**UNIVERSITY OF CALIFORNIA, RIVERSIDE**  
Department of Mathematics

**Calendar of Events**  
For the Week Jan. 4th – Jan. 8th, 2010

**TUESDAY, 5th**
11:10-12:30PM, SURGE 268  
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

12:40-2:00PM, SURGE 284  
LIE THEORY (Vyjayanthi Chari)

2:10-3:00PM, SURGE 268  
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 268  
FUNCTIONAL ANALYSIS (James Stafney, UCR)  
“The Dirichlet Principle and Balayage”

3:40-5:00PM, SURGE 277  
ALGEBRAIC GEOMETRY (Ziv Ran)

**WEDNESDAY, 6th**
10:10-11:00AM, SURGE 268  
COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)

1:10-2:00PM, SURGE 284  
TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Jim Kelliher, UCR)  
“Divorcing Pressure from Viscosity”

**THURSDAY, 7th**
9:40-11:00AM, SURGE 268  
GROUPS SEMINAR (Aviv Censor)  
***Organizational Meeting***

11:10-12:30PM, SURGE 268  
FRAC TAL RESEARCH GROUP (Michel Lapidus)  
***Organizational Meeting***

11:10-12:30PM, SURGE 277  
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

1:10-2:00PM, SURGE 277  
OPERATOR ALGEBRAS & RELATED TOPICS (Marta Asaeda)  
***Organizational Meeting***

12:40-2:00PM, SURGE 284  
LIE THEORY (Vyjayanthi Chari)

2:10-3:00PM, SURGE 268  
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 277  
ALGEBRAIC GEOMETRY (Ziv Ran)

3:40-5:00PM, SURGE 268  
MATHEMATICAL PHYSICS (Michel Lapidus)  
***Organizational Meeting***

**FRIDAY, 8th**
11:10-12:00PM, SURGE 284  
DIFFERENTIAL GEOMETRY (Abul Masood-ul-Alam, Sacramento)  
“Proof that Static Stellar Models are Spherical”

12:10-1:00PM, SURGE 268  
COBORDISM & TOPOLOGICAL FIELD THEORIES (Julie Bergner, UCR)  
“Towards a Precise Definition of (∞,n)-categories”

3:10-4:00PM, SURGE 268  
COMMUTATIVE ALGEBRA (CANCELED)  
***THIS SEMINAR IS CANCELED FOR THIS WEEK***
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

LIE THEORY (Vyjayanthi Chari)

TOPOLOGY (Stefano Vidussi)

FUNCTIONAL ANALYSIS (James Stafney)
“Balayage and the Generalized Dirichlet Problem”

ALGEBRAIC GEOMETRY (Ziv Ran)

COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)

TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Qi Zhang)

GROUPOIDS SEMINAR (Jacob West)
“The Fundamental Groupoid Revisited”

FRACtAL RESEARCH GROUP (Michel Lapidus)

***CANCELED – AMS / MMA Meeting***

COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

OPERATOR ALGEBRAS & RELATED TOPICS (Ricky Han)
“A Planar Algebra Construction of Haagerup Subfactor (cont.)”

LIE THEORY (Vyjayanthi Chari)

TOPOLOGY (Stefano Vidussi)

ALGEBRAIC GEOMETRY (Ziv Ran)

MATHEMATICAL PHYSICS (Michel Lapidus)

***CANCELED – AMS / MMA Meeting***

DIFFERENTIAL GEOMETRY (Yat-Sun Poon)

***CANCELED***

COBORDISM & TOPOLOGICAL FIELD THEORIES (Julie Bergner)

***CANCELED***

COMMUTATIVE ALGEBRA (David Rush)
TUESDAY, 19th
11:10-12:30PM, SURGE 268
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

12:40-2:00PM, SURGE 284
LIE THEORY (Vyjayanthi Chari)

2:10-3:00PM, SURGE 268
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 268
FUNCTIONAL ANALYSIS (James Stafney, UCR)
“Balayage and the Generalized Dirichlet Problem”

3:40-5:00PM, SURGE 277
ALGEBRAIC GEOMETRY (K. Lee, UCR)
“Elementary Problems from Ch. 1 of Arbarello et al.”

WEDNESDAY, 20th
10:10-11:00AM, SURGE 268
COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)

1:10-2:00PM, SURGE 284
TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Edward Burkard, UCR)
“Curvature and Tensors (Part 2)”

THURSDAY, 21st
9:40-11:00AM, SURGE 268
GROUPOIDS SEMINAR (Julie Bergner, UCR)
“Classic Fixed Point Theory”

11:10-12:30PM, SURGE 268
FRACTAL RESEARCH GROUP (Hafedh Herichi, UCR)
“On Some Properties of the Spectral Operator”

11:10-12:30PM, SURGE 277
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

1:10-2:00PM, SURGE 277
OPERATOR ALGEBRAS & RELATED TOPICS (Ricky Han)
“A Planar Algebra Construction of the Haagerup Subfactor (cont.)”

