

Weekly Seminar & Events Bulletin

October 14th, 2018 - October 20th, 2018

Monday, October 15, 2018

- 12:00am-12:00am **Group, Lie and Number Theory** -- No Seminar () *Fall Break* -- 4088 East Hall
- 12:00am-12:00am **Geometry & Physics** -- Fall Break () -- 4096 East Hall
- 4:00pm-5:00pm **Complex Analysis, Dynamics and Geometry** -- Fall Break () -- 3088 East Hall

Tuesday, October 16, 2018

- 4:00pm-5:00pm **Colloquium Series** -- Fall Break () -- 1360 East Hall

Wednesday, October 17, 2018

- 3:00pm-3:50pm **Student Arithmetic** -- Kannappan Sampath (University of Michigan) *Kummer theory and arithmetic construction of class fields* -- EH 4096 East Hall
- 4:00pm-5:00pm **Financial/Actuarial Mathematics** -- Ibrahim Ekren (Florida State University) *Equilibrium option price with competing market makers* -- 1360 East Hall
- 4:00pm-5:20pm **Algebraic Geometry** -- Martin Olsson (UC Berkeley) *Categories of coherent sheaves and Torelli-type theorems.* -- 4096 East Hall
- 4:00pm-5:30pm **RTG Seminar on Geometry, Dynamics and Topology** -- Giuseppe Martone (U Michigan) *Positive coordinates for Higher Teichmueller spaces III* -- 3866 East Hall

Thursday, October 18, 2018

- 1:00pm-2:30pm **Student Homotopy Theory** -- Yunze Lu (University of Michigan) *An introduction to chromatic homotopy theory* -- 2866 East Hall
- 3:00pm-4:00pm **Commutative Algebra** -- Robert Marshawn Walker (University of Michigan) *On ideals defining products of affine schemes* -- 4088 East Hall
- 4:00pm-5:00pm **Colloquium Series** -- Martin Olsson (University of California, Berkeley) *Logarithmic geometry and applications to moduli theory.* -- 1360 East Hall
- 4:00pm-5:00pm **Student Algebraic Geometry** -- Andy Gordon (UM) *An Introduction to Chow Rings and Enumerative Problems* -- 3866 East Hall
- 4:00pm-5:00pm **Differential Equations** -- Qingtang Su (Umich) *Long time behavior of the 2d water waves with point vortices* -- 4088 East Hall

Friday, October 19, 2018

- 3:00pm-4:00pm **Topology** -- Aravind Asok (USC) (*SPECIAL DAY AND TIME*) *Torsion in K-theory and unstable A^1 -homotopy of the general linear group* -- 4096 East Hall
- 3:00pm-4:00pm **Applied Interdisciplinary Mathematics (AIM)** -- Benjamin Seibold (Temple University) *Moment closures in radiation transport and how to efficiently solve them* -- 1084 East Hall
- 3:00pm-3:50pm **Combinatorics** -- Pavel Galashin (M.I.T.) *Ising model and total positivity* -- 2866 East Hall
- 3:00pm-4:00pm **Geometry** -- Thomas Koberda (UVA) *Commensurators of thin subgroups of $PSL_2(\mathbb{Z})$* -- 3866 East Hall
- 4:00pm-5:00pm **Student AIM Seminar** -- Sharon Broude Geva (University of Michigan) *Women in High Performance Computing* -- 1084 East Hall
- 5:00pm-6:00pm **Student Machine Learning** -- Saibal De (University of Michigan) *Active Classification using Adaptive Submodularity (Cont.)* -- 4088 East Hall

Weekly Seminar & Events Bulletin
October 14th, 2018 - October 20th, 2018

Saturday, October 20, 2018

8:00am-6:00pm **Special Events** -- () *AMS Sectional Meeting* -- Mason Hall

Weekly Seminar & Events Bulletin

October 14th, 2018 - October 20th, 2018

Abstracts for the week of October 14th, 2018 - October 20th, 2018

Group, Lie and Number Theory

Monday, October 15, 2018, 12:00am-12:00am

4088 East Hall

No Seminar ()

Fall Break

Geometry & Physics

Monday, October 15, 2018, 12:00am-12:00am

4096 East Hall

Fall Break ()

Complex Analysis, Dynamics and Geometry

Monday, October 15, 2018, 4:00pm-5:00pm

3088 East Hall

Fall Break ()

Colloquium Series

Tuesday, October 16, 2018, 4:00pm-5:00pm

1360 East Hall

Fall Break ()

Weekly Seminar & Events Bulletin

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Student Arithmetic

Wednesday, October 17, 2018, 3:00pm-3:50pm

EH 4096 East Hall

Kannappan Sampath (University of Michigan)

Kummer theory and arithmetic construction of class fields

It is known that ray class fields over \mathbb{Q} are the cyclotomic extensions. Over imaginary quadratic fields, the ray class fields are constructed "analytically" using the theory of complex multiplication. But the computations arising from this method are elaborate and sometimes need a computer even in the simplest of cases. We will instead use Kummer theory to compute examples of class fields and explain why it suffices, in principle.

