

# 2001 - Talks

Contact [Marie Taris](#) for details.

<b>MATHEMATICS TALKS LIST</b>	<b>2001</b>	
Analysis Seminar Wednesday, 01/17 1:00, Room 199	Organizational Meeting	
Solvmanifold Seminar Friday, 1/19 3:00, Room 199	Tracy Payne Washington University	"Geometry of Homogenous Spaces"
Wavelets Seminar Tuesday, 1/23 4:00, Room 199	Guido Weiss Washington University	"Continuous and discreet wavelets revisited"
Major Oral Wednesday, 1/24 4:00, Room 199	Mauro Maggioni	"Wavelet frames on $H^{\{n\}}$ via discretization of a continuous Calderón formula"
Analysis Seminar Friday, 1/26 11:00, Room 199	Prof. Kang-Tae Kim Pohang Institute of Science & Technology and Washington University	"On the Kohn-Nirenberg domain and its holomorphic automorphisms"
Wavelets Seminar Tuesday, 1/30 4:00, Room 199	Hrvoje Sikic University of Zagreb	"Properties of the dimension function for TFWs"

Analysis Seminar Friday, 2/2 11:00, Room 199	Prof. Hugo Aimar Universidad Nacional del Litoral-Conicet.	"Modeling PDE problems through spaces of homogeneous type"
Solvmanifold Seminar Friday, 2/2 3:00, Room 199	Prof. Tracy Payne Washington University	"Examples of Solvmanifolds"
Wavelets Seminar Tuesday, 2/6 4:00, Room 199	Hrvoje Sikic University of Zagreb	"Properties of the dimension function for TFWs" (Continued)
Colloquium Thursday, 2/8 4:00 tea, Room 200, 4:30 talk, Room 199	Prof. Bill Ross University of Richmond	"Generalized analytic continuation" Host: John McCarthy
<p>ABSTRACT: This talk will be a historical survey of the ways in which the component functions <math>f _{D_{\{j\}}}</math>, where <math>D_{\{j\}}</math> are the components of an open set <math>U</math>, of a meromorphic function <math>f</math> on <math>U</math> can be meaningfully "related" to each other. We start with some of the classical results of Weierstrass, Poincare, Borel, and Walsh and then proceed to more modern results of Gonchar, Tumarkin, and Shapiro. We also mention some applications of this notion of "continuation" (beyond analytic continuation) to various problems in analysis and operator theory. A follow-up seminar talk will give more details of the applications of generalized analytic continuations to problems in operator theory.</p>		
Analysis Seminar Friday, 2/9 11:00, Room 199	Prof. Bill Ross University of Richmond	"Formal trigonometric series and cyclic vectors for the backward shift" Host: John McCarthy
<p>ABSTRACT: If <math>X</math> is some reasonable Banach space of analytic functions on the unit disk, what are the cyclic vectors for the backward shift operator <math>B F = (f - f(0))/z</math> on <math>X</math>? We will use the notion of "continuation by formal trigonometric series" mentioned in the previous colloquium talk to discuss this problem.</p>		
Solvmanifold Seminar Friday, 2/9 3:00, Room 199	Chal Benson University of Missouri-St. Louis	"Damek-Ricci Spaces"

Colloquium Friday, 2/9 3:30 tea, Room 200, 4:00 talk, Room 199	Prof. John Shareshian University of Miami	"Subgroup lattices of finite groups" Host: Steve Krantz
<p>ABSTRACT: I will discuss questions involving relations between the algebraic properties of a finite group and the combinatorial structure of its lattice of subgroups, with an emphasis on the order complex of the subgroup lattice. For any partially ordered set <math>P</math>, the order complex of <math>P</math> is the (abstract) simplicial complex whose <math>k</math>-dimensional faces are the totally ordered subsets of <math>P</math> having size <math>k+1</math>. The subgroup lattice of <math>G</math> is simply the set <math>L(G)</math> of all subgroup of <math>G</math>, partially ordered by inclusion. So, one can associate a topological space to <math>G</math> by taking a geometric realization of the order complex of <math>L(G)</math> and investigate connections between the algebraic structure of <math>G</math> and the topological structure of this space. I will present various results and conjectures involving the objects mentioned above.</p>		
Wavelets Seminar Tuesday, 2/13 4:00, Room 199	Guido Weiss Washington University	"A review of the characterization of wavelets produced by general dilations and translations."
Solvmanifold Seminar Friday, 2/16 3:00, Room 199	Prof. Chal Benson University of Missouri-St. Louis	"Damek-Ricci Spaces Continued"
Colloquium Thursday, 2/22 4:00 tea, Room 200, 4:30 talk, Room 199	Prof. Bill Shannon Washington University School of Medicine	"Correlation of Gene Expression Levels with Covariates in Microarray Experiments"
<p>ABSTRACT: Gene chips have become one of the hottest tools available in biomedical research. I will describe a novel statistical approach we have developed using Mantel statistics to correlate gene chip data with clinical covariates. These methods are illustrated using brain tumor data, and the results contrasted with results obtained using current state-of-the-art biostatistical approaches.</p>		
Analysis Seminar Friday, 2/23 11:00, Room 199	Jong-Guk Bak Pohang Institute of Science and	"Estimates for Radon transforms in the plane"

	Technology, Korea	
Solvmanifold Seminar Friday, 2/23 3:00, Room 199	Prof. Chal Benson University of Missouri-St. Louis	"Damek-Ricci Spaces continued"
Wavelets Seminar Tuesday, 2/27 4:00, Room 199	Undergraduate Phillip Gressman Washington University	"Wavelets defined on the integers"
Loeb Colloquium Thursday, 3/1 4:00 tea, Room 200, 4:30 talk, Room 199	Prof. Craig Huneke University of Kansas- Lawrence	"A history of the use of characteristic $p$ in commutative algebra" Host: N. Mohan Kumar
<p>ABSTRACT: This talk will be largely historical in nature, tracing the use of reducing to characteristic <math>p</math> in commutative algebra. Perhaps the first use of this technique comes from the proof in 1857 of the irreducibility of the cyclotomic polynomials. An illustration of this technique to a well-known problem in graph theory will be given, and the uses of it in the 1970s and early 1980s to several problems in homological algebra will be discussed, leading up to the creation in 1986 of the theory of tight closure.</p>		
Analysis Seminar Friday, 3/2 11:00, Room 199	Cristina Draghici Washington University	"Polarization inequalities for integrals with application to Schrödinger heat kernels"
Seminar Friday, 3/2 2:30, Room 115	Prof. Craig Huneke University of Kansas- Lawrence	A generalized Krull height theorem
Solvmanifold Seminar Friday, 3/2 3:00, Room 199	Gail Ratcliff University of Missouri-St.	"Einstein Solvmanifolds"

