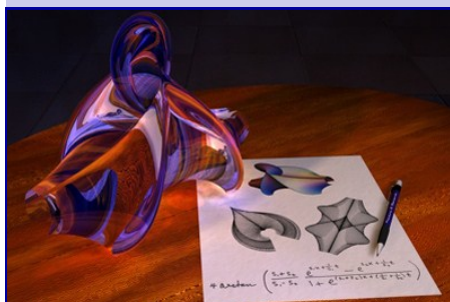
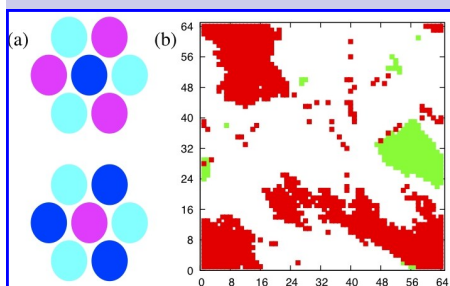


# Geometry and Dynamics

## *Interdisciplinary Graduate Education in the Mathematical Sciences*



Brandeis University



Program Director: Prof. Albion Lawrence

Program Manager: Anthony Bottaro

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Brandeis University

Dept. of Physics MS-057

415 South Street

Waltham, Ma 02454

## Eligibility

Applicants to PhD studies at Brandeis in the School of Science, Psychology, and International Economics and Finance are eligible if they intend to do theoretical/mathematical work.

Applicants must be US Citizens or Permanent Residents.

## How to apply

Students should apply to a PhD program in a specific discipline related to the IGERT program, through the GSAS webpage (<http://www.brandeis.edu/gsas/>).

Please indicate your interest in the Brandeis IGERT program in your application. In addition, for coordination purposes, notify Anthony Bottaro ([bottaro@brandeis.edu](mailto:bottaro@brandeis.edu)) once you have submitted an application, with your name and the program you have applied to.

Admissions decisions will be made by the department you have applied to. Admission to the IGERT program will then be decided by the IGERT steering committee.

## Scientific Overview

The 21st century is witnessing a remarkable expansion of quantitative and mathematical approaches to all disciplines of the natural and social sciences. Progress at the frontiers of science -- in subjects such as climate change, disease epidemiology, the origins of the universe, the emergence of cognition, economic forecasting, the theory of elementary particles, and managing and developing energy resources -- requires an understanding of phenomenology and a strong foundation in advanced mathematical techniques, the latter to enable quantitative analysis of large datasets and to construct predictive models. These problems require theorists who can apply their strong mathematical training to diverse problems in new areas.

The Brandeis program in Geometry and Dynamics is a National Science Foundation-funded IGERT (Integrative Graduate Education and Research Traineeship) program designed to complement students' core disciplinary training with a broad-based education in mathematical techniques and their applications across the natural and social sciences. The education and research efforts are structured around four scientific themes:

1. Complex dynamical systems
2. Stochastic Processes
3. Quantum and Statistical Field Theory
4. Geometry and Topology

These themes unite various combinations of string theory, low-dimensional topology, condensed matter physics, physical chemistry, neuroscience, financial mathematics, computer science, and more; they appear repeatedly across these fields.

## Program Description

The Brandeis IGERT program is accepting applications from prospective graduate students interested in primarily theoretical/mathematical work. The principal programs involved are:

- (1) Chemistry
- (2) International Economics and Finance
- (3) Mathematics
- (4) Neuroscience
- (5) Physics
- (6) Computer Science

although prospective students in any relevant department are invited to apply. Students will fulfill the PhD requirements of their primary department. They will select a PhD advisor from that department and a co-advisor from outside of their department. The IGERT grant will generally fund the students for two years in the first three of their career, with a stipend of \$30,000, in order to free up time for the educational components of the IGERT program.

IGERT program activities include: research rotations inside and outside of the student's home departments; common courses shared by the IGERT students; monthly internal seminars by fellow students; monthly seminars with external speakers; and yearly 2-week summer institute.

Brandeis provides a highly collegial environment with a strong tradition of exciting interdisciplinary work. The IGERT activities will allow the student to take full advantage of this tradition, by providing a vibrant interdisciplinary community of faculty and fellow graduate students, and the intellectual tools needed to engage in forefront interdisciplinary work.

Finally, there will be opportunities for internships for senior IGERT students at the new International Center for the Theoretical Sciences in Bangalore, India.

## Program Committee

Bulbul Chakraborty, Physics  
Albion Lawrence, Physics  
Blake LeBaron, International Business School  
Paul Miller, Biology/Neuroscience  
Daniel Ruberman, Mathematics

## Affiliated Faculty

Mark Adler, Mathematics  
Yaneer Bar-Yam, NECSI  
Aparna Baskaran, Physics  
Ruth Charney, Mathematics  
Irving R. Epstein, Chemistry  
Jozsef Fiser, Psychology/Neuroscience  
Michael Hagan, Physics  
Matthew Headrick, Physics  
Dmitry Kleinbock, Mathematics  
Jane' Kondev, Physics  
Bong Lian, Mathematics  
John Lisman, Biology/Neuroscience  
Jordan Pollack, Computer Science