evidence that humans plan for sensory uncertainty when making reaching movements. To test this idea, subjects were required to repeatedly reach to the same object while gaze direction was varied, both when the target was in view and when it was occluded. The results display that observers' reach parameters systematically change as a function of the expected optimal uncertainty, even with vision obscured. Moreover, it is shown that these changes in reach behavior are predictable from a Bayesian model that quantifies the sources of uncertainty in the task: 1) visual uncertainty; 2) haptic uncertainty; and 3) sensorimotor transformation noise. The second portion of the talk overviews a natural loss function for human reach and grasp. Previous work (Trommershauser, et. al., 2004) has demonstrated that people's mean end-point location on a pointing task is such that it maximizes the expected reward for the task. However, the reward associated with each reach (i.e., the loss function) is experimentally imposed in most work of this sort. The talk will overview our work in deriving natural loss functions that may be used to predict people's actions in everyday tasks. To that end, a parametric loss function for reaching tasks was developed that is based on the physical properties of the target, the configuration of the object with respect to gravity and the observer, and the biological cost associated with the reach. A key assumption is that people plan for the object's motion when making a reach and grasp. Using this framework, predictions can be made about how people should reach if they were to minimize the expected risk for this loss function. To test the model, people were required to reach to objects at varying orientations. The results suggest that people are reaching in a manner that minimizes their expected risk for a natural loss function. The properties of this loss function and their consequences for perceptually guided reaching will be discussed.

**Friday, October 22**

**IMA/MCIM INDUSTRIAL PROBLEMS SEMINAR, 570 Vincent Hall**

1:25                      **TBA**

**IMA Workshop:**  
**Singularities in Materials**  
 October 25–29, 2004  
 Organizers: Fanghua Lin (Courant Institute, New York University),  
 Jacob Rubinstein (Indiana University),  
 Peter J. Sternberg (Indiana University)

**PRELIMINARY SCHEDULE**

See [www.ima.umn.edu/matter/fall/singularities.html](http://www.ima.umn.edu/matter/fall/singularities.html) for current information.

**Monday, October 25**

**All talks are in Lecture Hall EE/CS 3-180 unless otherwise noted.**

8:30	<b>Coffee and Registration</b>	Reception Room EE/CS 3-176
9:15	<b>Douglas N. Arnold and Organizers</b>	Welcome and Introduction
9:30	<b>Stan Alama</b> McMaster University	Vortices and Pinning Effects for the Ginzburg-Landau Model in Multiply Connected Domains

*Abstract:* We consider the two-dimensional Ginzburg-Landau model with magnetic field, for a superconductor with multiply connected cross-section. We study energy minimizers in the London limit as the Ginzburg-Landau parameter tends to infinity, to determine the number and asymptotic location of vortices. We show that the holes act as pinning sites, acquiring nonzero winding for bounded fields and attracting all vortices away from the interior for fields up to a critical value. At the critical level the pinning effect breaks down, and vortices appear in the interior of the superconductor at locations which we identify explicitly, in terms of the solutions of an elliptic boundary value problem. The method involves sharp upper and lower energy estimates, and a careful analysis of the limiting problem which captures the interaction between the vortices and the holes.

10:20                    **Discussion and Coffee**

11:00	<b>Andre Geim</b> University of Manchester	Sub-Atomic Movements of Domain Walls in Crystal-Lattice Potential
-------	---	---

*Abstract:* The discrete nature of the crystal lattice bears on virtually every material property but it is only when the size of condensed-matter objects – e.g., dislocations, vortices in superconductors, domain walls in magnetic materials - becomes comparable to the lattice period, that the discreteness reveals itself explicitly. The associated phenomena are usually described in terms of the Peierls (“atomic washboard”) potential, which was first introduced for the case of dislocations at the dawn of the condensed-matter era. Since then, it has been invoked in many situations to explain certain features in bulk properties of materials but never observed directly. We have succeeded for the first time to monitor experimentally how a single domain wall moves through individual peaks and troughs of the atomic landscape. The wall becomes trapped between adjacent crystalline planes, which results in its propagation by distinct jumps matching the periodicity of the Peierls potential (Nature 426, 812, 2003). As a domain wall moves from one Peierls valley to another, it becomes unexpectedly flexible at Peierls ridges, which we attribute to atomic-size kinks propagating along a wall in the transient bistable position. The physics of topological defects at this true atomic scale is badly understood and seems to require a theory beyond the existing models.