	Louis	
Major Oral Monday, 3/5 11:00, Room 199	Brody Johnson	"Generalized Quasi-Affine Frames and the Algorithm $\hat{A}$ Trous"
Wavelet Seminar Tuesday, 3/6 4:00, Room 199	Guido Weiss Washington University	"The Frazier-Jawerth Approach"
Colloquium CANCELLED Thursday, 3/8 4:00 tea, Room 200, 4:30 talk, Room 199	Jeff McNeal Ohio State University	" $L^2$ harmonic forms on some Kaehler manifolds" Host: Steve Krantz
<p>ABSTRACT: I will discuss a new vanishing theorem on complete, Kaehler manifolds. The result says that there are no harmonic <math>(p,q)</math> - forms on a complete, Kaehler manifold <math>M</math> (if <math>p+q</math> is not equal to <math>n = \dim M</math>) whenever <math>M</math> satisfies 2 conditions: (i) the metric on <math>M</math> is given by a global potential, and (ii) the gradient of this potential grows slower than (a constant times) the potential function itself. This result extends an earlier result of Gromov. I will give some examples to illustrate the new theorem.</p>		
Kirk Lecture Thursday, 3/22 4:00 tea, Room 200, 4:30 talk, Room 199	Prof. Leonard Gross Cornell University	"Dirichlet forms in holomorphic function spaces" Host: Richard Rochberg
<p>ABSTRACT: Suppose that <math>m</math> is a smooth probability measure on a Riemannian manifold <math>M</math>. The Dirichlet form <math>(\text{grad } f, \text{grad } g)_{L^2(m)}</math> is the sesquilinear form of some non-negative self-adjoint operator <math>A</math> on <math>L^2(M, m)</math>. It is well known that the semigroup <math>\exp(-tA)</math> is a contraction, not only in <math>L^2(m)</math> but also in <math>L^p(m)</math> for all <math>p</math> is greater than or equal to 1. Moreover when a logarithmic Sobolev inequality holds then <math>\exp(-tA)</math> is also bounded from <math>L^p</math> to <math>L^q</math> if <math>p, q</math> and <math>t</math> are properly related (hypercontractivity). But if <math>M</math> is a complex manifold and the semigroup is restricted to the holomorphic <math>L^p</math> functions then stronger hyper contractivity properties hold. Some recent work on the action of this semigroup in these holomorphic function spaces will be surveyed. Applications to Hankel operators over complex manifolds will be given.</p>		
Analysis Seminar Friday, 3/23 11:00, Room 199	Leonard Gross Cornell University	"Further Applications of Dirichlet Forms"
Solvmanifold Seminar Friday, 3/23	Prof. Tracy Payne	"Homogenous Spaces with Quarter-Pinched

3:00, Room 199	Washington University	Negative Curvature"
Colloquium Friday, 3/23 4:00 tea, Room 200, 4:30 talk, Room 199	Somesh Chattopadhyay University of Virginia	"A Novel Approach to Estimating Hormonal Pulse-times and Structural Parameters" Host: Ed Spitznagel
<p>ABSTRACT: Hormones are secreted from the neuroendocrine and endocrine glands either in a continuous or a pulsatile manner, or in a combination of two. They influence and are influenced by the secretion of other hormones. A pulse time is the onset of a pulse, which should be reflected by a very rapid increase in the observed concentration level. A clinician would want to be able to estimate the unobserved secretion rates from the hormone concentration in the blood samples. To estimate the secretion rates, one needs to incorporate the set of pulse times as a parameter in the model, it being more like a nuisance parameter. A desirable pulse-detection algorithm should produce an initial set of (estimated) pulse times, and a procedure by which to systematically add/remove pulse times, based upon the fit of a model to the data. We have developed an algorithm to simultaneously detect the underlying pulse times and the structural parameters for secretion and elimination; the methods involve extensions of Gibbs sampling and simulated annealing. The methods are applied to luteinizing hormone data.</p>		
Tenth International Conference on Approximation Theory 3/26-3/29 St. Louis Sheraton Westport Plaza	Organizers: C.K. Chui, Stanford Univ. & UMSL L.L. Schumaker, Vanderbilt Univ. J. Stoekler, UMSL	Conference website: <a href="http://www.math.umsi.edu/~at">www.math.umsi.edu/~at</a> Contact address: at@math.umsi.edu
Solvmanifold Seminar Friday, 3/30 3:00, Room 199	Prof. Tracy Payne Washington University	"Homogenous Spaces with Quarter-Pinched Negative Curvature continued"
Geometry Seminar Friday, 4/6 4:00, Room 199, Kirk Seminar Room	Chris Connell UIC	"Asymptotic regularity of negatively curved solvmanifolds"
<p>ABSTRACT: In this talk, I will investigate the regularity of the ideal boundary of</p>		

negatively curved solvmanifolds as well as the stable/unstable foliations for the geodesic flow. We will then describe some of the relationships between the regularity and conditions such as asymptotic harmonicity and the complete integrability of the geodesic flow.

Showme Analysis Seminar  
Friday, 4/6  
**See schedule below**

Larry Fest  
Saturday-Sunday, 4/7-4/8  
**See schedule below**

Wavelet Seminar  
Tuesday, 4/10  
4:00, Room 199, Kirk Seminar Room

Prof. J.  
Stoeckler  
UMSL

The beginning of a series of talks on the "Ron & Shen approach."