LIE THEORY (Vyjayanthi Chari)

2:10-3:00PM, SURGE 268
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 277
ALGEBRAIC GEOMETRY (Ziv Ran, UCR)
“Subscheme Methods for Nodal Curves: An Overview”

3:40-5:00PM, SURGE 268
MATHEMATICAL PHYSICS (Michael Maroun, UCR)
“Computation of the Divergent Integrals Arising in the Feynman Functional Integral for the Shrodinger Dynamics”

FRIDAY, 22nd
11:10-12:00PM, SURGE 284
DIFFERENTIAL GEOMETRY (Dr. L-S Tseng, Harvard)
“Symplectic Hodge Theory”

12:10-1:00PM, SURGE 268
COBORDISM & TOPOLOGICAL FIELD THEORIES (John Huerta, UCR)
“A Crash Course in Simplicial Methods”

3:10-4:00PM, SURGE 268
COMMUTATIVE ALGEBRA (David Rush)
Abstract: Although Hodge theory is an important tool in Riemannian and complex geometry, its usefulness in sympletic geometry has been rather limited. In this talk, we reframe the notion of Hodge theory on sympletic manifolds and show how it can be powerfully applied to certain novel differential operators that are not necessarily elliptic. In so doing, we discover a number of new finite-dimensional cohomologies that encode sympletic invariants.
UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events
For the Week January 25th – 29th, 2010

TUESDAY, 26th
11:10-12:30PM, SURGE 268
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

12:40-2:00PM, SURGE 284
LIE THEORY (Irfan Bagci, UCR)
“On Cohomology and Support Varieties for Lie Superalgebras”

2:10-3:00PM, SURGE 268
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 268
FUNCTIONAL ANALYSIS (Victor Shapiro, UCR)
“Hermite Polynomials and Non-Linear PDE”

3:40-5:00PM, SURGE 277
ALGEBRAIC GEOMETRY (Ziv Ran)

WEDNESDAY, 27th
10:10-11:00AM, SURGE 268
COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)

1:10-2:00PM, SURGE 284
TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Qi Zhang, UCR)

THURSDAY, 28th
9:40-11:00AM, SURGE 268
GROUPOIDS SEMINAR (Julie Bergner, UCR)
“Ringoids in Fixed Point Theory”

11:10-12:30PM, SURGE 268
FRACTAL RESEARCH GROUP (Nishu Lal, UCR)
“Complex Dynamics in Higher Dimensions: Part I”

11:10-12:30PM, SURGE 277
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

1:10-2:00PM, SURGE 277
OPERATOR ALGEBRAS & RELATED TOPICS (Ricky Han)
“A Planar Algebra Construction of the Haagerup Subfactor (cont.)”

12:40-2:00PM, SURGE 284
LIE THEORY (Matt Bennett, UCR)
“The Catalan Numbers and Representation Theory of Current Algebras”

2:10-3:00PM, SURGE 268
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 277
ALGEBRAIC GEOMETRY (Ziv Ran)

3:40-5:00PM, SURGE 268
MATHEMATICAL PHYSICS (Dr. Aviv Censor, UCR)
“Topological Degroupoidification”

FRIDAY, 29th
11:10-12:00PM, SURGE 284
DIFFERENTIAL GEOMETRY (Charles Boyer, Univ. New Mexico)
“Maximal Tori in Contactomorphism Groups and Extremal Metrics”

12:10-1:00PM, SURGE 268
COBORDISM & TOPOLOGICAL FIELD THEORIES (Julie Bergner, UCR)
“More Simplicial Methods and the Nerve Construction”

3:10-4:00PM, SURGE 268
COMMUTATIVE ALGEBRA (David Rush)
"Maximal Tori in Contactomorphism Groups and Extremal Metrics"

Abstract: I describe a general scheme for relating transverse, almost complex, structures on a contact manifold to conjugacy classes of maximal tori in the contactomorphism group. To a maximum torus of Reeb type there is an associate cone of Reeb vector fields, the Sasaki cone. I then consider the problem of the existence of extremal Sasakian or K-contact metrics related to a given conjugacy class of maximal tori. Examples are given and the moduli problem is discussed.
TUESDAY, 2\textsuperscript{nd}
11:10-12:30PM, SURGE 268

COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

12:40-2:00PM, SURGE 284

LIE THEORY (Konstantina Christodouloupoulou, UCR)
“On Blocks and Modules for Whittaker Pairs (following P. Batra & V. Mazorchuk)”

2:10-3:00PM, SURGE 268

TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 268

FUNCTIONAL ANALYSIS (Victor Shapiro, UCR)
“Hermite Polynomials and Quasilinear PDE”

3:40-5:00PM, SURGE 277

ALGEBRAIC GEOMETRY (Ziv Ran)

WEDNESDAY, 3\textsuperscript{rd}
10:10-11:00AM, SURGE 268

COMBINATORIAL NUMBER THEORY (John Dusel)
“Expansion of Orbits of Some Dynamical Systems over Finite Fields”

1:10-2:00PM, SURGE 284

TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Qi Zhang, UCR)
“Reading on Ricci Flow”

THURSDAY, 4\textsuperscript{th}
9:40-11:00AM, SURGE 268

GROUPOIDS SEMINAR (Chris Carlson, UCR)
“From Manifolds to Orbifolds: A Topological Excursion”

11:10-12:30PM, SURGE 268

FRACTAL RESEARCH GROUP (Rob Niemeyer, UCR)
“Periodic Orbits of the Koch Snowflake Billiard”

11:10-12:30PM, SURGE 277

COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

1:10-2:00PM, SURGE 277

OPERATOR ALGEBRAS & RELATED TOPICS (Ricky Han)
“A Planar Algebra Construction of the Haagerup Subfactor (cont.)”

12:40-2:00PM, SURGE 284

LIE THEORY (Eliana Zoque Lopez, UCR)
“Principal Nilpotent Pairs in a Semi-simple Lie Algebra (following Ginzburg)”

2:10-3:00PM, SURGE 268

TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 277

ALGEBRAIC GEOMETRY (Ziv Ran)

3:40-5:00PM, SURGE 268

MATHEMATICAL PHYSICS (Eugene Gutkin)
“Security and Flatness for Riemannian Manifolds, Especially for Surfaces”
(joint with colloquium)

FRIDAY, 5\textsuperscript{th}
11:10-12:00PM, SURGE 284

DIFFERENTIAL GEOMETRY (Jorge Lauret, Universidad Nacional de Cordoba)
“Homogeneous Ricci Flows and Solitons and the Alekseevskii Conjecture”

12:10-1:00PM, SURGE 268

COBORDISM & TOPOLOGICAL FIELD THEORIES (Julie Bergner, UCR)
“Complete Segal Spaces”

3:10-4:00PM, SURGE 268

COMMUTATIVE ALGEBRA (David Rush)
"Security and Flatness for Riemannian Manifolds, Especially Surfaces"

Abstract: A pair of points in a Riemannian manifold is secure if the geodesics between the points can be blocked by a finite number of point obstacles; otherwise the pair is insecure. A manifold is secure if all pairs of its points are secure. A manifold is insecure if an insecure point pair exists.

Compact, flat manifolds are secure. A standing conjecture says that these are the only secure, compact Riemannian manifolds. In a joint work with Victor Bangert, we proved this for surfaces of genus greater than zero. I will report on this and related works.

(Note: This is a joint with Math Physics Seminar.)
Abstract: We shall describe and ODE for a curve in the variety of Lie algebras which is equivalent in a natural and specific sense to the Ricci flow starting at any homogeneous Riemannian manifold. Such a flow is however much for friendly in some particular cases (as, for instance, nilmanifolds).

Concerning Ricci solitons, we will define algebraic solitons on homogeneous spaces by generalizing the concept of nilsoliton and give an idea of the proof of the following: any example of an algebraic soliton which is not a solvmanifold would give rise to a counterexample to the long standing Alekseevskii conjecture: Any connected Einstein homogeneous Riemannian manifold of negative scalar curvature is diffeomorphic to a euclidean space.

We use tools from geometric invariant theory to study the natural GL(n)-action on the variety of n-dimensional Lie algebras. The interplay works thanks to a strong relationship discovered between the moment map for the action and the Ricci curvature of the homogeneous manifold. Properties of the critical points of the square norm of the moment map and stratification defined by Kirwan are strongly used in the proof of the results we have obtained so far.

