45^{th} Annual New York State Regional Graduate Mathematics Conference

Syracuse University

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2020

Contents

Welcome!

Welcome and thank you for participating in the 45th Annual NYSRGMC. The Annual New York State Regional Graduate Mathematics Conference (ANYSRGMC) is the longest running graduate mathematics conference in the country, and is organized entirely by graduate students. Though we have made some last minute changes, we are excited to be one of (if not the) first remote graduate student conferences.

ANYSRGMC is a Mathematics conference dedicated to providing an opportunity for mathematics graduate students in any field to present their research or give an expository talk. The ANYSRGMC allows students from across the country an opportunity to come together and explore a wide variety of mathematical topics. Students have a unique opportunity to explore their interests, gain new insights across fields, network with their peers, and explore possible cross-disciplinary collaborative efforts. Early graduate students and advanced undergraduate students are able to present undergraduate research, experience a broad range of current mathematical research, and learn from older graduate students. This year specifically, we have expanded our scope by inviting undergraduates to participate in a poster session. Overall, it is our hope and our goal to develop careers, broaden horizons, and engage the mathematics community at large. We hope you enjoy the conference!

Technology and Structure

We will be using Blackboard Collaborate Ultra (BCU) to host this conference. Live talks and Keynote talks will happen directly on BCU, via the links provided in the schedule.

Recorded talks can be found on this playlist (link below) and presenters will be doing 10 minute question and answer sessions the day of the conference.

https://www.youtube.com/playlist?list=PLRTJZ0Q0NBbUrLJRPG13w8MwqfLQCQMIQ

Posters can be found in the following Google Drive folder. The poster session will be held on BCU, giving contributors a chance to present their posters and answer questions.

https://drive.google.com/drive/folders/1egl3AtKXBXO15-iUJwzp4IieZnt75in-

Remember, a copy of the schedule, this conference packet, and all other conference related things can be found on the conference webpage:

http://mgo.syr.edu/conferences/upcoming/

Acknowledgements

The organizers would like to thank the Graduate Student Organization, Syracuse University Mathematics Department, American Mathematical Society, and the National Science Foundation for generously supporting this conference. We would like to thank Julie O'Connor, Leah Quinones, Kelly Jarvi, and Jordan Correia for their help with all the conference details — both little and big. A special thanks to Marguerite Davis, Joshua Fenton, and Caleb McWhorter for all their help with the conference organization and event planning. The organizers would also like to give a special thanks to Professor Graham Leuschke and Amy Graves for their work with the NSF Grant; for their knowledge and endless patience, we are enormously indebted. We would like to thank our speakers, Dr. Bruce Sagan and Dr. Theodora Bourni, for graciously accepting the invitation to speak at our conference. Finally, we would like to thank all the conference attendees for participating and giving such wonderful talks. This conference would truly be impossible without all of you.

Funding

This conference is generously supported by the Mathematics Graduate Organization, Graduate Student Organization, Syracuse University Mathematics Department, American Mathematical Society, and the National Science Foundation.

		Schedule		
		Questions & Answers	Mixed Sessions	Live Talks
Link to Room		Link to Dr. Sagan's Talk		
Invited Address	10:45 am	Dr. Bruce Sagan (Michigan State University)		
	11:00 am			
	11:15 am			
	11:30 am			
	11:45 am			
Link to Room		Link to Lunch & Poster Session		
Lunch	12:00 pm	Lunch Break / Poster Session		
	12:15 pm			
	12:30 pm			
	12:45 pm			
Link to Rooms		Room I Link	Room II Link	Room III Link
Session I	1:00 pm	Erin Griffin	Miriam R A Kabagorobya	Fei Cao
	1:15 pm	Tapesh Yadav		
	1:30 pm	Elisa Negrini	Brian Odiwuor	Linda Cook
	1:45 pm	Jeremiah Southwick		
	2:00 pm	Elizabeth Collins-Wildman	Nigar Altindis	Wisdom Ogala
	2:15 pm	Mian Adnan		
Link to Rooms		Room I Link	Room II Link	Room III Link
Session II	2:30 pm	Padi Fuster Aguilera	Andrew Miller	Alex Slinkin
	2:45 pm	Hayden Julius	Kyle Allaire	
	3:00 pm	Nikola Milicevic	Ngan Hoang-Nguyen-Thuy	Aram Bingham
	3:15 pm	Rachel Domagalski	Oday Hazaimah	
	3:30 pm	Caleb McWhorter	Emmanuel Fleurantin	Dorsa Ghoreishi
	3:45 pm	Liangbung Luo		
Break	4:00 pm	Break		
Link to Room		Link to Dr. Bourni's Talk		
Invited Address	4:15 pm	Dr. Theodora Bourni (University of Tennessee Knoxville)		
	4:30 pm			
	4:45 pm			
	5:00 pm			
	5:15 pm			