Undergraduate Math Club  
Pi Mu Epsilon  
Tuesday, 4/10  
5:30, Room 222

Kang-Tae Kim

"Reading Aerial Photographs with Projective Geometry"

**ABSTRACT:** The idea of reading several photographs of the same area to gather and extract useful information is more than two centuries old. It has a name: Projective Geometry. In this talk, we will see some basic ideas of Projective Geometry and its applications in this photograph reading.

Analysis Seminar  
Friday, 4/13  
11:00, Room 199, Kirk Seminar Room

Mike Jury  
Washington  
University  
Graduate  
Student

"Pick Interpolation and Von Neumann's Inequality"

Wavelet Seminar  
Tuesday, 4/17  
4:00, Room 199, Kirk Seminar Room

Prof. J.  
Stoeckler  
UMSL

"the 'Ron & Shen approach' cont."

Minor Oral  
Thursday, 4/19  
2:00, Room 199, Kirk Seminar Room

Jing Zhang

"Classification of Rational Surfaces"

Colloquium  
Thursday, 4/19  
4:00 tea, Room 200, 4:30 talk, Room

Prof. Sanzhen  
Lu  
Beijing Normal

"On Boundedness of a certain class of oscillatory integrals"

199, Kirk Seminar Room	University, Wayne State University	
Analysis Seminar Friday, 4/20 11:00, Room 199, Kirk Seminar Room	Pedro Mendez- Hernandez Purdue University	"Brascamp-Lieb- Luttinger type inequalities and applications to heat kernels" Host: Al Baernstein
<p>ABSTRACT: In this talk we will discuss various isoperimetric-type inequalities for Dirichlet heat kernels of the Laplacian and fractional Laplacian. These inequalities are obtained from different versions of the rearrangement inequalities for multiple integrals of H. J. Brascamp, E. H. Lieb and J. M. Luttinger. It is well known that these rearrangement inequalities provide a powerful and elegant method for obtaining many of the classical isoperimetric inequalities. These include, among others, the Rayleigh-Faber-Krahn inequality and isoperimetric inequalities for the torsional rigidity, the trace of the Dirichlet heat kernel and integrals of heat kernels. We present a version of the Brascamp-Lieb-Luttinger multiple integrals inequalities for convex domains where, instead of fixing the volume of the domain, one fixes its inradius. Our inequalities yield similar isoperimetric-type inequalities for Dirichlet heat kernels of the Laplacian and fractional Laplacian. We will also present another variation of the classical rearrangement inequalities which implies sharp estimates for ratios of Dirichlet heat kernels of the Laplacian for certain convex domains of fixed diameter. Such ratio inequalities imply sharp inequalities for spectral gaps of the Dirichlet Laplacian.</p>		
Wavelet Seminar Tuesday, 4/24 4:00, Room 199, Kirk Seminar Room	Prof. J Stoeckler UMSL	"the 'Ron & Shen approach' cont."
PhD Oral Thursday, 4/26 11:00, Room 199, Kirk Seminar Room	Dylan Retsek	"Compostion Operators on the Hardy Space"
Colloquium Thursday, 4/26 4:00 tea, Room 200, 4:30 talk, Room 199, Kirk Seminar Room	Prof. Pat Eberlein University of North Carolina- Chapel Hill	"Compact 2-step nilmanifolds and Riemannian submersions"
<p>ABSTRACT: Every linear representation of a compact connected Lie group <math>G</math> on a finite dimensional real vector space <math>V</math> defines a natural simply connected, 2-step, nilpotent Lie group <math>N^*</math> with a left invariant metric. If <math>G</math> is semisimple, then <math>N^*</math> always</p>		



admits a lattice subgroup  $L^*$ . My current project is to study the geometry of the compact quotient manifolds  $L^* \backslash N^*$  with particular attention to properties of the geodesic flow (density of closed geodesics, first integrals, conjugacy rigidity etc.) and the existence of compact totally geodesic submanifolds. If  $N$  is any simply connected, 2-step, nilpotent Lie group that admits a lattice subgroup  $L$ , then for a suitable left invariant metric on  $N$  there exists a group representation example  $N^*$  as above, a lattice subgroup  $L^*$  in  $N^*$  and a Riemannian submersion from  $L^* \backslash N^*$  onto  $L \backslash N$  whose fibers are flat, totally geodesic tori. One hopes to study the geometry of  $N$  with the preferred metric above by understanding the geometry of  $N^*$  and using the tools of Riemannian submersion geometry.

Solvmanifold Seminar  
Friday, 4/27  
3:00, Room 199, Kirk Seminar Room

Prof. Pat  
Eberlein  
University of  
North  
Carolina-  
Chapel Hill

TBA

\*This week's wavelet seminar is being postponed.\*

Seminar  
Tuesday, 5/1  
4:00, Room 113

Prof. Ann  
Podleski and  
Prof. Ed  
Spitznagel

"Computer Lab  
Demonstrations for  
Calculus II"

ABSTRACT: With support from a grant from the Howard Hughes Medical Institute, a computer laboratory/demonstration component was added to a special section of Calculus II (Math 1323 - Calculus II with Statistics). We will be presenting many of the class demonstrations and associated activities. Most of them are relevant to our regular Calculus II courses as well.

Award Presentation and tea  
Wednesday, 5/2  
4:00, Room 200, tea to follow

Prof. Ann  
Podleski  
Guido L. Weiss  
Teaching  
Service Award  
Recipient

Colloquium  
Thursday, 5/3  
4:00 tea, Room 200, 4:30 talk, Room  
199, Kirk Seminar Room

C.K. Cheung  
Boston College

"Old and New Invariant  
metrics in Complex  
Geometry"  
Host: Kang-Tae Kim

ABSTRACT: In this talk, we will give a broad survey of the classical invariant metrics

in complex geometry, and, based on what is known about the old ones, introduce other new invariant metrics. In particular, we will like to investigate how these invariant metrics have played an important central role in the study of both differential geometry and several complex variables.