11:50                    **Discussion**

12:00                    **Lunch Break**

1:30	<b>Jack Xin</b> University of Texas – Austin	The (2+1) sine-Gordon Equation and Dynamics of Localized Pulses
------	---	---

*Abstract:* The (2+1) sine-Gordon (SG) equation is derived from a Maxwell-Bloch system to model the dynamics of localized light pulses in two space dimensional cubic nonlinear materials. A class of nonlinear Schroedinger equations with both focusing and defocusing mechanisms appears as underlying asymptotic description for both the propagation and interaction phenomena. The dynamical persistence of pulses is related to the internal oscillations. Alternative asymptotic methods are reviewed to shed more light. Numerical simulations show the robustness of solitary wave like interaction on the plane.

2:20                    **Discussion and Coffee**

3:30                    **Group Photo**

3:40	<b>IMA Tea and more</b> <b>(with POSTER SESSION)</b>	400 Lind Hall
------	---	---------------

Tuesday, October 26

**All talks are in Lecture Hall EE/CS 3-180 unless otherwise noted.**



amplitude perturbation expansion are nonlocal nonlinear Schrodinger systems. They are sometimes referred to as Benney-Roskes or Davey-Stewartson type. The two dimensional ground state solution, is found to play an important role in the wave collapse mechanism.

**Wednesday, October 27**

**All talks are in Lecture Hall EE/CS 3-180 unless otherwise noted.**

9:00	<b>Coffee</b>	Reception Room EE/CS 3-176
9:30	<b>Robert V. Kohn</b> Courant Institute	A Deterministic-Control-Based Approach to Interface Motion

*Abstract:* Interface motion is central to many application areas, including materials science and computer vision. Motion by curvature is a basic example, in which the normal velocity of the interface is equal to its curvature. The level-set approach, now 15 years old, represents the evolving interface as the zero-level-set of an evolving PDE. This viewpoint has been extremely successful for both simulation and analysis.

I'll discuss joint work with Sylvia Serfaty, which develops a new perspective on the level-set approach to motion by curvature and related interface motion laws. We show, loosely speaking, that the level-set PDE is the value function of a deterministic two-person game. More precisely, we give a family of discrete-time, two-person games whose value functions converge in the continuous-time limit to the solution of the motion-by-curvature PDE. This result is unexpected, because the value function of a deterministic control problem is normally a first-order Hamilton-Jacobi equation, while the level-set formulation of motion by curvature is a second-order parabolic equation.

10:20	<b>Discussion and Coffee</b>	
11:00	<b>Francois Peeters</b> Universiteit Antwerpen	Vortex Matter in Nanostructured and Hybrid Superconductors

*Abstract:* The interplay between superconductivity and the inhomogeneous magnetic field generated by nanostructured ferromagnets leads to new vortex arrangements not found in homogeneous superconductors. We consider two situations: 1) a ferromagnetic disk on top of a thin superconducting film, and 2) a lattice of such ferromagnetic disks separated by a thin oxide layer on top of a thin superconducting film.

For a single ferromagnetic disk magnetized perpendicular to the plane of the superconducting film we found that antivortices are stabilized in shells around a central core of vortices (or a giant vortex) with size/magnetization-controlled 'magic numbers.' The transition between the different vortex phases occurs through the creation of a vortex-antivortex pair under the edge of the magnetic disk. In the case of a lattice of ferromagnetic disks, the antivortices form a rich spectrum of lattice states. In the ground state the antivortices are arranged in the so-called matching configurations between the ferromagnetic disks while the vortices are pinned to the ferromagnets. The exact (anti)vortex structure depends on the size, thickness and magnetization of the magnetic dots, periodicity of the ferromagnetic lattice and properties of the superconductor expressed through the effective Ginzburg-Landau parameter  $\kappa^*$ . The experimental implications of our results such as magnetic-field-induced superconductivity will be discussed.

The theoretical analysis is based on a numerical .exact. solution of the phenomenological Ginzburg-Landau equations.