Friday, February 5th, 2010
Surge 284
11:10-12:00pm
UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events
For the Week February 8th - 12th, 2010

TUESDAY, 9th
11:10-12:30PM, SURGE 268
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

12:40-2:00PM, SURGE 284
LIE THEORY (Vyjayanthi Chari)

2:10-3:00PM, SURGE 268
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 268
FUNCTIONAL ANALYSIS (M.M. Rao, UCR)
“Evolution of Stationary Dilations”

3:40-5:00PM, SURGE 277
ALGEBRAIC GEOMETRY (Ziv Ran)

WEDNESDAY, 10th
10:10-11:00AM, SURGE 268
COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)

1:10-2:00PM, SURGE 284
TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Edward Burkard, UCR)
“Curvature and Tensors (Part 3)”

THURSDAY, 11th
9:40-11:00AM, SURGE 268
GROUPOIDS SEMINAR (Daniele Grandini, UCR)
“Geometry Groupoids, Part 1: Manifolds”

11:10-12:30PM, SURGE 268
FRACIAL RESEARCH GROUP (Jason Payne, UCR)
“The Theorem of Hadamard De La Vallee Poussin”

11:10-12:30PM, SURGE 277
COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)

1:10-2:00PM, SURGE 277
OPERATOR ALGEBRAS & RELATED TOPICS (Feng Xu)
TBA

12:40-2:00PM, SURGE 284
LIE THEORY (Vyjayanthi Chari)

2:10-3:00PM, SURGE 268
TOPOLOGY (Stefano Vidussi)

3:40-5:00PM, SURGE 277
ALGEBRAIC GEOMETRY (Ziv Ran, UCR)
“Nodal Curves Whose Canonical System is Not Very Ample”

3:40-5:00PM, SURGE 268
MATHEMATICAL PHYSICS (Prof. Gerald Johnson)
“Feynman’s Operational Calculi: The Extraction of Linear Factors and Applications”

FRIDAY, 12th
11:10-12:00PM, SURGE 284
DIFFERENTIAL GEOMETRY (No Meeting)
***CANCELED***

12:10-1:00PM, SURGE 268
COBORDISM & TOPOLOGICAL FIELD THEORIES (Julie Bergner, UCR)
“n-Fold Complete Segal Spaces”

3:10-4:00PM, SURGE 268
COMMUTATIVE ALGEBRA (David Rush)
Abstract:

Instabilities in fluid motion are ubiquitous and yet instabilities come in various “flavors”. The partial differential equations of fluid dynamics are very challenging nonlinear systems. A classical approach to detecting instabilities is to study the spectral problem associated with the linearized equations. We will discuss how in some situations it is possible to prove that linear instability implies instability for the full nonlinear equations. Examples where this can be proved include the cases of the 2-dimensional Euler equations, the 3-dimensional Navier-Stokes equation and an interesting equations arising in oceanography called the surface quasi-geostrophic equation.

Thursday, February 10th, 2010
Surge 284
4:10-5:00pm
Tea Time at 3:40pm
Abstract: The purpose of this series of talks will be understanding several geometric objects naturally related to groupoids, such as orbifolds, actions, foliations, algebroids, pseudogroups and differentiable stacks. These objects are linked to each other in various ways. If time permits, I will explain all their mutual relations, shown in the following chart:

Part 1: Orbifolds

Orbifolds → Pseudogroups → Groupoids → Stacks

Group(oid) Actions → Foliations

I will introduce orbifolds as a generalization of manifolds and show how they arise in the context of proper group actions. I will also explain why orbifolds can be thought of equivalence classes of proper Lie groupoids.

Thursday, February 11th, 2010
Surge 268
9:40-11:00am
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<th>Day</th>
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<td><strong>THURSDAY, 18th</strong></td>
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<td>GROUPOIDS</td>
<td>GROUPOIDS SEMINAR (Daniele Grandini, UCR)</td>
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<td>SEMINAR</td>
<td>“Geometry and Groupoids, Part 2: from Group(oid)s to Orbifolds”</td>
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<td>“Introduction to Spontaneous Symmetry Breaking”</td>
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<td>OPERATOR</td>
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<td>MATHEMATICAL</td>
<td>MATHEMATICAL PHYSICS (Rob Niemeyer, UCR)</td>
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<td><strong>FRIDAY, 19th</strong></td>
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<td>DIFFERENTIAL</td>
<td>DIFFERENTIAL GEOMETRY (Steven Bradlow, UCSD)</td>
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<td>GEOMETRY</td>
<td>“Sp (4,R) – Higgs Bundles: A Higgs Bundle Case Study”</td>
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<td>COBORDISM</td>
<td>COBORDISM &amp; TOPOLOGICAL FIELD THEORIES (Julie Bergner, UCR)</td>
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<td>“Complete Segal Spaces of Cobordisms”</td>
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<td>3:10-4:00PM</td>
<td>SURGE 268</td>
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<td>ALGEBRA</td>
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"Unique Lift of Action of the Temperley-Lieb Algebra to a Faithful Action of the Fuss-Catalan Algebra"