Analysis Seminar Friday, 5/4 11:00, Room 199, Kirk Seminar Room	Kang-Tae Kim Pohang Institute of Science & Technology Washington University	"Normal families, Peak and Anti-Peak functions in some infinite dimensional spaces"
Solvmanifold Seminar Tuesday, 5/8 4:00, Room 199, Kirk Seminar Room	Prof. Gail Ratcliff Univ. of Missouri-Saint Louis	"Harmonic solvamnifolds"
Analysis Seminar Thursday, 5/10 11:00, Room 199, Kirk Seminar Room	Professor Laura De Carli, University of Missouri - Columbia and Universita di Napoli.	"Sharp $L^p$ - $L^q$ estimates for a class of convolutions operator"
ABSTRACT: I will discuss sharp estimates for a class of convolution operators that include the Hankel transform. These results allow one to give good estimates of the $L^p$ norm of $x^m J_a(x)$ , where $J_a$ is the Bessel function of order $a$ , which in turn allow one to prove a bunch of other things.		
Talk Thursday, 5/25 2:00, Room 199, Kirk Seminar room	Prof. N. Mohan Kumar Washington University	"Vector bundles on algebraic curves and projective surfaces"
The talk will be in more expository favor and will be accessible to general audience.		
Minor Oral Friday, 6/1 11:00, Room 199, Kirk Seminar Room	Seth Howell	"New and Classical Invariant Metrics"
Analysis Seminar	Prof. Fernando	"Non-centered maximal

Tuesday, 9/4 12:00, Room 199, Kirk Seminar Room	Soria University Autónoma de Madrid and Washington University	function associated with Gaussian measure"
Wavelet Seminar Wednesday, 9/5 3:30, Room 199, Kirk Seminar Room	Prof. Guido L. Weiss Washington University	"Affine, Quasi-affine and Co-affine wavelets"
Colloquium Thursday, 9/6 4:00 Tea, Room 200, 4:30 Talk, Room 199, Kirk Seminar Room Host: Kang-Tae Kim	Prof. Andrea Spiro University of Camerino, Italy	"Equivalence Problems in Differential Geometry and the Theorem of Cartan-Sternberg"
Geometry Seminar Friday, 9/7 4:00, Room 199, Kirk Seminar Room	Prof. Gary R. Jensen Washington University	"Immersions in Euclidean Space by Moving Frames"
Analysis Seminar Tuesday, 9/11 12:00, Room 199, Kirk Seminar Room	Prof. Andrea Spiro University of Camerino, Italy	"Almost Homogeneous Compact Kaehler- Einstein manifolds"
Wavelet Seminar Wednesday, 9/12 3:30, Room 199, Kirk Seminar Room	Prof. Demetrio Labate Washington University	"A unified characterization of reproducing systems generated by a finite family"
Colloquium Thursday, 9/13 4:00 tea, Room 200, 4:30 talk, Room 199, Kirk Seminar Room	Prof. Steven G. Krantz Washington University	"How to Practice Safe TeX"
Abstract: TeX is the definitive typesetting system for mathematics today. It is used universally by journal publishers and book publishers alike. TeX gives more control to the author of a mathematical manuscript, but there is a certain learning curve for getting started with TeX. Incorporating graphics into TeX is a special, and separate problem.		

Colloquium Friday, 9/14 3:30 tea, Room 200, 4:00 talk, Room 113 Host: Steven Krantz	Prof. Boris Mityagin, Ohio State University	"Spectral gaps of periodic Schroedinger operator and smoothness of its potential"
<p>Abstract: The rate of decay of instability zones (spectral gaps) of Schroedinger operator with periodic potential depends and is well determined by the smoothness of its potential. This relationship was well known for potentials of Sobolev classes (V.A. Marchenko, 1970's) or analytic potentials [E. Trubowitz, 1977]. We went beyond of these classes of potentials. Series of results (joint with T. Kappeler and P. Djakov) to this direction will be presented.</p> <p>As a typical example, let us formulate the following statement. Let <math>V(x) = \sum_k v_k \exp(2i \pi k x)</math> be a periodic potential of Schroedinger operator <math>L = -d^2/dx^2 + V(x)</math> such that <math>\sum  v_k ^2 \exp(2a k ^\alpha) &lt; \infty</math>, <math>a &gt; 0</math>, <math>0 &lt; \alpha &lt; 1</math>. Then the gaps <math>\delta_n = \lambda_n^+ - \lambda_n^-</math>, where <math>\lambda_n^\pm</math> are eigenvalues of periodic (or antiperiodic) boundary problem on <math>[0,1]</math>, satisfy a condition <math>\sum  \delta_n ^2 \exp(2a(2n)^\alpha) &lt; \infty</math>.</p>		
Today's colloquium (9/14) has been cancelled.		
Major Oral/Analysis Seminar Tuesday, 9/18 12:00, Room 199, Kirk Seminar Room	Leonid Kovalev	"Sobolev mappings with integrable dilatation"
Wavelet Seminar Wednesday, 9/19 3:30. Room 199, Kirk Seminar Room	Prof. Demetrio Labate Washington University	"A unified characterization of reproducing systems generated by a finite family" cont.
Math Club Talk Wednesday, 9/19 5:30, Room 222	Prof. Renato Feres Washington University	"Geometry in Very High Dimensions"
Colloquium Thursday, 9/20 4:00 tea, Room 200, 4:30 talk, Room 199, Kirk Seminar Room Host: Gary Jensen	Prof. Udo Hertrich-Jeromin Technical University in Berlin	"Models in Moebius differential geometry"
Abstract: I intend to propose various ways to think about objects in Moebius		

(differential) geometry, and to explain their differences, advantages or disadvantages in different situations. I will give examples from the theory of isothermic and constant mean curvature surfaces, and their discrete counterparts.

Professor Udo Hertrich-Jeromin is unable to travel from Berlin. His Thursday talk is cancelled, and his Friday Seminar will be replaced with a talk by Professor Gary R. Jensen, at the time and place listed below.

