<table>
<thead>
<tr>
<th>Date</th>
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<th>Seminar/Event</th>
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| Monday, Mar 5, 2018 | 12:00am-12:00am | **Complex Analysis, Dynamics and Geometry** -- Margaret Stawiska-Friedland (Math Reviews)  
  *Pseudo-Leja points and approximation of planar sets by polynomial Julia sets* -- 3096 East Hall |
|            | 4:00pm-5:00pm | **Integrable Systems and Random Matrix Theory** -- Ujue Etayo (Universidad de Cantabria (Spain))  
  *Distributing points on spheres through Determinantal Point Processes.* -- 1866 East Hall |
|            | 4:00pm-5:00pm | **Financial/Actuarial Mathematics** -- Pierre Cardaliaguet (Paris Dauphine) *On the (in)efficiency of mean field games.* -- 1360 East Hall |
|            | 4:00pm-5:00pm | **Student Combinatorics Seminar** -- Gracie Ingermanson (University of Michigan) *TBA* -- 3866 East Hall |
|            | 4:10pm-5:30pm | **Group, Lie and Number Theory** -- Marty Weissman (UC Santa Cruz) *The arithmetic of arithmetic Coxeter groups* -- 4088 East Hall |
| Tuesday, Mar 6, 2018 | 3:00pm-4:00pm | **Student Geometry/Topology** -- Montek Gill (University of Michigan) *Waldhausen’s algebraic K-theory of spaces* -- 3866 East Hall |
|            | 3:00pm-4:00pm | **Student Commutative Algebra** -- Zhan Jiang (University of Michigan) *Quasi-length, Content and Q-sequence* -- 3096 East Hall |
|            | 4:10pm-5:00pm | **Colloquium Series** -- Selim Esedoglu (University of Michigan) *Algorithms for mean curvature motion of networks* -- 1360 East Hall |
| Wednesday, Mar 7, 2018 | 4:10pm-5:30pm | **Algebraic Geometry** -- David Treumann (Boston College) *F-fields* -- 4096 East Hall |
|            | 5:15pm-6:30pm | **Teaching Mathematics** -- Nancy Kress (Univ Colorado, Boulder) *Inclusive Teaching in Mathematics: An Asset Oriented Approach* -- 3096 East Hall |
| Thursday, Mar 8, 2018 | 3:00pm-4:00pm | **Commutative Algebra** -- Jack Jeffries (University of Michigan) *Transformation rules for natural multiplicities* -- B735 East Hall |
|            | 4:00pm-5:00pm | **Student Dynamics** -- Yonatan Shelah (University of Michigan) *An introduction to complex dynamics in higher dimensions* -- 1866 East Hall |
|            | 4:00pm-5:30pm | **Logic** -- Dana Bartosova (Carnegie Mellon University) *Ellis' problem for automorphism groups* -- 3088 East Hall |
|            | 4:10pm-5:30pm | **Preprint Algebraic Geometry Seminar** -- Haoyang Guo (UM) *Line bundles on rigid varieties and Hodge symmetry (following Hansen-Li)* -- 2866 East Hall |
|            | 5:00pm-6:00pm | **Topology** -- Disheng Xu (University of Chicago) *Rigidity of Abelian action with hyperbolicity* *Note change in time.* -- 1866 East Hall |
|            | 5:00pm-6:00pm | **Representation Stability** -- Nir Gadish (University of Chicago) *Finitely generated sequences of linear subspace arrangements* -- 3866 East Hall |
# Weekly Seminar & Events Bulletin  
March 4th, 2018 - March 10th, 2018