Abstract: In his thesis F. Hivert introduced a faithful action of the symmetric group $S_n$ on the ring of polynomials $\mathbb{C}[x_1, x_2, \ldots, x_n]$, which does not preserves the multiplication, but still leads to interesting results. The invariants of the action are the quasi-symmetric functions. Unfortunately, when we extend this action to the group algebra $\mathbb{C}[S_n]$, the action we obtain is not faithful anymore. However, by taking the quotient of $\mathbb{C}[S_n]$ by the kernel of this new action we obtain a faithful action of the Temperley-Lieb $TL_n(2)$ on the ring of polynomials in $n$ variables. Since the Temperley-Lieb algebra can be embedded in the Fuss-Catalan algebra on two colours $FC_n(a, b)$ with $ab = 2$, a natural question to ask is if the action of the Temperley-Lieb algebra can be extended to a faithful action of the Fuss-Catalan algebra, and if the extension is unique. We will show how we use the theory of subfactors to answer both these questions in the affirmative. This is joint work with R. Burnstein.
Abstract: The purpose of this series of talks will be understanding several geometric objects naturally related to groupoids, such as orbifolds, actions, foliations, algebroids, pseudogroups and differentiable stacks. These objects are linked to each other in various ways. If time permits, I will explain all their mutual relations, shown in the following chart:

I will show with several examples how orbifolds arise in the context of proper group actions and that the orbit space of an etale, proper Lie groupoid admits a natural orbifold structure.

Thursday, February 18\textsuperscript{th}, 2010
Surge 268
9:40-11:00am
"Sp (4,R) – Higgs Bundles: a Higgs Bundle Case Study"

Abstract: Using $G = Sp (4,R)$ as a special case, we will describe what $G$-Higgs bundles are and how they can be used to study representation varieties for representations of surface groups into non-compact real Lie groups. In particular we will use Higgs bundles to count the number of components of representation varieties and to investigate in which components the representations do or do not factor through reductive subgroups of $G$. 

Friday, February 19th, 2010
Surge 284
11:10-12:00pm
TUESDAY, 23rd
11:10-12:30PM, SURGE 268  COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)
12:40-2:00PM, SURGE 284  LIE THEORY (Vyjayanthi Chari)
2:10-3:00PM, SURGE 268  TOPOLOGY (Stefano Vidussi)
3:40-5:00PM, SURGE 268  FUNCTIONAL ANALYSIS (M. M. Rao, UCR)
“De Bruijn’s Approach to Distributions & Fourier Analysis”
3:40-5:00PM, SURGE 277  ALGEBRAIC GEOMETRY (Ziv Ran)

WEDNESDAY, 24th
10:10-11:00AM, SURGE 268  COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)
1:10-2:00PM, SURGE 284  TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Qi Zhang)

THURSDAY, 25th
9:40-11:00AM, SURGE 268  GROUPOIDS SEMINAR (Daniele Grandini, UCR)
“Geometry and Groupoids, Part 2: From Groupoids to Orbifolds (cont.)”
11:10-12:30PM, SURGE 268  FRACTRAL RESEARCH GROUP (Scot Childress, UCR)
“Some Kind of Physics Thing”
11:10-12:30PM, SURGE 277  COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)
12:40-2:00PM, SURGE 284  LIE THEORY (Irfan Bagci, UCR)
“An Intro to Cohomology and Representation Theory of Modular Lie (super) Algebras”
1:10-2:00PM, SURGE 277  OPERATOR ALGEBRAS & RELATED TOPICS (Feng Xu)
TBA
2:10-3:00PM, SURGE 268  TOPOLOGY (Stefano Vidussi)
3:40-5:00PM, SURGE 277  ALGEBRAIC GEOMETRY (Ziv Ran)
3:40-5:00PM, SURGE 268  MATHEMATICAL PHYSICS (Daniel Sternheimer, Keio Univ.)
“Deformation, Quantizations, and the Geometry of Space-Time: An Introductory Overview” (joint with colloquium)

FRIDAY, 26th
11:10-12:00PM, SURGE 284  DIFFERENTIAL GEOMETRY (Vestislav Apostolov, Université du Québec à Montréal)
“Extremal Kähler Metrics on Projective Bundles”
12:10-1:00PM, SURGE 268  COBORDISM & TOPOLOGICAL FIELD THEORIES (Julie Bergner, UCR)
“n-Fold Complete Segal Spaces of Cobordisms and Notions of Duals”
3:10-4:00PM, SURGE 268  COMMUTATIVE ALGEBRA (David Rush)
Daniel Sternheimer  
(Keio University/Intitut de Mathématiques de Bourgogne)  

"Deformations, Quantizations, and the Geometry of Space-Time: An Introductory Overview"

Abstract:  
We present, from an epistemological point of view, the evolution of physical concepts in the context of the relation between mathematics and physics. We stress the importance of symmetries and of space-time in fundamental physical theories and show that the above evolution is best understood in the framework of the mathematical notion of deformation. Important paradigms include the concepts of relativity and quantization, exemplified by deformation quantization and its manifold avatars going from analytic and algebraic geometry to quantum groups and the “dual” aspect of quantum spaces. Deforming and quantizing Minkowski space-time and its symmetry to anti de Sitter has significant physical consequences that we sketch.

