8th Annual Davis Math Conference

Schedule and Abstracts

Organizers: Kirill Paramonov and Jingyang Shu

January 11th 2018

1 Schedule

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<th>Speaker</th>
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<td>9:00 AM</td>
<td>Breakfast</td>
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<tr>
<td>9:25 AM</td>
<td>Introductory Remarks</td>
<td>Jordan Snyder</td>
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<tr>
<td>9:30 AM</td>
<td>Partial Differential Equations</td>
<td>Joseph Biello</td>
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<tr>
<td>10:05 AM</td>
<td>Mathematical Physics</td>
<td>John Murray</td>
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<td>10:30 AM</td>
<td>TBA</td>
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<td>11:05 AM</td>
<td>Topology</td>
<td>Kevin Lamb</td>
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<tr>
<td>11:30 AM</td>
<td>Number Theory</td>
<td>Elena Fuchs</td>
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<tr>
<td>12:05 PM</td>
<td>Optimization</td>
<td>William Wright</td>
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<td>12:30 PM</td>
<td>Lunch</td>
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<tr>
<td>1:30 PM</td>
<td>Computational Mathematics</td>
<td>Thomas Strohmer</td>
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<td>2:05 PM</td>
<td>Machine Learning</td>
<td>Kirill Paramonov</td>
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<td>Mathematical Biology</td>
<td>Robert Guy</td>
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<td>3:05 PM</td>
<td>Combinatorics</td>
<td>Chaim Even Zohar</td>
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2 Abstracts

2.1 Partial Differential Equations

Joseph Biello
Title: TBA
Abstract: TBA

2.2 Mathematical Physics

John Murray
Title: Higher Algebra and Quantum Field Theory
Abstract:
Though the experimental predictions of quantum field theories are astonishingly accurate, we are far from having a complete mathematical description of these theories. We will explore a formalism using new ideas from higher algebra to advance us toward that goal. In particular, we will describe how one deformation quantizes functions on the simplices of a derived stack. From a physical perspective, this process defines perturbation theory about classical field configurations including those that model tunneling between vacua.

2.3 Probability

TBA
Title: TBA
Abstract: TBA

2.4 Topology

Kevin Lamb
Title: TBA
Abstract: TBA
2.5 Number Theory

Elena Fuchs
Title: TBA
Abstract: TBA

2.6 Optimization

William Wright
Title: An Eigenvalue Optimization Method for Phase Retrieval
Abstract:
Phase retrieval is the process of recovering the phase of an unknown signal using only the magnitudes of some signal observations. Some common applications are X-ray crystallography, electron microscopy, speech processing, and astronomical imaging. A wide variety of methods exist for retrieving phase, yet most do not allow for much noise in the observations. A phase retrieval method was recently developed [Friedlander, 2016] which handles noise, leading to an eigenvalue optimization problem. This underlying eigenvalue problem has a unique structure which we exploit using modern eigenvalue methods to increase the efficiency of the phase retrieval process.

2.7 Computational Mathematics

Thomas Strohmer
Title: Mathematics of Data Science
Abstract:
I will talk about some recent research my collaborators and I have conducted in the field of data science. Topics include blind deconvolution, convex and nonconvex optimization, data clustering, and deep learning.

2.8 Machine Learning

Kirill Paramonov
Title: TBA
Abstract: TBA
2.9 Mathematical Biology

Robert Guy
Title: TBA
Abstract:
TBA

2.10 Combinatorics

Chaim Even Zohar
Title: Patterns in Random Permutations
Abstract:
Every $k$ entries in a permutation of order $n$ can have one of $k!$ different relative orders, called patterns. How many times does each pattern occur in a large random permutation? We analyze the distribution of pattern densities, using representations of the symmetric group.