## Friday, March 09, 2018

<table>
<thead>
<tr>
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<td><strong>Special Events</strong> -- () Mathematics Graduate Recruitment</td>
<td>-- East Hall</td>
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<td>-- 1866 East Hall</td>
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<tr>
<td>3:00pm-4:00pm</td>
<td><strong>Applied Interdisciplinary Mathematics (AIM)</strong></td>
<td>-- Michael Shelley (New York University/Flatiron Institute) <em>Modeling and simulating active mechanics in the cell</em> -- 1084 East Hall</td>
</tr>
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<td>3:10pm-4:00pm</td>
<td><strong>Student Algebraic Geometry</strong></td>
<td>-- Jason Liang (UM) <em>The Jacobian Variety</em> -- 3096 East Hall</td>
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<td>4:10pm-5:00pm</td>
<td><strong>Combinatorics</strong></td>
<td>-- Zachary Hamaker (U. Michigan) <em>K-triangulations, subwords and plane partitions</em> -- 4088 East Hall</td>
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<td>5:10pm-6:00pm</td>
<td><strong>Special Events</strong> -- Sijue Wu (UM) Recruitment Symposium: Mathematical Analysis of the Water Wave Motion</td>
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<tr>
<td>9:45am-10:00am</td>
<td><strong>Special Events</strong> -- Brenae Smith and Molly Tiernan Bannow (UM)</td>
<td><em>Recruitment Symposium: Life in Ann Arbor</em> -- B844 East Hall</td>
</tr>
<tr>
<td>10:10am-11:00am</td>
<td><strong>Special Events</strong> -- Charlotte Chan (UM) Recruitment Symposium: The Drinfeld Curve</td>
<td>-- 1360 East Hall</td>
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<tr>
<td>10:10am-10:40am</td>
<td><strong>Special Events</strong> -- Audra McMillan (UM) Recruitment Symposium: Introduction to Differential Privacy</td>
<td>-- B844 East Hall</td>
</tr>
<tr>
<td>10:40am-11:10am</td>
<td><strong>Special Events</strong> -- Bobbie Wu (UM) Recruitment Symposium: A Simplest High-order Numerical Method</td>
<td>-- B844 East Hall</td>
</tr>
<tr>
<td>11:10am-12:00pm</td>
<td><strong>Special Events</strong> -- Wouter Van Limbeek (UM) Recruitment Symposium: Geometry of Expander Graphs</td>
<td>-- 1360 East Hall</td>
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Abstracts for the week of March 4th, 2018 - March 10th, 2018

Complex Analysis, Dynamics and Geometry

Monday, March 05, 2018, 12:00am-12:00am
3096 East Hall
Margaret Stawiska-Friedland (Math Reviews)

Pseudo-Leja points and approximation of planar sets by polynomial Julia sets

We revisit approximation of nonempty compact planar sets by filled-in Julia sets of polynomials proposed by K. Lindsey and M. Younsi and connect it with recent results in interpolation theory by V. Andrievskii, M. Ounaies, A. Irigoyen and others. Specifically, we show that using slightly modified fundamental Lagrange interpolation polynomials with certain nodes having subexponential growth of Lebesgue constants improves the approximation rate given by Lindsey and Younsi. To this end we investigate interpolation properties of some arrays of points in $\mathbb{C}$ and prove subexponential growth of Lebesgue constants for pseudo Leja sequences with bounded Edrei growth on finite unions of quasiconformal arcs. Finally, for some classes of sets we estimate more precisely the rate of approximation by filled-in Julia sets in Hausdorff and Klimek metrics. This is joint work with Leokadia Bialas-Ciez and Marta Kosek.

Integrable Systems and Random Matrix Theory

Monday, March 05, 2018, 4:00pm-5:00pm
1866 East Hall
Ujue Etayo (Universidad de Cantabria (Spain))

Distributing points on spheres through Determinantal Point Processes.

How are holes in the pollen particles distributed in such a way as to optimize germination? How do we determine the organization of the proteins that cover the viruses? What is the optimal encapsulation of active ingredients such as drugs, nutrients or living cells? All of these structures correspond to an intuitive notion of "well distributed points" in the two dimensional sphere. A question arises naturally: what is the explicit mathematical definition of well distributed points? The answer varies a lot: from points that minimize the error of interpolation to best packing problems passing through points that minimize a potential on the sphere. During this talk we will explore the configurations of points in d-dimensional spheres that minimize some potential or energy. Surprisingly, some of the best configurations in this sense are random configurations of points. In particular, they come from the so-called Determinantal Point Processes. We will see some properties of Determinantal Point Processes and how we can take advantage of them in order to obtain well distributed points on the sphere.
Financial/Actuarial Mathematics
Monday, March 05, 2018, 4:00pm-5:00pm
1360 East Hall
Pierre Cardaliaguet (Paris Dauphine)
On the (in)efficiency of mean field games.