Thursday, February 25th, 2010  
Surge 284  
4:10-5:00pm  
Tea Time at 3:40pm
"Extremal Kähler Metrics on Projective Bundles"

Abstract: I will discuss the existence problem of extremal Kähler metrics (in the sense of Calabi) on the total space of a holomorphic projective bundle \( P(E) \) over a compact complex curve. The problem is not solved in full generality even in the case of a projective plane bundle over \( \mathbb{CP}1 \). However, I will show that sufficiently “small” Kähler classes admit extremal Kähler metrics if and only if the underlying vector bundle \( E \) can be decomposed as a sum of stable factors. The talk will be based on a recent work with D. Calderbak, P. Gauduchon and C. Tonnesen-Friedman.

Friday, February 26th, 2010
Surge 284
11:10-12:00pm
## Calendar of Events
### For the Week March 1st – 5th, 2010

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<th>Day</th>
<th>Time</th>
<th>Location</th>
<th>Event Description</th>
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<td><strong>TUESDAY, 2nd</strong></td>
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<td>11:10-12:30PM</td>
<td>SURGE268</td>
<td><strong>COHOMOLOGY OF ALGEBRAIC VARIETIES</strong> <em>(Ziv Ran)</em></td>
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<td>12:40-2:00PM</td>
<td>SURGE 284</td>
<td><strong>LIE THEORY</strong> <em>(Ghislain Fourier, Universität zu Köln, Germany)</em></td>
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<td>“Another Basis for sl_n-modules and its Applications”</td>
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<td>2:10-3:00PM</td>
<td>SURGE 268</td>
<td><strong>TOPOLOGY</strong> <em>(Stefano Vidussi)</em></td>
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<td>3:40-5:00PM</td>
<td>SURGE 268</td>
<td><strong>FUNCTIONAL ANALYSIS</strong> <em>(Lucas Randall, UCR)</em></td>
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<td>“De Bruijin’s Approach to Distributions &amp; Fourier Analysis: Part 2”</td>
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<td>SURGE 277</td>
<td><strong>ALGEBRAIC GEOMETRY</strong> <em>(Ziv Ran)</em></td>
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<td><strong>WEDNESDAY, 3rd</strong></td>
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<td>SURGE 268</td>
<td><strong>COMBINATORIAL NUMBER THEORY</strong> <em>(Mei-Chu Chang)</em></td>
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<td>1:10-2:00PM</td>
<td>SURGE 284</td>
<td><strong>TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS</strong> <em>(Qi Zhang)</em></td>
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<td><strong>THURSDAY, 4th</strong></td>
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<td>9:40-11:00AM</td>
<td>SURGE 268</td>
<td><strong>GROUPOIDS SEMINAR</strong> <em>(Daniele Grandini, UCR)</em></td>
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<td>“Geometry and Groupoids, Part 3: Pseudogroups”</td>
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<td>11:10-12:30PM</td>
<td>SURGE 268</td>
<td><strong>FRACTRAL RESEARCH GROUP</strong> <em>(Dr. Dana Clahane, Fullerton College)</em></td>
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<td>“Fractal Membranes”</td>
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<td>11:10-12:30PM</td>
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<td><strong>COHOMOLOGY OF ALGEBRAIC VARIETIES</strong> <em>(Ziv Ran)</em></td>
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<td>12:40-2:00PM</td>
<td>SURGE 284</td>
<td><strong>LIE THEORY</strong> <em>(Tim Ridenour, UCR)</em></td>
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<td>SURGE 277</td>
<td><strong>OPERATOR ALGEBRAS &amp; RELATED TOPICS</strong> <em>(Feng Xu)</em></td>
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<td>SURGE 268</td>
<td><strong>TOPOLOGY</strong> <em>(Stefano Vidussi)</em></td>
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<td><strong>ALGEBRAIC GEOMETRY</strong> <em>(Ziv Ran)</em></td>
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<td><strong>FRIDAY, 5th</strong></td>
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<td>11:10-12:00PM</td>
<td>SURGE 284</td>
<td><strong>DIFFERENTIAL GEOMETRY</strong> <em>(Dr. Mehmet F. Arikan, Rochester University)</em></td>
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<td>“An Upper Bound for the ’Support Genus Invariant’ of Contact Structures”</td>
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<td>12:10-1:00PM</td>
<td>SURGE 268</td>
<td><strong>COBORDISM &amp; TOPOLOGICAL FIELD THEORIES</strong> <em>(Julie Bergner, UCR)</em></td>
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<td>“Fully Dualizable Objects and the Precise Statement of the Cobordism Hypothesis”</td>
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<td>3:10-4:00PM</td>
<td>SURGE 268</td>
<td><strong>COMMUTATIVE ALGEBRA</strong> <em>(David Rush)</em></td>
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"Blow-up in Multidimensional Aggregation Equations"