Geometry Seminar  
Friday, 9/21  
4:00, Room 199, Kirk Seminar Room

Prof. Gary R.  
Jensen  
Washington  
University

"The Theory of Moving  
Frames"

Abstract: I will explain how to deal with transformations of isothermic surfaces in the quaternionic setup, thus giving some technical details about one of the models presented in method to reproduce the Darboux transforms of the Clifford tori that were obtained by Holly Bernstein.

Analysis Seminar  
Tuesday, 9/25  
12:00, Room 199, Kirk Seminar Room

Herve Gaussier  
University of  
Provence-  
Marseille,  
France

"Estimates on the  
dimension of the  
symmetry group of a  
system of partial  
differential equations"

Wavelet Seminar  
Wednesday, 9/26  
3:30, Room 199, Kirk Seminar Room

Prof. Ed  
Wilson  
Washington  
University

"A Point of View for  
Shift Invariant Spaces"

Math Club  
Wednesday, 9/26  
5:30, Room 222

Prof. Steven G.  
Krantz  
Washington  
University

"Bertrand's paradox"

Abstract: We present a brief discussion of a celebrated paradox in probability theory, in which we present a probabilistic situation and subject it to three different analyses--resulting in three different answers. And all of these answers are correct!

Colloquium  
Thursday, 9/27  
4:00 Tea, Room 200, 4:30 Talk, Room  
199, Kirk Seminar Room

Prof. Herve  
Gaussier  
University of  
Provence-  
Marseille,  
France

"Domains with Non-  
Compact Automorphism  
Group"

Analysis Seminar Tuesday, 10/2 12:00, Room 199, Kirk Seminar Room	Prof. Nik Weaver, Washington University	"Prime and primitive C*- algebras"
Abstract: I will describe my recent construction of a prime C*-algebra that is not primitive. This solves an old problem of Dixmier. Background in C*-algebra will not be assumed.		
Wavelet Seminar Wednesday, 10/3 3:30, Room 199 Kirk Seminar Room	Prof. Nik Weaver Washington University	"A frame approach to the Kadison-Singer problem"
Abstract: The Kadison-Singer problem (a famous problem among C*-algebraists) can be interpreted in terms of frames in finite dimensional Hilbert spaces. Using this approach, I have been able to falsify a stronger conjecture due to Akemann and Anderson. The K-S problem is still open.		
Math Club Wednesday, 10/3 5:30, Room 222	Prof. Ed Wilson Washington University	"Wavelets: A nice meeting ground"
Abstract: This will be an expository talk on wavelets, emphasizing that this relatively new and rapidly developing field continues to attract attention from essentially every quantitatively-oriented discipline as well as many branches of mathematics.		
Colloquium Thursday, 10/4 4:00 tea, Room 200, 4:30 talk, Room 100 Kirk Seminar Room	Louis Kauffman University of Illinois- Chicago	"Functional Integration Without Integration"
Abstract: One of the major sources of inspiration in the development of knot theory has been the quantum field theoretic interpretation of knot invariants due to Edward Witten. This interpretation depends upon the use of functional integrals over gauge fields. These integrals, in general, do not have mathematical existence, but their formal properties have pointed the way to significant developments in topology. In this talk we discuss a way to substitute for this integral an equivalence class of functions of gauge fields: Let $F(A)$ denote a function of a gauge field $A$ . Let $DF(A)$ denote a functional derivative of $F(A)$ with respect to one of the "coordinates" of $A$ . We define an equivalence relation: $F \sim G$ if $F - G = DH$ for some $H$ and some $D$ . We let $I(F)$ denote the equivalence class of $F$ . $I(F)$ is meant to be a substitute for the (nonexistent)		

functional integral of  $F$  over all gauge fields  $A$ . Note that if there were such an integral  $\text{Int}(F)$ , then  $F \sim G$  implies that  $\text{Int}(F) = \text{Int}(G)$ . This talk will show how a large portion of the topological quantum field theory of invariants of knots and links can be done in the context of the functional class  $I(F)$ . We will also discuss the philosophy of this approach which avoids the thought of "summing over all possibilities" while maintaining the structure that emanates from this idea.

Geometry Seminar  
Friday, 10/5  
4:00, Room 199 Kirk Seminar Room

Prof. Gary R.  
Jensen  
Washington  
University

"Using the Complex  
Structure"

Analysis Seminar  
Tuesday, 10/9  
12:00, Room 199 Kirk Seminar Room

Prof. Steven G.  
Krantz  
Washington  
University

"Fixed Points for  
Holomorphic Mappings"

Wavelet Seminar  
Wednesday, 10/10  
3:30, Room 199 Kirk Seminar Room

Prof. Fernando  
Soria  
Washington  
University

"A quasi-  
orthogonalization  
process for Tight Frame  
Wavelets"

Math Club  
Wednesday, 10/10  
5:30, Room 222

Brody Johnson  
Washington  
University

"The hat problem"

Abstract: Guests at a party are adorned with either a red or blue hat. Each guest sees the other guests' hats, but not his own. Without any communication, each player must decide to guess the color of his hat or pass. The team (all the guests) wins the game when a correct guess is made and no incorrect guesses are made. They lose otherwise. The hat problem asks for each number of guests,  $n$ , what strategy will maximize the group's chance of winning the game?

Geometry Seminar  
Thursday, 10/11  
1:00, Room 104

Prof. Gary  
Jensen  
Washington  
University

"Minimal Surfaces"

Analysis Seminar  
Tuesday, 10/16  
12:00, Room 199 Kirk Seminar Room

David Opela  
Washington  
University

"On Some  
Generalizations of BMO  
and VMO on Bounded  
Domains"

Abstract: We study the so-called generalized Campanato spaces, which are

generalizations of BMO, define its "vanishing" subspace, an analog of VMO. Our main concerns are the role of the geometry of the domain in its relation to Holder spaces and "topological" properties, such as separability and compact subsets.

