

**Submittee:** Jayadev Athreya

**Date Submitted:** 2017-05-31 10:21

**Title:** Pacific Northwest Dynamics Day

**Event Type:** Conference-Workshop

---

**Location:**

University of Washington

---

**Dates:**

April 29, 2017

---

**Topic:**

Dynamical systems and ergodic theory, applications to number theory

---

**Methodology:**

Lectures and social events

---

**Objectives Achieved:**

Dynamicists and ergodic theorists across the PIMS community were made aware of each others latest research and connections between fields.

---

**Scientific Highlights:**

Mike Boyle, new to the pacific northwest, gave a beautiful talk on the mapping class group of shifts. Tom Schmidt's talk on pseudo-Anosov maps led to many new questions connecting geometry and dynamics, and introduced flat surfaces to a new audience, and Lior Silberman (UBC)'s final talk of the day, on quantum unique ergodicity, showed deep connections between dynamics, number theory, and analysis.

---

**Organizers:**

Athreya, Jayadev, Mathematics, UW

Lind, Douglas, Mathematics, UW

Hoffman, Chris, Mathematics, UW

Quas, Anthony, Mathematics, UVic

---

**Speakers:**

9:00am-10:00am

Mike Boyle

Title: The mapping class group of a shift of finite type

Abstract: The mapping class group of a nontrivial irreducible shift of finite type (SFT) is the group of flow equivalences of its mapping torus up to isotopy. It plays the role for flow equivalence that the automorphism group plays for topological conjugacy. The group is countable; acts faithfully (and for all  $n$ ,  $n$ -transitively) on the set of circles in the mapping torus; is not residually finite; has solvable word problem; has a nontrivial outer automorphism group; contains the automorphism group (mod powers of the shift) of every flow equivalent shift; etc. This is joint work with Sompong Chuysurichay.

10:00am-10:30am

Coffee

10:30am-11:30 am

Ronnie Pavlov

Title: Non-uniform specification properties for subshifts

Abstract: The celebrated specification property of Bowen implies many useful properties for an expansive topological dynamical system, among them intrinsic ergodicity, i.e. uniqueness of the measure of maximal entropy. In the setting of symbolic dynamics, this property is equivalent to the existence of a constant  $N$  such that any two  $n$ -letter words  $v, w$  in the language can be combined into a new word in the language given a gap between them of length at least  $N$ . There are several natural weakenings of specification in the symbolic setting; for instance one can allow a gap which grows as a function  $f(n)$ , or one can allow a small number  $g(n)$  of "edits" to the letters of  $v, w$  instead of leaving a gap; we call these properties non-uniform gap specification and non-uniform mistake specification. I will summarize some results about these properties, focusing mostly on thresholds for  $f(n)$  and  $g(n)$  which are known to either guarantee intrinsic ergodicity or allow for multiple measures of maximal entropy.

11:30am-12:30pm

Tom Schmidt

Title: Pseudo-Anosov maps with vanishing Sah-Arnoux-Fathi invariant

Abstract: The Sah-Arnoux-Fathi invariant (SAF) is a homomorphism from the group of interval exchange maps under function composition to a certain abelian group. Arnoux showed that SAF gives an invariant of flow directions on translation surfaces (these are the flat structures on Riemann surfaces determined by integration of an abelian differential). Each orientable pseudo-Anosov map can be realized as an affine diffeomorphism on a translation surface. There are scattered examples in the literature of pseudo-Anosov maps whose expanding direction has vanishing SAF-value. We characterize all such pseudo-Anosov maps in terms of their dilatation. This is joint work with my student, Hieu Trung Do.

12:30pm - 2pm

Lunch

2pm-3pm

Anthony Quas

Title: Stability of Lyapunov Exponents for Hilbert Space Operator Cocycles

Abstract: We study a family of noise-like perturbations of a cocycle of compact operators on a separable Hilbert space (over an arbitrary base dynamical system). We prove that the Lyapunov exponents of the perturbed cocycle converge to those of the unperturbed cocycle as the magnitude of the perturbations is shrunk to 0; we also show that the corresponding Oseledets subspaces converge in probability to the Oseledets subspaces for the unperturbed cocycle.

3:00pm-3:30pm

Coffee

3:30pm-4:30pm

Lior Silberman

Title: Quantum Unique Ergodicity on Locally Symmetric spaces

Abstract: I shall discuss the problem of equidistribution of exact and approximate eigenfunctions on rank-1 and high-rank locally symmetric spaces, paying particular emphasis to the role of homogenous dynamics. After a general introduction I will describe positive and negative results, joint (separately) with Venkatesh, Anantharaman and Eswarathasan.

**Links:**

<https://sites.math.washington.edu/pnodd/>

---