11:50	<b>Discussion</b>	
12:00	<b>Lunch Break</b>	
1:30	<b>Boaz Ilan</b> University of Colorado at Boulder	Singularity Formation in Nonlinear Schrodinger Equations with Fourth-Order Dispersion

*Abstract:* Similarly to the classical NLS, NLS equations with fourth-order dispersion can admit singularity formation. Such equations arise in the studies of optical-beam propagation in fiber arrays and in the numerical analysis of finite-difference





11:50	<b>Discussion</b>	
12:00	<b>Lunch Break</b>	
1:30	<b>Jacob Rubinstein</b> Indiana University	The Least Action Principle for Waves

*Abstract:* TBA

**IMA/MCIM INDUSTRIAL PROBLEMS SEMINAR, 570 Vincent Hall**

1:25	<b>Todd Wittman</b> MCIM, School of Mathematics, University of Minnesota	TBA
------	---	-----

**PART III: Current IMA Participants**

**FIRST YEAR POSTDOCTORAL MEMBERS**

Brian DiDonna, Sookyung Joo, Richard Kollar, Matthias Kurzke, Frederic Legoll, Xiantao Li.

**SECOND YEAR POSTDOCTORAL MEMBERS**

Gerard Awanou, Tim Garoni, Lea Popovic.

**POSTDOCTORAL MEMBERS IN INDUSTRIAL MATHEMATICS**

Qianyong Chen (ExxonMobil), Chuan-Hsiang Han (Ford), Chiu Yen Kao (VA Medical Center), Peter Philip (Corning).

LONG TERM VISITORS

Patricia Bauman	Purdue University	9/26/04–10/09/04
Jorge Berger	Ort Braude College	9/29/04–10/29/04
Fulvio Bisi	Università di Pavia	9/25/04–10/09/04
Helmut Brand	Universität Bayreuth	9/01/04–10/15/04
Maria Carme Calderer	University of Minnesota	9/01/04–6/30/05
L. Pamela Cook	University of Delaware	9/07/04–12/31/04
Masao Doi	University of Tokyo	9/18/04–12/01/04
Xiaobing Feng	University of Tennessee	9/25/04–10/30/04
Eliot Fried	University of Illinois – Urbana/Champaign	9/26–10/03, 10/25–11/06/04
Matthias Gobbert	University of Maryland – Baltimore County	8/25/04–12/24/04
Robert Gulliver	University of Minnesota	9/01/04–6/30/05
Richard D. James	University of Minnesota	9/01/04–6/30/05
Markos A. Katsoulakis	University of Massachusetts	10/23/04–11/22/04
Fanghua Lin	New York University	9/01/04–12/31/04
Chun Liu	Pennsylvania State University	9/01/04–6/30/05
Zuhan Liu	Xuzhou Normal University	9/14/04–1/31/05
John Lowengrub	University of California – Irvine	10/20/04–11/20/04
Mitchell Luskin	University of Minnesota	9/01/04–6/30/05
Christof Melcher	Humboldt/Universität zu Berlin	10/17/04–11/07/04

Govind Menon	University of Wisconsin	9/07/04–12/15/04
Daniel Phillips	Purdue University	10/24/04–11/06/04
Petr Plechac	University of Warwick	9/01/04–12/31/04
Harald Pleiner	Max Planck Institute for Polymer Research	9/01/04–10/17/04
Rolf Ryham	Pennsylvania State University	9/01/04–6/30/05
George R. Sell	University of Minnesota	9/01/04–6/30/05
Tien-Tsan Shieh	Indiana University	9/01/04–6/30/05
André M. Sonnet	University of Strathclyde	9/25/04–10/08/04
Peter J. Sternberg	Indiana University	8/15/04–6/30/05
Vladimir Sverak	University of Minnesota	9/01/04–6/30/05
Ellad Tadmor	Technion – Israel Institute of Technology	9/19/04–10/10/04
Peter Takac	Universität Rostock	10/15/04–12/15/04
Eugene Terentjev	Cambridge University	9/01/04–10/10/04
Zhi-Qiang Wang	Utah State University	9/01/04–12/31/04
Stephen J. Watson	Northwestern University	9/01/04–6/30/05
Baisheng Yan	Michigan State University	9/01/04–6/30/05
Emmanuel Yomba	University of Ngaoundéré	10/06/04–3/30/05