Abstract:
The aggregation equation is a continuum model for interacting particle systems with attractive/repulsive pairwise interaction potential $K$. It arises in a number of models for biological aggregation, materials science and granular media. The main phenomenon of interests is that, even with smooth initial data, the solutions can concentrate mass in finite time (i.e. a delta Dirac appears in the solution in finite time). Using techniques from fluid dynamics and from optimal transport, we prove rigorous results which explain how and under what circumstances these Dirac delta functions appear.

Monday, March 1st, 2010
Surge 284
4:10-5:00pm
Tea Time at 3:40pm
Abstract:
The brain is arguably the most complex “system” ever encountered. The goal is to understand how neurons behave in different situations as a starting point. However, neurons are extremely complicated exhibiting stochastic behavior on various levels. Investigations into the underlying mechanisms of neural networks crucially depend on mathematical techniques ranging from numerical methods, dynamical systems, probability theory, statistics, etc. This talk will highlight some theoretical tools that have been developed, as well as their applications.
"An Upper Bound for the ‘Support Genus Invariant’ of Contact Structures"

Abstract: The algorithm given by Akbulut and Ozbagci constructs an explicit open book decomposition on a closed contact three-manifold described by a contact surgery on a link in the three-sphere. In this talk, we’ll improve this algorithm by using Giroux’s contact cell decomposition process. Our algorithm gives a better upper bound for the recently defined “support genus invariant” of contact structures.