Mean field games (MFG) are dynamic games with infinitely many infinitesimal agents. In this joint work with C. Rainer, we study the efficiency of Nash MFG equilibria: Namely, we compare the social cost of an MFG equilibrium with the minimal cost a global planner can achieve. We find a structure condition on the problem under which there exists efficient MFG equilibria and, in case this condition is not fulfilled, quantify how inefficient MFG equilibria are.

Joint work with Catherine Rainer.

Student Combinatorics Seminar
Monday, March 05, 2018, 4:00pm-5:00pm
3866 East Hall
Gracie Ingermanson (University of Michigan)
TBA

Group, Lie and Number Theory
Monday, March 05, 2018, 4:10pm-5:30pm
4088 East Hall
Marty Weissman (UC Santa Cruz)
The arithmetic of arithmetic Coxeter groups

In the 1990s, John H. Conway developed a visual approach to the study of integer-valued binary quadratic forms. His creation, the "topograph," sheds light on classical reduction theory, the solution of Pell-type equations, and allows tedious algebraic estimates to be simplified with straightforward geometric arguments. The geometry of the topograph arises from a coincidence between the Coxeter group of type (3, infinity) and the group PGL(2,Z). From this perspective, Conway's topograph is the first in a series of applications arising from coincidences between Coxeter groups and arithmetic groups. In this talk, I will survey Conway's results and generalizations arising from arithmetic hyperbolic Coxeter groups.

Student Geometry/Topology
Tuesday, March 06, 2018, 3:00pm-4:00pm
3866 East Hall
Montek Gill (University of Michigan)
Waldhausen's algebraic K-theory of spaces

I will describe Waldhausen's algebraic K-theory of spaces, and what relation it has to the diffeomorphism groups of smooth manifolds via the Whitehead spaces.
Mel and Craig defined "content", which is a heuristic measure of local cohomology, in their joint paper[1]. This idea is that since the top local cohomology with support on I is a directed limit of Ext’s, which are killed by a power of I, we should use the generalized length (called quasi-length) to measure each Ext module and take the limit of that. It turns out that although the quasi-length notion is quite hard to compute, the content notion behaves quite well in some "good" cases. I will explain all these notions and give some basic examples. I will also mention some open problems related to these notions. This talk is based on two papers [1] & [2].

Colloquium Series

Tuesday, March 06, 2018, 4:10pm-5:00pm
1360 East Hall

Selim Esedoglu (University of Michigan)

Algorithms for mean curvature motion of networks

Motion by mean curvature for networks of surfaces arises in a variety of applications, such as the dynamics of foam and the evolution of microstructure in polycrystalline materials. It is steepest descent (gradient flow) for an energy: the sum of the areas of the surfaces constituting the network.

During the evolution, surfaces may collide and junctions (where three or more surfaces meet) may merge and split off in myriad ways as the network coarsens in the process of decreasing its energy. The first idea that comes to mind for simulating this evolution -- parametrizing the surfaces and explicitly specifying rules for cutting and pasting when collisions occur -- gets hopelessly complicated. Instead, one looks for algorithms that generate the correct motion, including all the necessary topological changes, indirectly but automatically via just a couple of simple operations.

An almost miraculously elegant such algorithm, known as threshold dynamics, was proposed by Merriman, Bence, and Osher in 1992. Extending this algorithm, while preserving its simplicity, to more general energies where each surface in the network is measured by a different, possibly anisotropic, notion of area requires new mathematical understanding of the original version, which then elucidates a systematic path to new algorithms.

Algebraic Geometry

Wednesday, March 07, 2018, 4:10pm-5:30pm
4096 East Hall

David Treumann (Boston College)

F-fields

An F-field on a manifold M is a local system of algebraically closed fields of characteristic p. You can study local systems of vector spaces over this local system of fields. On a 3-manifold, they're rigid, and the rank one local systems are counted by the Alexander polynomial. On a surface, they come in positive-dimensional moduli (perfect of characteristic p), but they are more stable than ordinary local systems, in the GIT sense. When M is symplectic, maybe an F-field should remind you of a B-field, it can be used to change the Fukaya category in about the same way. On S^1 x R^3, this version of the Fukaya category is related to Deligne-Lusztig theory, and I found something like a cluster structure on the Deligne-Lusztig pairing varieties by studying it.
Teaching Mathematics  
Wednesday, March 07, 2018, 5:15pm-6:30pm  
3096 East Hall  
Nancy Kress (Univ Colorado, Boulder)  
*Inclusive Teaching in Mathematics: An Asset Oriented Approach*  

We will explore a few key shifts in instructional strategies which can significantly impact students' opportunities to participate actively in learning and doing mathematics. I will share how I am thinking about this challenge conceptually, what I mean by “teaching for equitable access,” how I have used these strategies in high school and college classes, and finally the varied ways that students have responded to these teaching approaches. I will provide significant time to answer your questions and to engage in conversation about particular challenges you may face.