About the Invited Speakers

Dr. Theodora Bourni (University of Tennessee Knoxville)

Professor Bourni received her Ph.D. from Stanford University under Professor Leon Simon. She was then a post-doc at the Max Planck Institute for Gravitational Physics (Albert Einstein Institute) and then was at the Institut für Mathematik. Professor Bourni currently serves as an Assistant Professor of Mathematics at the University of Tennessee Knoxville. She has given over 50 invited talks and has won numerous awards, including gold medals at the Balkan Mathematical Olympiad and National Mathematical Olympiad in Athens. Professor Bourni's research interests include Geometric Analysis, including geometric flows and geometric measure theory, and Partial Differential Equations. She is especially interested in minimal surfaces and mean curvature flows.

Dr. Bruce Sagan (Michigan State University)

Professor Sagan received his Ph.D. from MIT under Professor Richard Stanley. He is currently a Full Professor at Michigan State University. He has also had numerous visiting positions at the Royal Institute of Technology, University of Michigan, University of Pennsylvania, the Mathematical Sciences Research Institute, and the Newton Institute. Professor Sagan is the author of two books and over 100 papers. He has received dozens of grants, given over 200 invited talks, and overseen 16 Ph.D. students. In addition to his many academic accolades, Professor Sagan is also an award winning folk musician. In addition to violin, he plays many ethnic instruments: the Swedish nyckelharpa, the Norwegian hardingfele, and the Bulgarian gadulka, and has performed throughout North America, Europe, and Australia. Professor Sagan's research interests are in algebraic, enumerative, and topological combinatorics. He is particularly interested in connections with symmetric functions and group representations. You may find his university webpage here and his musical webpage here.

Invited Address – Dr. Bruce Sagan

10:45 – 11:45

The Protean Chromatic Polynomial

Dr. Bruce Sagan Voight (Michigan State University)

Abstract: Let t be a positive integer and let G be a combinatorial graph with vertices V and edges E. A *proper coloring of G from a set with t colors* is a function $c\colon V \to \{1, 2, \ldots, t\}$ such that if $uv \in E$ then $c(u) \neq c(v)$, that is, the endpoints of an edge must be colored differently. These are the colorings considered in the famous Four Color Theorem. The *chromatic polynomial* of G, $P(G; t)$, is the number of proper colorings of G from a set with t colors. It turns out that this is a polynomial in t with many amazing properties. One can characterize the degree and coefficients of $P(G; t)$. There are also connections with acyclic orientations, increasing spanning forests, hyperplane arrangements, symmetric functions, and Chern classes in algebraic geometry. This talk will survey some of these results.

12:00 – 12:45

Lunch and Poster Session

The link to the lunch and poster sessions is at this link. The ‘rooms’ will be broken up into breakout sessions, one speaker with their poster to present and answer questions.

1:00 – 1:25

Recorded Talks

Finding Gradient Bach Solitons on 4-dimensional Homogeneous Manifolds

Erin Griffin (Syracuse University)

Abstract: Geometric flow is a very important idea in modern differential geometry. In this talk, I will begin by motivating my research, discussing the basic definitions and why I chose to pursue classifying this specific type of gradient Bach soliton. After defining the idea of a manifold 'splitting' into components with distinct metrics, I will present results by Ho about solitons that are 'split' into two 2-dimensional components and my own result about manifolds of this form which cannot be gradient Bach solitons. In closing, we will look at other types of splittings and possible research directions.

A New Proof of Nakazi's Theorem

Tapesh Yadav (University of Florida)

Abstract: A new proof of an important theorem by Nakazi using recent results by Sarason in his seminal paper on agebraic properties of truncated Toeplitz operators.