VISITORS IN RESIDENCE (as of October 1, 04)

Mark J. Ablowitz	University of Colorado – Boulder	10/25–28
Stan Alama	McMaster University	10/24–29
Suman Anand	National Physical Laboratory	10/24–29
Soeren Bartels	University of Maryland	10/23–28
Leonid Berlyand	Pennsylvania State University	10/24–29
Dimitris Bertsimas	Massachusetts Institute of Technology	10/09–10
Fabrice Bethuel	Universit Pierre et Marie Curie	10/23–29
Lia Bronsard	McMaster University	10/24–29
Paolo Cermelli	CNR-Universita di Torino	10/24–29
Rustum Choksi	Simon Fraser University	10/23–29
Shibin Dai	University of Maryland	10/24–29
Antonio DeSimone	SISSA-Italy	9/26–10/06
Alan Dorsey	University of Florida	10/24–29
Katherine B. Ensor	Rice University	10/08–10
Andre Geim	University of Manchester	10/24–29
Tiziana Giorgi	New Mexico State University	10/24–29
Dmitry Golovaty	University of Akron	10/24–29
Lawrence F. Gray	University of Minnesota	10/09–09
Changfeng Gui	University of Connecticut	10/24–31
Boaz Ilan	University of Colorado – Boulder	10/24–29
Michel E. Jabbour	University of Kentucky	10/24–29
Hala Jadallah	Purdue University	10/24–29
Ning Jiang	University of Maryland	10/24–29
Yun-Hui Kim	Indiana University	10/24–29
Joy Ko	New York University	10/24–29
Robert V. Kohn	New York University – Courant Institute	10/08–10, 10/26–30
Christopher J. Larsen	Worcester Polytechnic Institute	10/24–29
Bo Li	University of California – San Diego	10/24–29
Robert P. Lipton	Louisiana State University	10/24–29
Qingfeng Ma	Indiana University	10/24–29
Jose Alberto Montero	McMaster University	10/24–29
Ziad H. Musslimani	University of Central Florida	10/24–29
Alexander Nepomnyashchy	Technion – Israel Institute of Technology	10/24–29
Daniel Onofrei	Worcester Polytechnic Institute	10/24–29
Mohammad Reza Pakzad	University of British Columbia	10/24–29

Peter Palffy-Muhoray	Kent State University	10/24–29
Xingbin Pan	East China Normal University	10/24–29
Jinhae Park	University of Minnesota	10/25–29
Francois M. Peeters	Universiteit Antwerpen	10/24–29
Robert Pelcovits	Brown University	9/26–10/03
Dmitry Pelinovsky	McMaster University	10/24–29
Roger Penrose	Oxford University	10/04–06
Craig T. Poling	Lockheed Martin	10/08–10
Yves Pomeau	University of Arizona	10/23–29
Ivano Primi	University of Rome “La Sapienza”	10/23–30
Xiaofeng Ren	Utah State University	10/23–29
Tristan Riviere	ETHZ	10/24–29
Koby Rubinstein	Indiana University	10/23–29
Mordechai Segev	Technion Israel Institute of Technology	10/24–29
Sylvia Serfaty	New York University	10/24–29
James A. Sethian	University of California	10/09–10
Valeriy Slastikov	Cargenie Mellon University	10/24–29
De Witt L. Sumners	Florida State University	10/08–10
Pengtao Sun	Simon Fraser University	10/24–30
Eitan Tadmor	University of Maryland	10/09–10
Philippe Tondeur	University of Illinois – Urbana-Champaign	10/08–10
Michael Vogelius	Rutgers	10/24–29
Darko Volkov	Worcester Polytechnic Institute	10/24–29
Changyou Wang	University of Kentucky	10/25–29
Dongming Wei	University of Maryland	10/24–29
Ruth Williams	University of California – San Diego	10/08–10
Chai Wah Wu	IBM Corporation	10/14–15
Jack Xin	University of Texas – Austin	10/24–25
Mihalis Yannakakis	Stanford University	10/09–10
Linbao Zhang	University of Maryland	10/24–29
Wen Zhang	Oakland University	10/23–30

See also [www.ima.umn.edu/people/](http://www.ima.umn.edu/people/)