A supporting reading is available on the Mathematics Learning Community on Inclusive Teaching webpage, [http://www.math.lsa.umich.edu/~glarose/dept/teaching/icit.html](http://www.math.lsa.umich.edu/~glarose/dept/teaching/icit.html).

Commutative Algebra  
Thursday, March 08, 2018, 3:00pm-4:00pm  
B735 East Hall  
Jack Jeffries (University of Michigan)  
*Transformation rules for natural multiplicities*  

This is based on joint work with Ilya Smirnov.

A question of Kollár asks whether varieties with good algebraic properties (log-terminal singularities) have nice topological properties (finite local fundamental group). Motivated by this question, Carvajal-Rojas, Schwede, and Tucker proved a transformation rule for F-signature under finite maps with small ramification. Their result yields bounds for the size of the étale local fundamental group. In this talk, we will show the analogous result for differential signature, a numerical invariant that makes sense over fields of any characteristic. Our proof also yields a simplified approach to the aforementioned result.

Student Dynamics  
Thursday, March 08, 2018, 4:00pm-5:00pm  
1866 East Hall  
Yonatan Shelah (University of Michigan)  
*An introduction to complex dynamics in higher dimensions*  

I will introduce the Fatou, Julia and indeterminacy sets for meromorphic functions on $\mathbb{P}^n$. Special attention will be paid to some surprising differences from the one-dimensional case of rational functions.
Logic
Thursday, March 08, 2018, 4:00pm-5:30pm
3088 East Hall
Dana Bartosova (Carnegie Mellon University)
Ellis’ problem for automorphism groups

Ellis’ problem is a problem from topological dynamics asking whether two well studied flows are canonically isomorphic. In the case of groups of automorphisms of discrete structures, we can translate this problem into a question about Boolean algebras and solve the problem for some countable structures. We also arrive at questions about existence of certain ultrafilters. This is a join work with Andy Zucker.

Preprint Algebraic Geometry Seminar
Thursday, March 08, 2018, 4:10pm-5:30pm
2866 East Hall
Haoyang Guo (UM)
Line bundles on rigid varieties and Hodge symmetry (following Hansen-Li)
https://arxiv.org/abs/1708.08506

Topology
Thursday, March 08, 2018, 5:00pm-6:00pm
1866 East Hall
Disheng Xu (University of Chicago)
Rigidity of Abelian action with hyperbolicity *Note change in time.

Smooth classification of actions of higher rank groups (with hyperbolicity) has been a topic of interest for few decades. Many differentiable rigidity properties of the irreducible algebraic models support the following conjecture made by A. Katok and R. Spatzier: All “irreducible” smooth Anosov $\mathbb{Z}^k$ actions on any compact smooth manifold are smooth conjugate to algebraic models. Katok-Spatzier conjecture is proved under the assumption the supporting manifold is an infranilmanifold. In a more general problem, i.e. partially hyperbolic abelian actions of higher-rank abelian groups there have been so far no smooth classification results.

In this talk I will talk about our recent progress towards Katok-Spatzier conjecture on general manifold (joint work with D. Damjanovic). And for partially hyperbolic action with compact center fibers, (joint work with D. Damjanovic and A. Wilkinson, working in progress) we also get a global classification result if the center is one or two dimensional.
Representation Stability
Thursday, March 08, 2018, 5:00pm-6:00pm
3866 East Hall
Nir Gadish (University of Chicago)
Finitely generated sequences of linear subspace arrangements

Hyperplane arrangements are a classical meeting point of topology, combinatorics and representation theory. Generalizing to arrangements of linear subspaces of arbitrary codimension, the theory becomes much more complicated. However, a crucial observation is that many natural sequences of arrangements seem to be defined using a finite amount of data.

