

Stochastic Analysis Related to Hamilton-Jacobi PDEs

May 18 - 22, 2020



Scientific Overview

Modeling complex multiscale phenomena in random media is limited by the lack of periodicity that imposes great limitations to mathematical analysis. Stochastic homogenization and averaging are often used; these settings however lack mathematical structure, estimates from periodic media are not applicable, and most classical PDE methods fail. Computational methods on the other hand, are very expensive and in practice, small random perturbations of periodic ones are sought, from which asymptotic expansions are derived.

It is thus necessary to use sophisticated probabilistic methods. Hamilton-Jacobi equations offer great promise in helping tackle these systems. Examples of their applicability include front propagation, random walks in random media, stochastic PDEs driven by Brownian motion, Abelian sandpiles, peeling processes. Of great importance are also the study of kinetic Fokker Planck equations and degenerate elliptic operators, which often arise in models of particle interactions and optimization, computing the effective diffusivity in the Kramers to Smoluchowski limits, and rates of convergence to the invariant measure in the degenerate elliptic case. This workshop will explore this new avenue of research.

This workshop will include a poster session; a request for posters will be sent to registered participants in advance of the workshop.

Long Program Schedule

This workshop is part of the long program on “High Dimensional Hamilton-Jacobi PDEs.”

- Opening Day: March 9, 2020
- High Dimensional Hamilton-Jacobi PDEs Tutorials: March 10-13, 2020
- Workshop I: High Dimensional Hamilton-Jacobi Methods in Control and Differential Games: March 30-April 3, 2020
- Workshop II: PDE and Inverse Problem Methods in Machine Learning: April 20-24, 2020
- Workshop III: Mean Field Games and Applications: May 4-8, 2020
- **Workshop IV: Stochastic Analysis Related to Hamilton-Jacobi PDEs: May 18-22, 2020**
- Culminating Workshop at Lake Arrowhead: June 7-12, 2020

Participation

Additional information about this workshop including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM’s mission, and we welcome their applications.

Organizers

Jeff Calder (University of Minnesota), Will Feldman (University of Chicago), Grigorios Pavliotis (Imperial College), Fraydoun Rezakhanlou (UC Berkeley), and Takis Souganidis (University of Chicago).

Speakers

Jeff Calder (University of Minnesota, Twin Cities), Nicholas Dirr (Cardiff University), Will Feldman (University of Chicago), Benjamin Gess (Universität Leipzig), Elena Kosygina (CUNY), Claude Le Bris (Ecole Nationale Des Ponts et Chaussee), Jessica Lin (McGill University), Jim Nolen (Duke University), Houman Owhadi (Caltech), Grigorios Pavliotis (Imperial College), Fraydoun Rezakhanlou (UC Berkeley), Christof Schuette (Center for Adaptive Behavior and Cognition), Timo Seppalainen (University of Wisconsin-Madison), Takis Souganidis (University of Chicago), Jack Xin (UC Irvine), Atila Yilmaz (Temple University), Aaron Nung Kwan, Yip (Purdue University), Yifeng Yu (UC Irvine), and Ofer Zeitouni (Weizmann Institute of Science).



For more information, visit the program webpage:
www.ipam.ucla.edu/hjws4