1:00 – 1:25

Live Talks

Kinetic theory in econophysics: some models of distribution of money

Fei Cao (Arizona State University)

Abstract: In this work, a simple model for money exchange is investigated: agents picked proportional to their wealth give at random time a dollar to one another. Thus, the richer an individual is, the more likely he will pay. Surprisingly this stochastic dynamics is of mean-field type and eventually leads to a Poisson distribution of wealth (shown both numerically and analytically by Nicolas Lanchier. To better understand this dynamics, we investigate its limit as the number of agents goes to infinite. We prove rigorously the so-called propagation of chaos (using a probabilistic coupling technique) which links the stochastic dynamics to a (limiting) deterministic system of linear ordinary differential equations (ODEs). This deterministic description is then analyzed by taking advantage of its (discrete) Fokker-Planck formulation and we prove its convergence toward its unique equilibrium (a Poisson distribution) using entropy methods. Moreover, we will prove that the model at hand converges exponentially fast to its limiting (Poisson) distribution of money through the well-known Bakry-Emery approach. Numerical experiment, together with a heuristic (yet convincing) argument, is provided to demonstrate the sharp rate of convergence of the limit ODE system to its equilibrium. Finally, we also introduce a closely related model where, at each random time step, agents are picked inversely proportional to the amount of dollar they have, and we observe at least numerically that, under different scaling of the exchange rate, the limiting distribution of money might be a Dirac distribution or even do not exit (blow up). Joint work with Sebastien Motsch.

The Use of Multiple Resources by English as Second Language Learners (ESLL) to Communicate Mathematical Ideas

Miriam R A Kabagorobya (Syracuse University)

Abstract: The semiotic nature of mathematics is multimodal, implying that meaningfulness in mathematics learning is drawn from three types of representations, namely; linguistic, symbolic and visual representations. Understanding this relationship is very important for practitioners because it informs them about what learners do to develop strategies they use to effectively communicate their mathematical ideas. When applying this multimodal approach, learners (English as

Second Language Learners for example) explain their mathematical understanding using multiple resources. In this preliminary investigation, a case study of an English as Second Language Learner was carried out using task-based structured interviews and the initial findings showed that the student drew on many resources like other language, concrete objects and gestures to explain their mathematical ideas. This implies that, during practice, teachers need not to focus on the English vocabulary that the student uses but rather, focus on how that student brings to bear the inventory of the resources they have at their disposal to explain their ideas.

1:30 – 1:55

Recorded Talks

An Introduction to Deep Neural Networks and Generative Adversarial Networks

Elisa Negrini (Worcester Polytechnic Institute)

Abstract: Deep Neural Networks have demonstrated stunning empirical results across many applications (like vision, natural language processing, and reinforcement learning), but the challenge of providing theoretical foundations for deep learning techniques is still largely open. In this talk I will introduce Deep Neural Networks and present the Universal Approximation Theorem. This is a functional analysis theorem which states that a feed- forward network with a single hidden layer and a finite number of neurons can approximate continuous functions on compacts of $\mathbb{R}^n$, under mild assumptions on the activation function.

This theorem focuses only on the expressivity of the network, but when working with real world problems the amount and quality of available data is also a great concern: in order to obtain good performance of the network, a large amount of densely sampled data is needed, but it can be very expensive to obtain. A possible way to overcome this problem is to generate synthetic data with the same statistics as few observed data. This is what Generative Adversarial Networks (GANs) do. In the second part of the talk I will introduce GANs and show how they perform on a real world dataset.

Widely Digitally Delicate Primes

Jeremiah Southwick (University of South Carolina)

Abstract: In 1978, Murray Klamkin asked whether there exist prime numbers such that if any digit is replaced by any other digit, the resulting number is composite. In 1979, several examples were published together with a proof by Paul Erdos that infinitely many such primes exist. Following the terminology of Jackson Hopper and Paul Pollack, we call such primes “digitally delicate.” The smallest digitally delicate prime is 294001. In this talk, we discuss some of the history surrounding digitally delicate primes, implications of prior work, and recent work by the speaker with Michael Filaseta.

1:30 – 1:55

Live Talks

Detecting a Long Even Hole

Linda Cook (Princeton University)

Abstract: We call a subgraph of G induced if its vertices are a subset of the vertices of G and it contains any edge of G with both its endpoints in this subset. We call an induced cycle of even length in G an even hole. In 1991, Bienstock showed that it is NP-Hard to test whether a graph G has an even hole containing a specified vertex v in G. In 2002, Conforti, Cornuéjols, Kapoor and Vušković gave a polynomial-time algorithm to test whether a graph contains an even hole by applying a theorem about the structure of even-hole-free graphs from an earlier paper. In 2003, Chudnovsky, Kawarabayashi and Seymour provided a simpler polynomial time algorithm that searches for even holes directly. We extend this result by presenting a polynomial time algorithm to determine whether a graph has an even hole of length at least k for a given $k \geq 4$. (Joint work with Paul Seymour.)