We will assume familiarity with Kummer theory. We will compute with Kummer extensions of cyclotomic extensions of \mathbb{Q} (and \mathbb{Q}_p); so some familiarity with explicit computations may be helpful. I will however explain notions from class field theory that are relevant.

Financial/Actuarial Mathematics

Wednesday, October 17, 2018, 4:00pm-5:00pm

1360 East Hall

Ibrahim Ekren (Florida State University)

Equilibrium option price with competing market makers

In this talk, we present a market equilibrium between \mathbb{N} option market makers that compete for the orders of their clients. The market makers face market illiquidity when trading the stock and manage their inventory optimally. In this framework, we exhibit a Nash equilibrium for the interaction of the agents and compute the equilibrium price of the option.

This is an ongoing work with Sergey Nadtochiy and Yavor Stoev, based on previous work with Peter Bank and Johannes Muhle-Karbe.

Algebraic Geometry

Wednesday, October 17, 2018, 4:00pm-5:20pm

4096 East Hall

Martin Olsson (UC Berkeley)

Categories of coherent sheaves and Torelli-type theorems.

Abstract: In this talk I will survey a program, joint with Max Lieblich, aimed at understanding structures associated to algebraic varieties and their connection with classification problems. The origin of this work is a result with Lieblich showing that the derived category of a K3 surface together with the codimension filtration on Chow groups modulo numerical equivalence determine the isomorphism class of the K3 surface. In this talk I will explain further results inspired by this as well as some open problems in the area.

Weekly Seminar & Events Bulletin

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RTG Seminar on Geometry, Dynamics and Topology

Wednesday, October 17, 2018, 4:00pm-5:30pm

3866 East Hall

Giuseppe Martone (U Michigan)

Positive coordinates for Higher Teichmueller spaces III

Shear and lambda-lengths coordinates parametrize two different versions of the Teichmueller space of a surface S with boundary and marked points.

Fock and Goncharov greatly generalized this picture by connecting it to Lusztig's theory of total positivity. Among other things, they introduced two new (dual) Higher Teichmueller spaces for S , and they proved that each of these spaces admits a "positive part". Moreover, they parametrized these positive parts using coordinates for moduli spaces of flags. The coordinate changes are explicitly described using tools coming from cluster algebras.

This series of talks will start by recalling the classical examples in an easy-to-generalize framework. As a consequence, very little background will be needed.

Student Homotopy Theory

Thursday, October 18, 2018, 1:00pm-2:30pm

2866 East Hall

Yunze Lu (University of Michigan)

An introduction to chromatic homotopy theory

Chromatic homotopy theory is based on Quillen's and Landweber's work on complex oriented cohomology theories and formal group laws. In this talk I will explain their results and introduce other basic concepts and results in the field, including what a chromatic filtration is. I will also survey how the theory applies to computations.

Commutative Algebra

Thursday, October 18, 2018, 3:00pm-4:00pm

4088 East Hall

Robert Marshawn Walker (University of Michigan)

On ideals defining products of affine schemes

This is joint work with Irena Swanson found on arXiv:1806.03545. Given a polynomial ring C over a field and proper ideals I and J whose generating sets involve disjoint variables, we determine how to embed the associated primes of each power of $I+J$ into a collection of primes described in terms of the associated primes of select powers of I and of J . We discuss applications to constructing primary decompositions for powers of $I+J$, and to attacking the persistence problem for associated primes of powers of an ideal.

Weekly Seminar & Events Bulletin

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Colloquium Series

Thursday, October 18, 2018, 4:00pm-5:00pm

1360 East Hall

Martin Olsson (University of California, Berkeley)

Logarithmic geometry and applications to moduli theory.

Logarithmic geometry in the sense of Fontaine, Illusie, and Kato was originally introduced in the late 1980s to study various phenomena in p-adic Hodge theory. Since that time the theory has found applications in many other parts of algebraic geometry such as Hodge theory, compactification of moduli spaces, and toric geometry. In this colloquium I will give an example-based introduction to the subject and discuss applications of logarithmic geometry to moduli theory.

Student Algebraic Geometry

Thursday, October 18, 2018, 4:00pm-5:00pm

3866 East Hall

Andy Gordon (UM)

An Introduction to Chow Rings and Enumerative Problems

In this talk I will define the Chow Ring of a smooth projective variety, and compute some simple examples. Then we will use these examples to solve nontrivial enumerative problems, questions of the form: "How many varieties are there satisfying certain restrictive conditions" For example, given 3 fixed circles, how many circles are simultaneously tangent to all 3? This talk will require no knowledge beyond the definition of a variety.