In this talk I will describe a notion of ‘finitely generation’ for collections of arrangements, unifying the treatment of known examples. Such collections turn out to exhibit strong forms of stability, both in their combinatorics and in their cohomology representation. This structure makes the appearance of representation stability transparent and opens the door to generalizations.

Special Events
Friday, March 09, 2018, 10:10am-11:00am
B844 East Hall
Danny Forger (UM)
Recruitment Symposium: Mathematical Approaches to Study Circadian Rhythms

I will describe mathematical models of networks of neurons and chemical reactions within neurons that generate daily (circadian) timekeeping. I will also describe an app we developed that tracks sleep and circadian rhythms of individuals in over 100 countries.

Special Events
Friday, March 09, 2018, 11:10am-12:00pm
B844 East Hall
Sasha Barvinok (UM)
Recruitment Symposium: Complex Geometry and Computational Complexity

For a variety of reasons, we sometimes want to evaluate (exactly or approximately) multivariate polynomials (physicists call them “partition functions”) defined as sums of great many monomials, indexed by some combinatorial structures, such as permutations. A good example is provided by the permanent of a matrix, which looks like the determinant, only simpler: all monomials are counted with the “+” sign. It turns out that such a polynomial can be evaluated efficiently in a complex domain if it does not have zeros in a slightly larger domain. I am going to describe some results and simple-looking questions which we have no idea how to answer.
Symplectic Reading Group
Friday, March 09, 2018, 12:00am-12:00am
1360 East Hall

()  

No meeting this week.

Student Homotopy Theory
Friday, March 09, 2018, 12:10pm-2:00pm
1360 East Hall
Yunze Lu (University of Michigan)

The Adams spectral sequence and some basic computations

Spectral sequences are ubiquitous in algebraic topology, they have been playing an important role in various computations for stable objects. The main goal of this talk is to provide the audience with a workable setup for the Adams spectral sequence based on generalised (co)homology theories, and also to present a few basic examples, like computations for complex corbidism MU. We will start with a brief account of how spectral sequences originated in Leray's and Serre's work. With an appropriate resolution we will obtain Adams's generalisation. We will also discuss formal group laws and how they are related to complex oriented cohomology theories.

Special Events
Friday, March 09, 2018, 1:10pm-2:00pm
3096 East Hall
Wei Ho (UM)

Recruitment Symposium: Rational Points on Curves

A simple but fundamental problem in arithmetic geometry is to find the rational solutions to a system of polynomial equations. When those equations cut out a curve, the answer to this question strongly depends on a geometric invariant, called the genus. In the case of genus one curves, the number of rational solutions can be zero, finite but nonzero, or infinite. For those with at least one rational point, it is still unknown how many such curves have finitely many points. In this talk, I will discuss conjectures, heuristics, data, and theorems related to this problem.

Special Events
Friday, March 09, 2018, 1:10pm-2:00pm
1866 East Hall
(UM)
Recruitment Symposium: AIM Graduate Student Panel

Students: Jia Guo, Alexander Zaitzeff, Ray Navarrete, and Leighton Wilson will host an AIM Student Panel answering some of your questions regarding the AIM Program and life here at University of Michigan.
Many fundamental phenomena in eukaryotic cells - nuclear migration, spindle positioning, chromosome segregation - involve the interaction of (often transitory) cellular structures with boundaries and fluids. Understanding the consequences of these interactions require specialized numerical methods for their large-scale simulation, as well as mathematical modeling and analysis. In this context, I will discuss the recent interactions of mathematical modeling and large-scale, detailed simulations with experimental measurements of activity-driven biomechanical processes within the cell.

Student Algebraic Geometry
Friday, March 09, 2018, 3:10pm-4:00pm
3096 East Hall
Jason Liang (UM)
The Jacobian Variety

We will discuss the Jacobian variety of a complex projective curve. This talk will be accessible to anyone who is in or has taken 632.

Special Events
Friday, March 09, 2018, 3:10pm-4:00pm
B844 East Hall
William Fulton (UM)
Recruitment Symposium: Formulas for Degeneracy Loci

In the 1840's, Cayley and Salmon found formulas for the loci of m by n matrices which do not have maximal rank. Because these varieties are defined by many more equations than their codimension, finding such formulas has been a challenge and stimulus to the development of intersection theory ever since.