Teaching Mathematics in Large Classrooms: Turning challenges into opportunities

Brian Odiwuor (Syracuse University)

Abstract: As part of a global education campaign, many nations have experienced and continue to experience a substantial rise in student enrollment leading to large class sizes. As a result, affected teachers are struggling with teaching in large classes thus calling for urgent scientific investigation. This paper is a study proposal on challenges that mathematics instructors encounter in preparing and delivering instruction in large classes and possible strategies of turning the challenges into opportunities. Effective learning requires similar preparation for both small and large classrooms. However, there is extra input that teaching large classes require. In this paper, I present literature and case studies from three high school teachers on unexplored opportunities available for teachers to facilitate instruction delivery in large classrooms. The study seeks to explore demands for effective learning in large classrooms by answering questions on assessment criteria, effective feedback, class control and student engagement, diversity, enhancing rapport as well as effective use of available resources.

2:00 – 2:25

Recorded Talks

A Generalization to the Leibnitz's Theorem & its Application in Probability Distribution

Mian Adnan (Bowling Green State University)

Abstract: We have inaugurated a Generalization to the Leibnitz Theorem. It has extensive application in Calculus as well as in Statistics especially in Probability Distribution.

Using Random Matrix Theory to Analyze Spin Glasses

Elizabeth Collins-Wildman (University of Michigan)

Abstract: Given a set of N children, how can we partition them into two subsets such that we maximize their overall satisfaction (i.e. most children end up with other children that they like)? This simple example provides a context in which to introduce the Sherrington-Kirkpatrick (SK) model for spin glasses. This talk will focus on the Spherical Sherrington-Kirkpatrick (SSK) model, which is similar to the SK model but easier to analyze using techniques from random matrix theory and asymptotic analysis. After introducing a few basic tools from random matrix theory, I will sketch how these tools are used to examine fluctuations in the free energy of the SSK model (based on results by Jinho Baik and Ji Oon Lee, 2016). This talk will not assume prior knowledge of spin glass models or random matrix theory.

Live Talks

Exploring the Nature of the Co-emergence of Students' Representational Fluency and Functional Thinking

Nigar Altindis (Syracuse University)

Abstract: Learning functions includes translations and connections among and within representations along with functional thinking; that is an essential skill for students to develop in learning functions in general (NCTM, 2000). Functional thinking has been defined in general as a style of creative thinking about functions, creating patterns, and generalizing the functional relationships within concrete representations of functions (Blanton & Kaput, 2011). The National Council of Teachers of Mathematics emphasized both the use and connection of representations in making sense of functional relationships; it stated that students should "create and use tabular, symbolic, graphical, and verbal representations and (eliminate to) analyze and understand patterns, relations, and functions" (NCTM, 2000, p. 297). Learning functions is one of the most complex and difficult topics to learn; it involves forms of representations, includes other complex topics (e.g., limit), and integrates multiple subtopics of mathematics (Leinhardt et al., 1990).

This study aims to shed light on the nature of students' connections and translations among and within representations of quadratic functions in tandem with their covariational and correspondence reasoning. A design-based research methodology is employed; I conduct a teaching experiment and create "a small-scale version of a learning ecology" (Cobb et al., 2003, p. 9). The teaching experiment includes teaching episodes with each session lasting one hour, for eight days. the study includes eight to ten secondary school students grouped into three groups. Data analyses, I network analytical frameworks covariational reasoning (Thompson & Carlson, 2017), and representational fluency (Fonger, 2019).

The findings of this study endeavors to complement and advance existing literature on quantitative reasoning and representations by networking two distinct literatures for supporting students' meaningful understanding of quadratic functions. The findings allow teachers to prepare high school students for advance mathematics through quantitative reasoning as well as covariational and algebraic reasonings.

Insight into explainable AI, our concerns, and the future of industries

Wisdom Ogala (University of Central Florida)

Abstract: In this talk, we explored explainable Machine Learning, aired our concerns about AI and envisioned new careers for mathematicians in the industries. The world in general, academic communities and industries have always feared the possibilities of being replaced by AI but one thing they had failed to realize is that,

in the midst of being replaced lies an unending streams of opportunity for industrial applications. This opportunities ranges from the refinement of already existing algorithms to the explainability of AI. The system has never been perfect, in fact the more problems we solve the more the problems we are yet to solve. It is on this ground we bring to you a stimulating talk to spur your interest in the field of machine learning and to show that machine learning is applicable to almost all field of mathematics as long as there are variables to learn, predictions to make, data to explore, controls to reinforce, explanation to give and automation to initiate.