Differential Equations

Thursday, October 18, 2018, 4:00pm-5:00pm

4088 East Hall

Qingtang Su (Umich)

Long time behavior of the 2d water waves with point vortices

We consider the motion of inviscid, incompressible and infinite depth water waves with point vortices in the fluid in two space dimensions. We show that the Taylor sign condition can fail if the point vortices are sufficiently close to the free boundary, so the motion of the water waves can be subject to the Taylor instability. And we show that for certain initial configurations, the point vortices will keep moving away from the interface, so that the free interface will remain smooth for a long time; and for initial data of size ϵ , the lifespan of the smooth solution is at least of order ϵ^{-2} .

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Topology

Friday, October 19, 2018, 3:00pm-4:00pm

4096 East Hall

Aravind Asok (USC)

(SPECIAL DAY AND TIME) Torsion in K-theory and unstable A^1 -homotopy of the general linear group

A classical result of Suslin shows that Milnor K-theory of a field F arises as a measure of failure of cohomological stability for the discrete general linear group of F . Using this observation, Andrei Suslin constructed a "Hurewicz" homomorphism from the degree i algebraic K-theory of a field F to the degree i Milnor K-theory of F and made a precise conjecture about the image of this homomorphism. I will discuss recent work on Suslin's conjecture joint with Jean Fasel and Ben Williams. In brief, we reformulate Suslin's conjecture in terms of A^1 -homotopy of the general linear group and use this reformulation to establish new cases of the conjecture.

Applied Interdisciplinary Mathematics (AIM)

Friday, October 19, 2018, 3:00pm-4:00pm

1084 East Hall

Benjamin Seibold (Temple University)

Moment closures in radiation transport and how to efficiently solve them

Radiation transport computations require the numerical approximation of integro-differential equations in a high-dimensional phase space. We start off by contrasting different moment methods aimed at minimizing spurious Gibbs phenomenon oscillations. We then discuss high-order methods to solve the resulting moment systems, with a particular focus on asymptotic preserving properties, meaning that the diffusive nature of radiation transport in the optically dense regime is reproduced automatically by the numerical scheme, even when under-resolved. A particularly simple approach, based on staggered grids and exponential integrators, implemented in the free and open-source software StaRMAP, is shown in a radiation dose simulation as it arises in cancer therapy.

Weekly Seminar & Events Bulletin

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Combinatorics

Friday, October 19, 2018, 3:00pm-3:50pm

2866 East Hall

Pavel Galashin (M.I.T.)

Ising model and total positivity

The Ising model, introduced in 1920, is one of the most well-studied models in statistical mechanics. It is known to undergo a phase transition at critical temperature, and has attracted considerable interest over the last two decades due to special properties of its scaling limit at criticality.

The totally nonnegative Grassmannian is a subset of the real Grassmannian introduced by Postnikov in 2006. It arises naturally in Lusztig's theory of total positivity and canonical bases, and is closely related to cluster algebras and scattering amplitudes.

I will give some background on the above objects and then explain a precise relationship between the planar Ising model and the totally nonnegative Grassmannian, obtained in our recent work with P. Pylyavskyy. We will see how various known results from total positivity provide answers to old and new questions regarding the Ising model. We will also explore the topology of the underlying spaces (joint work with S. Karp and T. Lam), and discuss how several other topics (such as electrical networks and the amplituhedron) fit into our story.

Geometry

Friday, October 19, 2018, 3:00pm-4:00pm

3866 East Hall

Thomas Koberda (UVA)

Commensurators of thin subgroups of $PSL_2(\mathbb{Z})$

A celebrated result of Margulis says that among irreducible lattices in higher rank semi-simple Lie groups, arithmetic lattices are characterized as those having dense commensurators. If the subgroup of the Lie group is Zariski dense and discrete but is no longer assumed to have finite covolume (that is, to be thin), then no such definitive dichotomy exists. A heuristic due to Y. Shalom says that thin subgroups should be thought of as non-arithmetic. In this talk I will discuss a theorem confirming Shalom's heuristic for certain naturally defined thin subgroups of $PSL_2(\mathbb{Z})$. This is joint work with M. Mj and A. Reid.

Student AIM Seminar

Friday, October 19, 2018, 4:00pm-5:00pm

1084 East Hall

Sharon Broude Geva (University of Michigan)

Women in High Performance Computing

Dr. Geva will discuss the Women in High Performance Computing organization and the new chapter at the University of Michigan. Dr. Geva is Director of Advanced Research Computing (ARC) at the UofM and on the Executive Board of WHPC. Come find out more about the organization and how you can get involved!

Weekly Seminar & Events Bulletin

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Student Machine Learning

Friday, October 19, 2018, 5:00pm-6:00pm

4088 East Hall

Saibal De (University of Michigan)

Active Classification using Adaptive Submodularity (Cont.)

In this talk, I will continue with how adaptive submodularity can be used to construct an algorithm with theoretical guarantees for active classification.

Special Events

Saturday, October 20, 2018, 8:00am-6:00pm

Mason Hall

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AMS Sectional Meeting