Wavelet Seminar  
Wednesday, 10/17  
3:30, Room 199 Kirk Seminar Room

Prof. Guido Weiss  
Washington University

TBA

Math Club  
Wednesday, 10/17  
5:30, Room 222

Prof. John McCarthy  
Washington University

"The Prime Number Theorem"

Abstract: There are 25 prime numbers below 100; there are 1229 below 10,000. How does 'The number of primes  $< N$ ' grow with  $N$ ?

Seminar  
Friday, 10/19  
2:00, Room 199, Kirk Seminar Room  
Host: Ed Spitznagel

Dr. Eli N. Donkar

"From Automorphic Functions to Social Security---a mathematical career in public service"

Abstract: Dr. Donkar is a Washington University alumnus and father of a current student. He serves as Deputy Chief Actuary in the Social Security Administration. He will talk for half an hour on his experiences, and answer questions about the actuarial profession and government for another half-hour. Refreshments will be served after the talk and question period. Students and parents are welcome.

Geometry Seminar  
Friday, 10/19  
4:00, Room 199, Kirk Seminar Room

Gary R. Jensen  
Washington University

"More on minimal immersions"

Wavelet Seminar  
Wednesday, 10/24  
3:30, Room 199, Kirk Seminar Room  
Host: Guido Weiss

Prof. Eugenio Hernandez  
Washington University

"Non-linear approximation in Sobolev spaces using wavelet expansions"

Math Club  
Wednesday, 10/24  
5:30, Room 222  
Host: Nik Weaver

Prof. Dylan Retsek  
Washington University

"The Kakeya needle problem"

Abstract: S. Kakeya was a nineteenth-century Japanese scientist who posed the



following problem: Dip a needle into a bottle of ink. What is the smallest inkblot one may leave behind while moving the needle on a piece of paper so as to reverse the positions of the endpoints? We will discuss the surprising answer and hint at its remarkable connection to an advanced problem in multi-dimensional harmonic analysis.

Colloquium  
Thursday, 10/25  
4:00 tea, Room 200, 4:30 talk, Room  
199, Kirk Seminar Room  
Host: John McCarthy

Prof. Joe Ball  
Virginia  
Polytechnic  
Institute

"Analytic functions  
mapping the disk to the  
disk: what they are, what  
they're good for, and  
how they generalize"

Abstract: Complex-valued analytic functions of a complex variable appear in a myriad of applications (e.g., as frequency response functions or transfer functions in engineering, scattering functions in physics) and in a number of guises (e.g., as the sum of a Taylor series, as a decomposition in continued fractions, as a Cauchy or Fourier integral). A relatively recent technique for the study of analytic functions is to realize the function as the transfer function of an ISO (input-state-output) linear system, a basic paradigm in control engineering. In the case where the analytic function maps the unit disk into itself, the associated ISO system satisfies an energy conservation law. We show how these ideas shed new light on such topics as Nevanlinna-Pick interpolation and robust control theory, and we shall get a glimpse of how the ideas generalize to multivariable settings. In addition to complex analysis, we shall see ideas from linear algebra, operator theory, physics and engineering in action. Nevertheless the talk will be kept at an elementary level--graduate students are encouraged to attend.

Analysis Seminar  
Friday, 10/26  
11:00, Room 111  
Host: John McCarthy

Prof. Joe Ball  
Virginia  
Polytechnic  
Institute

"Conservative linear  
systems, Lax-Phillips  
scattering and operator  
model theory: a Cuntz  
algebra multidimensional  
setting"

Abstract: It is well known that a Schur-class function (i.e., an analytic function mapping the unit disk into itself) arises (1) as the transfer function of a discrete-time, conservative linear system, (2) as the scattering function of a Lax-Phillips scattering system, and (3) as the characteristic function of a contraction operator  $T$  on a Hilbert space. We discuss a far-reaching generalization of these ideas, where the Schur-class function is replaced by a formal power series in finitely many (say  $d$ ) noncommuting variables giving rise to a contractive multiplier on a vector-valued Fock space, the time domain for the conservative, linear system is the free semigroup in  $d$  generators, the evolution group of the Lax-Phillips scattering system is a representation of the Cuntz algebra (or a row unitary operator), and the single contraction operator  $T$  is replaced by a row contraction  $(T_1, \dots, T_d)$ . Compression to symmetric tensors gives rise to function theory on the unit ball in complex  $d$ -dimensional Euclidean

space which has been studied by a number of authors of late.		
Geometry Seminar Friday, 10/26 4:00, Room 199 Kirk Seminar Room	Prof. Gary R. Jensen Washington University	"Isothermic immersions in Euclidean space"
Analysis Seminar Tuesday, 10/30 12:00, Room 199 Kirk Seminar Room Host: John McCarthy	Prof. Dan Timotin Romanian Academy	"Interpolation and intertwining lifting for ordered groups"
Wavelet Seminar Wednesday, 10/31 3:30, Room 199 Kirk Seminar Room	Prof. Guido Weiss Washington University	"An overview of our (that means 'us') project(s) on wavelets"
Colloquium Thursday, 11/1 4:00 tea, Room 200, 4:30 talk, Room 199, Kirk Seminar Room Host: John McCarthy	Prof. Dmitry Khavinson University of Arkansas	"An inverse problem for double layer potentials"
Abstract: For some curves, e.g., a circle, the solution of the Dirichlet problem is given explicitly by the double layer potential of the data. More generally, it turns out that for lemniscates a vast variety of the Dirichlet problems are also explicitly solved by the double layer potentials of the data. The problem is to find all such curves. It turns out that this question is equivalent to a nontrivial matching problem on the boundary of the domain: to match an analytic inside the domain function with an anti-analytic function outside the domain that vanishes at infinity.		
Analysis Seminar Tuesday, 11/6 12:00, Room 199 Kirk Seminar Room Host: Nets Katz	Prof. Natasa Pavlovic University of Illinois-Chicago	"A cheap Caffarelli-Kohn-Nirenberg inequality for Navier-Stokes equations with hyper-dissipation"
Abstract: This talk will be about joint work with Nets Katz on partial regularity results for the Navier-Stokes equations with hyper-dissipation. We prove that for the Navier Stokes equations with dissipation $-\Delta^\alpha$ , where $1 < \alpha < 5/4$ , and smooth initial data, the Hausdorff dimension of the singular set at time of first blow up is at most $5-4\alpha$ . We could think about this as about an interpolation between the result of Caffarelli-Kohn-Nirenberg in the case when $\alpha = 1$ , and the fact that one has a global strong solvability in the case when $\alpha \geq 5/4$ .		