Student AIM Seminar
Friday, March 09, 2018, 4:10pm-5:00pm
1084 East Hall
(University of Michigan)
Meet-and-Greet with Recruits

Come meet the new recruits and encourage them to study applied math here at Michigan!
Combinatorics
Friday, March 09, 2018, 4:10pm-5:00pm
4088 East Hall
Zachary Hamaker (U. Michigan)
K-triangulations, subwords and plane partitions

We survey bijections between several families of objects: centrally symmetric k-triangulations of a 2(n + k)-gon, plane partitions of height at most k in the square of size n and the Type B root poset, facets of two distinct subword complexes. With one exception, these bijections are in some sense combinatorial lifts of previously known maps. Subwords are lifts of reduced words and plane partitions are lifts of linear extensions. We will also discuss extensions to other types and connections to the K-theory of miniscule varieties. This work is joint with Nathan Williams, Rebecca Patrias and Oliver Pechenik.

Special Events
Friday, March 09, 2018, 5:10pm-6:00pm
1360 East Hall
Sijue Wu (UM)
Recruitment Symposium: Mathematical Analysis of the Water Wave Motion

I will give some explanations of the water wave phenomena using rigorous mathematical analysis.

Special Events
Friday, March 09, 2018, 8:00am-6:00pm
East Hall

Mathematics Graduate Recruitment

Special Events
Saturday, March 10, 2018, 10:10am-11:00am
1360 East Hall
Charlotte Chan (UM)
Recruitment Symposium: The Drinfeld Curve

The Drinfeld curve $xy^q - yx^q = 1$ has number theoretic origins but has had an enormous impact on representation theory. As such, it is an illustrative example of how ideas in representation theory, number theory, and algebraic geometry interact. In this talk, I will describe the representations of SL2(Fq) and discuss the central role of the Drinfeld curve in this story.
Sebastian is a belieber so, over the years, everyone in the department has told him (in confidence) whether or not they like the Beibs. The recruits for next year would like the fraction of the department who are beliebers made public to help aid their decision. Michael is against this statistic being released because he worries it might reveal something embarrassing about him. The field of differential privacy addresses the two main questions: are Michael's fears valid? and how can Sebastian release a useful version of this statistic and stay friends with Michael? In addition to ensuring that Michael's belieber status does not become public information, differential privacy places the notion of privacy in a rigorous mathematical framework and gives us a way to quantify privacy loss. In this talk, we will discuss the definition of differential privacy and a few key algorithms that achieve it.

A central task of numerical analysis is to develop efficient numerical methods for scientific and engineering problems. In Calculus class, we learned about the trapezoidal rule for numerical integrations, which is only second-order accurate. In this talk, we will show that the trapezoidal rule is, in fact, an "infinite-order" method when applied to a certain class of integrands.

Expander graphs are mathematical models of efficient networks: Namely they are finite graphs that are robust (i.e. hard to disconnect), yet sparse. As such they are very desirable and have many applications, but unfortunately, they have proven notoriously difficult to construct explicitly. We will see how the interplay between ideas from spectral geometry, representation theory, geometric group theory and dynamics have led to constructions of expander graphs with a wide range of different geometric behavior.
The Phase Response Curve (PRC) is an experimentally obtainable measure used to articulate certain properties of a neuron's excitability profile. However, the concept of the PRC also arises from the mathematical study of dynamical systems, particularly coupled oscillators. Given the interdisciplinary development of this measure, it is an extremely useful tool for computational neuroscientists seeking to understand the dynamics of complex neural networks, particularly those that tend to exhibit neural synchrony.

In this talk, I will introduce the PRC from both a mathematical and neuroscientific standpoint and describe how this measure is obtained in both settings. I will then illustrate the usefulness of this measure in the context of recently published research in which I studied the how properties of the PRC and changing network topologies interact to differentially affect the tendency for the classic E-I neural network to exhibit synchronous oscillations. This work is of interest to the neuroscientific community given that changes to the PRC of the type studied here can be achieved by modulation by the ubiquitous neuromodulator Acetylcholine, while also of interest to mathematicians interested in the dynamics of complex networks of coupled oscillators, in this case represented by neurons.