2:30 – 2:55

Recorded Talks

A PDE model for chemotaxis with logistic growth

Padi Fuster Aguilera (Tulane University)

Abstract: In this talk, we will derive a PDE model for chemotaxis (the movement of an organism in response to a chemical stimulus) with logistic growth. We will discuss the general derivation and to what kind of phenomena it can be applied to. We will state some results on existence of solutions of our model.

Discrete Maximal Parabolic Regularity for Advection-Diffusion-Reaction Operators

Kyle Allaire (University of Connecticut)

Abstract: For parabolic problems $u_t + Au = f$, where A is a second order elliptic operator, maximal parabolic regularity is an established tool for studying nonlinear operators and general problems where sharp regularity results are required. Recently, there has been growing interest in establishing similar results for time discrete and fully discrete approximations. In this talk, we'll discuss such results for discontinuous Galerkin time schemes and describe how these results can be extended to non-self-adjoint operators, such as advection-diffusion-reaction problems.

Nonstandard solutions to linear preserver problems

Hayden Julius (Kent State University)

Abstract: Preserver problems concern the characterization of maps of rings/algebras that leave invariant certain functions, subsets, relations, et cetera. We explore two classical preserver problems. First, if an R-linear map preserves the set of idempotents of $M_n(R)$, where R is a commutative ring with $\frac{1}{2}$, it is known that the map must be a Jordan homomorphism. Second, if a bijective F-linear map preserves commutative pairs of elements of certain F-algebras, where F is a field, it is known that the map must be a scalar times an isomorphism or anti-isomorphism

modulo the center. The commutativity preserver problem is especially important because of its connection to Lie isomorphisms; in fact, the description of such maps was the key to Brešar's solution of Herstein's problem on Lie isomorphisms of prime rings. In this talk, we discuss natural variants of the idempotent and commutativity preserver problems on $n \times n$ complex matrices whose solutions significantly differ from the usual description.

A Discrete Harnack Inequality in Two Dimensions Versus Three Dimensions Using Piecewise Linear Finite Elements

Andrew Miller (University of Connecticut)

Abstract: In this talk we will briefly introduce the finite element method using piecewise linear functions for the Laplace problem. We will then recall some basic properties of the continuous Green's function, introduce the Discrete Green's function, and discuss the differences in the basic properties of the Discrete Green's function. Finally, we briefly discuss the implication of a positive Discrete Green's function and proving a Discrete Harnack Inequality as well as compare the arguments used for proving positivity in two dimensions versus three dimensions and the challenges to the three dimensional case.

Live Talks

KZ equations modulo p and the Cartier map

Alex Slinkin (University of North Carolina at Chapel Hill)

Abstract: The KZ equations are certain differential equations associated with a Lie algebra. The hypergeometric solutions of the KZ equations with complex parameters were constructed by A. Varchenko and V. Schechtman in the late 1980s. Recently, the same KZ equations over the finite field $\mathbb{F}_p$ were studied. In this talk I will describe the polynomial solutions of the KZ equations considered over $\mathbb{F}_p$. I will also identify the space of these polynomial solutions with the space dual to a certain subspace of regular differentials on an associated curve.

3:00 – 3:25

Recorded Talks

Inferring relationships through graph theory and social network analysis

Rachel Domagalski (Michigan State University)

Abstract: Bipartite graphs can be used to capture social networks through event participation. By letting one set of vertices be participants and the other set be events, each edge represents an individual participating in an event. These bipartite graphs can be projected into a weighted graph by multiplying the bipartite adjacency matrix by its transpose. In the projection, an edge between two individuals represents the number of times they participated in the same event. We can now ask, how many times do two people have to participate in an event together before we can assume they have some sort of relationship? This is a difficult question because the bounds on the possible weight of an edge are a function of the degrees of both sets of vertices in the original bipartite graph. The latest developments in mathematical models and software for identifying these bounds, and for deciding when an observed edge weight is large, will be presented.