Friday, March 5th, 2010
Surge 284
11:10-12:00pm
**Calendar of Events**

**For the Week March 8th – 12th, 2010**

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<th><strong>TUESDAY, 9th</strong></th>
<th>COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)</th>
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<tbody>
<tr>
<td>11:10-12:30PM, SURGE 268</td>
<td>LIE THEORY (Matt Bennett, UCR)</td>
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<tr>
<td>1:00-2:00PM, SURGE 284</td>
<td>TOPOLOGY (Stefano Vidussi)</td>
</tr>
<tr>
<td>2:10-3:00PM, SURGE 268</td>
<td>FUNCTIONAL ANALYSIS (James Stafney, UCR)</td>
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<tr>
<td>3:40-4:30PM, SURGE 268</td>
<td>“Celestial Mechanics and Measure Preserving Transformations”</td>
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<tr>
<td>3:40-5:00PM, SURGE 277</td>
<td>ALGEBRAIC GEOMETRY (Ziv Ran)</td>
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<tr>
<th><strong>WEDNESDAY, 10th</strong></th>
<th>COMBINATORIAL NUMBER THEORY (Mei-Chu Chang)</th>
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<tbody>
<tr>
<td>10:10-11:00AM, SURGE 268</td>
<td>TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS (Benjamin Dodson, UCR)</td>
</tr>
<tr>
<td>11:10-12:00PM, SURGE 277</td>
<td>“Frequency Localized Morawetz Estimates for the Defocusing Nonlinear Schrödinger Equation”</td>
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<tr>
<th><strong>THURSDAY, 11th</strong></th>
<th>GROUPOIDS SEMINAR (Christopher Walker)</th>
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<tr>
<td>9:40-11:00AM, SURGE 268</td>
<td>TBA</td>
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<tr>
<td>11:10-12:30PM, SURGE 268</td>
<td>FRACTRAL RESEARCH GROUP (Hafedh Herichi, UCR)</td>
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<td>11:10-12:30PM, SURGE 277</td>
<td>“On the Appolonian Integral Packing”</td>
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<td>1:00-2:00PM, SURGE 284</td>
<td>COHOMOLOGY OF ALGEBRAIC VARIETIES (Ziv Ran)</td>
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<td>1:10-2:00PM, SURGE 277</td>
<td>LIE THEORY (Emanuel Stoica, MIT)</td>
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<td>2:10-3:00PM, SURGE 268</td>
<td>“Unitary Representations of Rational Cherednik Algebras and Hecke Algebras”</td>
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<td>3:40-5:00PM, SURGE 277</td>
<td>OPERATOR ALGEBRAS &amp; RELATED TOPICS (Marta Asaeda)</td>
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<tr>
<td>3:40-5:00PM, SURGE 268</td>
<td>TOPOLOGY (Stefano Vidussi)</td>
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<th><strong>FRIDAY, 12th</strong></th>
<th>ALGEBRAIC GEOMETRY (Ziv Ran)</th>
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<tr>
<td>11:10-12:00PM, SURGE 284</td>
<td>MATHEMATICAL PHYSICS (Dr. Scot Childress, UCR)</td>
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<tr>
<td>12:10-1:00PM, SURGE 268</td>
<td>“On the Subject of Mathematical Physics”</td>
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<tr>
<td>3:10-4:00PM, SURGE 268</td>
<td>DIFFERENTIAL GEOMETRY (Prof. Rafael Herrera Guzman, C.I.M.A.T.)</td>
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<td>“Complex Contact Manifolds and Circle Actions”</td>
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<td>COBORDISM &amp; TOPOLOGICAL FIELD THEORIES (Vasily Dolgushev, UCR)</td>
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<td>“The Cobordism Hypothesis for Manifolds with Structure”</td>
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<td>COMMUTATIVE ALGEBRA (David Rush)</td>
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Abstract: I present my work on network based methods to reconstruct the parameter of a differential equation inside a body from measurements taken at its surface. Two inverse problems are considered: the electric impedance tomography problem where the conductivity is to be estimated from current voltage measurements at the surface and the problem of estimating the (linear) elastic properties of a body from displacement and force measurements at its surface. These are severely ill-posed problems requiring some form of regularization. Our inversion strategy is to (1) Find a reduced model of the problem that can be recovered from the data, with deliberately few parameters to cope with the ill-posedness. (2) Interpret the reduced model as discretization of the underlying PDE. (3) Use the interpretation to estimate the unknown parameter in the PDE. For electric impedance tomography the reduced model is a resistor network arising from finite volumes of discretization with the number of parameters (resistors) determined by the quantity and quality of the measurements. We show that the model reduction problem of finding the smallest resistor network (of fixed topology) that can predict meaningful boundary measurements is uniquely solvable for a broad class of measurements. We propose a simple inversion method based on interpretation of the resistors as conductivity averages over the cells of a predetermined grid that is adapted to the measurements. The reconstruction method is well-suited to situations where measurements are only available on a portion of the surface. For inverse linear elasticity problem we outline the results that would be needed for applying this inversion strategy. Here the reduced models are networks of springs and masses. We present a first step towards a network based inversion method for the problem, namely, a complete characterization of the response function of networks of springs and masses.
Dr. Maria Gualdani
(Postdoctoral Scholar, University of Texas, Austin)

"Global Existence of a Free Boundary Problem with Non-Standard Sources"

Abstract:

We consider a nonlinear free boundary problem, proposed by J.M. Larsy and P.L. Lions in 2006 in the framework of mean field games. The model describes the evolution of a scalar price which is realized as a free boundary of a diffusion equation with evolving sources. The talk focuses on global existence, uniqueness and regularity of solutions. The proof uses tools from non-interacting stochastic particle systems and multiscale analysis.

Tuesday, March 9th, 2010
Surge 284
4:10-5:00pm
Tea Time at 3:40pm
"Frequency Localized Morawetz Estimates for the Defocusing Nonlinear Schrödinger Equations"

Abstract:

In this talk, we will continue our study of the $L^2$ critical nonlinear Schrodinger equation

$$iv_t + \Delta u = |u|^{4/d} u, u(0) = u_0$$

when $d \geq 3$. We will use the estimates obtained in the last talk to prove frequency localized Morawetz estimates that will defeat the minimal mass blowup scenario $N(t) \equiv 1$. We will also discuss extending this to dimensions $d = 1$ and $d = 2$. 

Wednesday, March 10th, 2010
Surge 277
11:10-12:00pm
"Unitary Representations of Rational Cherednik Algebras and Hecke Algebras"

Abstract: In this talk I will explain the classification of unitary irreducible representations in the highest weight category of the rational Cherednik algebra of the symmetric group and how unitarity is preserved by the KZ functor, that maps highest weight modules to modules over the corresponding Hecke algebra.

Thursday, March 11th, 2010
Surge 284
1:00-2:00pm
"Complex Contact Manifolds and Circle Actions"

Abstract: We study equivariant holomorphic Euler characteristics on complex contact manifolds admitting compatible circle actions. We prove a rigidity theorem and deduce the vanishing of several of them, which are analogous to those proved by LeBrun and Salamon on Fano contact manifolds.

Friday, March 12th, 2010
Surge 284
11:10-12:00pm