Wavelet Seminar Wednesday, 11/7 3:30, Room 199 Kirk Seminar Room Host: Guido Weiss	Prof. Hrvoje Sikic Washington University	"Some Questions about the Connectivity of Wavelets"
Math Club Wednesday, 11/7 5:30, Room 222 Host: Nik Weaver	Prof. Nets Katz Washington University	"What's the deal with cohomology?"
Abstract: We define the first DeRham cohomology group. Then we say what it is.		
Colloquium Thursday, 11/8 4:00 tea, Room 200. 4:30 talk, Room 199, Kirk Seminar Room Host: Nik Weaver	Prof. David Geary University of Missouri, Columbia	"A Darwinian Perspective on Mathematics and the Acquisition of Mathematical Competency"
Abstract: Evidence across a variety of species, including humans, suggests the existence of an evolved number-counting-arithmetic system, and evolutionary logic suggests further relations between biologically-based cognitive domains and other areas of mathematics. These biologically-primary forms of mathematics-related cognition are contrasted with non-evolved and thus biologically secondary mathematical competencies. The importance of distinguishing between primary and secondary mathematical domains is illustrated in several empirical studies of mathematical competency across age (younger and older adults) and culture (China and the United States).		
Colloquium Friday, 11/9 4:00 tea, Room 200. 4:30 talk, Room 199, Kirk Seminar Room Host: Steven G. Krantz	Prof. Jeff McNeal Ohio State University	"Continuous extension of biholomorphic mappings"
Abstract: An outstanding open problem in complex analysis is the boundary behavior of biholomorphic mappings between two domains. There are many contributions to this general problem. A highly successful approach to proving smoothness to the boundary (in the case where the boundaries themselves are smooth and pseudoconvex) was developed by Bell and Ligocka and proceeds through (regularity results on) the $\bar{\partial}$ -Neumann problem. Recent work of Barrett and Christ, however, shows that the $\bar{\partial}$ -Neumann operator does not always have the regularity properties necessary for the Bell/Ligocka approach. We shall indicate, however, that biholomorphic mappings between smooth, pseudoconvex domains do extend continuously to the boundaries. Our proof is based		

on regularity estimates for a "roughified" variant of the  $\bar{d}$ -Neumann problem, and involves a curious twisting of the Cauchy-Riemann complex. These estimates have many other applications.

Analysis Seminar  
Tuesday, 11/13  
12:00, Room 199 Kirk Seminar Room  
Host: John McCarthy

Prof. Nets Katz  
Washington  
University

"Combinatorial models  
for the Navier Stokes  
equation"

Geometry Seminar  
Tuesday, 11/13  
4:00, Room 199 Kirk Seminar Room

Prof. Gary R.  
Jensen  
Washington  
University

"The Christoffel  
transform"

Wavelet Seminar  
Wednesday, 11/14  
3:30, Room 199 Kirk Seminar Room

Prof. Guido  
Weiss  
Washington  
University

TBA

Math Club  
Wednesday, 11/14  
5:30, Room 222  
Host: Nik Weaver

Prof. John  
Shareshian

"Algorithmic complexity  
and topology"

Abstract: Say we have a graph  $G$  on  $n$  vertices. Is there an algorithm which, by checking for the presence or absence of each of the  $n(n-1)/2$  possible edges in  $G$  one at a time (in an order chosen by the algorithm according as it goes along), can tell whether  $G$  is connected (or planar, or 4-colorable, or....) without checking every edge? It turns out that algebraic topology is useful in examining this problem.

Colloquium  
Thursday, 11/15  
3:00 talk, Room 216, 4:00 tea, Room 200  
Host: Nets Katz

Prof. Michael  
Minotte  
Utah State  
University

"High-Order  
Histosplines: Superior  
Binned Density  
Estimation"

Abstract: Higher order histosplines provide density estimates for binned data which are fast both computationally and in asymptotic mean integrated squared error convergence. Such an approach is useful both when data is collected in binned form, and with huge data sets for storage and computational savings over unbinned methods. Matrix manipulation finds weights for B splines which restore the correct mass proportions property, in which the probability mass for each histogram bin equals exactly the fraction of the data found in that bin. Computational and visual aspects of the estimator will be examined and comparisons with kernel methods will be

conducted.		
Colloquium Thursday, 11/15 4:00 tea, Room 200, 4:30 talk, Room 199 Kirk Seminar Room Host: Steven G. Krantz	Prof. Walter Craig McMaster University	"On solitary water waves in three dimensions"
<p>Abstract: Waves in the surface of the ocean have long been a fascinating topic of study, and there is an extensive history of analysis of surface water waves. This includes classical work of T. Levi-Civita, D. Struik, H. Lewy and K. O. Friedrichs &amp; D. Hyers on two-dimensional traveling waves. I will speak on recent progress on the problem of traveling surface water waves in three dimensions, including an existence theory for doubly periodic solutions, an a priori regularity result for the free surface, and a non-existence result for solitary waves.</p>		
Combinatorics (Minor Oral) Seminar Monday, 11/19 4:00, Room 199 Kirk Seminar Room	Elliot Krop Washington University Advisor: Prof. Nets Katz	"On a new lower bound for K sets"
Analysis Seminar Tuesday, 11/20 12:00, Room 199 Kirk Seminar Room Host: Kang-Tae Kim	Prof. Jisoo Byun Pohang University of Science and Technology, Korea	"Automorphism orbits in the Kohn-Nirenberg domain and a generalization"
Colloquium Monday, 11/26 4:00 tea, Room 200. 4:30 talk, Room 199 Kirk Seminar Room Host: David Wright	Prof. Hema Srinivasan University of Missouri-Columbia	"Gorenstein Artin Algebras"
Colloquium Tuesday, 11/27 4:00 tea, Room 200. 4:30 talk, Room 199 Kirk Seminar Room Host: David Wright	Prof. Dale Cutcosky University of Missouri-Columbia	"Simultaneous Resolution"
Colloquium Wednesday, 11/28	Prof. Elizabeth Housworth	"Modeling Crossover Distributions"