Operator Splitting methods for monotone inclusions in Euclidean spaces

Oday Hazaimah (Northern Illinois University)

Abstract: In this talk, an analytical approach for solving nonsmooth convex optimization and variational iequality problems is presented. The proposed iteration is a natural modification of the classical Extragradient algorithm. Extragradient algorithm finds the solution of the sum of two monotone operators by evaluating the smooth operator twice per iteration. One of the main advantages of the proposed scheme is to avoid evaluating an extra-gradient step per iteration, this modification is suggested when the composite objective function is a sum of three convex functions, one of them nonsmooth. Moreover, convergence and complexity analyses for the functional value sequence are derived for the two proposed algorithms, called the Half-extragradient method and its accelerated version by forcing Fejer monotonicity. Like most gradient-based methods, we provide a sublinear complexity of $O(1/k)$ for the Half-extragradient and $O(1/k^2)$ for its associate accelerated version.

Structure of frequent itemsets with extended double constraints

Ngan Hoang-Nguyen-Thuy (University of Louisiana at Lafayette)

Abstract: Frequent itemset discovering has been one essential task in data mining. In the worst case, the cardinality of the class of all frequent itemsets is an exponent which leads to many difficulties for users. Therefore, a model of constraint-based mining is necessary when their needs and interests are the top priority. Our project aims to find a structure of frequent itemsets that satisfy the following conditions: they include a subset C10, contain no items of a subset C11, and have at least an item belonging to subset C21. The first new point of our project is the proposed theoretical result that is the generalization of our former researches (Hai et al. in Adv Comput Methods Knowl Eng Sci 479:367–378, 2013). Second, based on new sufficient and necessary conditions discovered just for closed itemsets and their generators in association with the methods of creating borders and eliminating branches and nodes on the lattice, we can effectively and quickly eliminate not only a class of frequent itemsets but also one or more branches of equivalence classes of which elements are insatiate the constraints. Third, a structure and a unique representation of frequent itemsets with extended double constraints are shown by representative closed itemsets and their generators. Finally, all theoretical results are proven to be reliable and they are firm bases to guarantee the correctness and efficiency of a new algorithm, MFS-EDC, which is used to effectively mine all constrained frequent itemsets. Experiments show the outstanding efficiency of this new algorithm compared to modified post-processing algorithms on benchmark datasets.

Algebraic Pretopology

Nikola Milicevic (University of Florida)

Abstract: A more general notion of a topological space is a Čech closure space, also called a pretopological space. In algebraic topology among the main objects of study are homology and homotopy groups. I will discuss the extension of these groups to pretopological spaces and give examples from digital topology. Given enough time, I will mention possible applications to topological data analysis. This is joint work with Peter Bubenik.

Live Talks

Bruhat posets of Hermitian-type symmetric spaces

Aram Bingham (Tulane University)

Abstract: Compact irreducible Hermitian symmetric spaces come in four infinite families. In each case, their complexifications yield an associated affine bundle over a Grassmannian $\pi : G/L \to G/P$. I'll describe the Bruhat poset of containments of Borel orbit closures in the total space G/L for these cases, and discuss some results relating it to other well-known posets of matrix Schubert varieties.

3:30 – 3:55

Recorded Talks

Logarithmic Sobolev inequalities on non-isotropic Heisenberg groups

Liangbung Luo (University of Connecticut)

Abstract: A Heisenberg group is the simplest non-trivial example of a sub-Riemannian manifold. In this talk, we will discuss the dimension (in)dependence of the constants in logarithmic Sobolev inequalities on non-isotropic Heisenberg groups. In this setting, a natural Laplacian is not an elliptic but a hypoelliptic operator. The argument relies on viewing the logarithmic Sobolev inequality as a limiting case of Sobolev inequalities and tensorization of the logarithmic Sobolev inequalities.

Non-abelian Chabauty

Caleb McWhorter

Abstract: Let K be a number field, and let X/K be a smooth, projective, and geometrically integral curve of genus at least 2. By Faltings' Theorem, there are only finitely many K-rational points on X. However, Faltings' proof did not give a method of computing the set $X(K)$. This talk will outline the method of Chabuaty-Coleman, and the more recent non-abelian generalization of Kim in computing the set $X(K)$.

3:30 – 3:55

Live Talks

Weak Phase Retrieval

Dorsa Ghoreishi (University of Missouri)

Abstract: TBD

Invited Address – Dr. Theodora Bourni
4:15 – 5:15

Curve Shortening Flow

Dr. Theodora Bourni (University of Tennessee Knoxville)

Abstract: In this lecture we will introduce curve shortening flow, motivate its definition and present some of its interesting properties. In doing this we will also give a parallel with the heat equation.

Mathematics Graduate Organization