4:00 tea, Room 200. 4:30 talk, Room 199 Kirk Seminar Room Host: Gary R. Jensen	University of Oregon	
<p>Abstract: Determining the distribution of crossovers on chromosomes during meiosis is important for locating genes associated with complex quantitative traits such as the predisposition to certain cancers. Common models that are useful in describing this distribution in some organisms are that the crossovers are distributed independently according to a Poisson distribution or that they are every kth resolution to Poisson-distributed double strand breaks with the intervening breaks repaired without crossing over. We describe these models as well as a new theory proposing two "types" of crossovers, each controlled by a distinct genetic pathway, and discuss the statistical methods used in assessing the new model. This work is joint with Greg Copenhaver and Franklin Stahl.</p>		
Math Club Wednesday, 11/28 5:30, Room 222 Host: Nik Weaver	Prof. Richard Rochberg Washington University	"The cube root of 2, the square root of 5, e: which one is closest to the fractions?"
<p>Abstract: Most numbers are irrational (i.e., not fractions). Among irrational numbers some are closer to the fractions than others. I will talk about:</p> <p>--How to make these ideas precise,</p> <p>--What is known in the area,</p> <p>--The question in the title, and</p> <p>--What we don't know.</p> <p>The earliest results on this topic were obtained in the mid-19th century using, among other things, the pidgenhole principle and basic ideas from calculus. The most recent results are among the deepest and subtlest mathematical research in the second half of the 20th century.</p>		
Colloquium Thursday, 11/29 4:00 tea, Room 200. 4:30 talk, Room 199 Kirk Seminar Room Host: Renato Feres	Prof. David Fisher Yale University	"Local Rigidity for actions of lattices in Lie groups"
<p>David will tell us about his joint work with G. Margulis concerning the dynamics of actions of lattices in semisimple Lie groups of real rank at least 2.</p>		

Seminar Talk Thursday, 11/29 4:00, Room 322 Rebstock Host: Gary R. Jensen	Prof. Elizabeth Housworth University of Oregon	"The Evolution of a Mathematician"
Abstract: I will give an overview of the projects in phylogenetic comparative methods and genomics I pursued while on leave to the Biology Department at the University of Oregon last year. The works that will be discussed are joint with Emilia Martins, Mike Lynch, and/or John Postlethwait.		
Analysis Seminar Friday, 11/30 4:00, Room 199 Kirk Seminar Room Host: Al Baernstein	Prof. Andreas Seeger University of Wisconsin-Madison	"On pointwise convergence of spherical means"
Showme Seminar Saturday, 12/1 10:00 Talks located in Lopata 101	Prof. Andreas Seeger University of Wisconsin Prof. Fernando Soria Universidad Autonoma de Madrid and Washington University Prof. John Lewis University of Kentucky	See Abstract for titles
Abstract: The Showme Seminar takes place December 1 from 10:00 a.m. to 9:00 p.m. Other attractions include lunch, dinner, and cookies. 10:30-11:30 a.m.: Hospitality Suite in Math Lounge 11:30-11:31 a.m.: Opening Ceremony 11:31-12:31 p.m.: Lecture by Andreas Seeger, University of Wisconsin: "Failure of weak amenability and a family of oscillatory integrals" 12:31-xx: Lunch in Math Lounge, or the Women's Building 2:30-3:30 p.m.: Lecture by John L. Lewis, University of Kentucky: "Harmonic measure and Wolff snowflakes" 3:30-4:00 p.m.: Cookies in Math Lounge 4:00-5:00 p.m.: Lecture by Fernando Soria, UAM and WU: "Sharp Estimates for oscillatory integrals associated with the Schroedinger equation" 5:30-xx p.m.: Drinks and Dinner in Women's Building		

<p>Analysis Seminar  Tuesday, 12/4  12:00, Room 199 Kirk Seminar Room  Host: John McCarthy</p>	<p>Michael Jury  Washington  University</p>	<p>"Matrix products and  finite interpolation  problems"</p>
<p>Topology Seminar  Tuesday, 12/4  2:30, Room 199 Kirk Seminar Room  Host: Rachel Roberts</p>	<p>Reva Kasman  University of  Illinois,  Chicago</p>	<p>"Trees, Folding, and the  Bieri-Neumann-Strebel  Invariant"</p>
<p>Abstract: For a finitely generated group <math>G</math>, the BNS invariant <math>\Sigma_G</math> is a subset of the character sphere for <math>G</math>. Ken Brown characterizes <math>\Sigma_G</math> in terms of abelian actions on <math>\mathbb{R}</math>-trees. Given a homomorphism <math>\chi</math> from a finitely presented group <math>G</math> to <math>\mathbb{Z}</math>, there is a finite sequence of Stallings folds on the Cayley graph of the group which produces a tree associated to the homomorphism. We can give a condition on this tree which implies that <math>\chi</math> is in <math>\Sigma_G</math>.</p>		
<p>Colloquium  Thursday, 12/6  4:00 tea, Room 200. 4:30 talk, Room  199 Kirk Seminar Room  Host: Renato Feres</p>	<p>Prof. Gregory  Yablonsky  Washington  University  Chemical  Engineering</p>	<p>"Does Mathematical  Chemistry Exist?"</p>
<p>Wavelet Seminar  Wednesday, 12/12  3:30, Room 199 Kirk Seminar Room</p>	<p>Prof. Qiyu Sun  University of  Singapore</p>	<p>TBA</p>
<p>Graduate Seminar  Friday, 12/14  10:00, Room 199 Kirk Seminar Room</p>	<p>Seth Howell  Washington  University</p>	<p>"Defining Invariants on  Convex Domains"</p>