UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of September 23rd – 27th, 2013

MONDAY, 23rd

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)
No Meeting

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Dr. Kevin Costello)
No Meeting

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR**
No Meeting

TUESDAY, 24th

12:40-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari)
No Meeting

WEDNESDAY, 25th

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Costello/Dr. Chang)
No Meeting

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Julie Bergner)
No Meeting

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)
No Meeting

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)
***No Meeting ***

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Juhi Jang)
***No Meeting ***

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)
***No Meeting ***

2:10-3:30PM, SURGE 277 — **MATH IN THE ENVIRONMENT** (Dr. John Baez)
***No Meeting ***

3:40-5:00PM, SURGE 284 — **COLLOQUIUM**
No Colloquium This Week

THURSDAY, 26th

11:10-12:00PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Michel Lapidus)

12:40-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari)
No Meeting

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Michel Lapidus)

FRIDAY, 27th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. AJ Todd, UCR)
"On Multisymplectic Orthogonality & G_2-Geometry"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. AJ Todd

UC Riverside

"On Multisymplectic Orthogonality & G_2-Geometry"

Abstract: This is a preliminary report on recent observations regarding orthogonality in multisymplectic geometry. A multisymplectic vector space (V,\om) of order k+1 is an n-dimensional real vector space equipped with a nondegenerate exterior (k+1)-form; a symplectic vector space then is an even-dimensional vector space equipped with a nondegenerate 2-form. Recall from symplectic geometry that we have a notion of symplectic orthogonality with respect to this 2-form. The purpose of this talk is to discuss two notions of orthognality that arise when dealing with an exterior form of degree >2. In particular, we will begin with an overview of what is meant by `nondegeneracy' in this context, followed by the notions of multisymplectic orthogonality and l-isotropic, l-coisotropic and l-Lagrangian subspaces, as defined by Cantrijn, Ibort and de León together with some basic results. Next, we will cover some calculations for subspaces of a G_2-vector space (a 7-dimensional real inner product space equipped with a 2-fold vector cross product) based on Cantrijn, Ibort and de León's defintion of multisymplectic orthogonality; finally, I will discuss an alternate definition of `multisymplectic orthogonality' together with some examples from G_2-geometry and basic results.

Friday, September 27th, 2013

Surge 268

11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of September 30th– October 4th, 2013

MONDAY, 30st

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Dr. Kevin Costello)

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR**

TUESDAY, 1st

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Dennis Hasselstrøm Pedersen, Århus Universitet, Denmark)
"Twisting functors"

WEDNESDAY, 2nd

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Costello/Dr. Chang)

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Owen Baker, UCR)
"Intro to Gromov-hyperbolic groups"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Juhi Jang)

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH IN THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM**
No Colloquium This Week

THURSDAY, 3rd

11:10-12:00PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Leo Vu)
"Quantum Analog of P vs. NP"

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari)

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Leo Vu)
"A Survey of Quantum Complexity Theory"

FRIDAY, 4th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. Zhang-Dan Guan, UCR)
"Modification and the Cohomology of compact solvmanifolds II"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 268 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Lie Theory

Dr. Dennis Hasselstrøm Pedersen

Århus Universitet, Denmark

"Twisting functors"

Abstract:

Dr. Dennis Hasselstrøm Pedersen, Let g be a semisimple finitedimensional Lie algebra and W its Weyl group. I will introduce Arkhipov's twisting functors T_w, $w \in W$. The twisting functors are certain functors on the BGG category O that can be used, for example, to construct what is called twisted Verma modules. The functor consists of tensoring with a "semiregular bimodule" and twisting the action by an automorphism corresponding to w. I will talk about the construction of T_w and some of the properties of the twisting functors.

Tuesday, October 1st, 2013
Surge 284
1:00 p.m. - 2:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Topology

Dr. Owen Baker

UC Riverside

"Intro to Gromov-hyperbolic groups"

Abstract:

This expository talk assumes no background in geometric group theory. Geometric group theory studies finitely generated groups in terms of geometric properties -- such as curvature -- of the spaces they act on "geometrically". A group can act geometrically on many different spaces, but these spaces are all "quasi-isometric". Thus one desires combinatorial instead of analytic notions of curvature. Being Gromov-hyperbolic (δ-hyperbolic) is quasi-isometry invariant, and can sometimes be checked combinatorially. In this talk, I will talk about several equivalent definitions of δ-hyperbolicity, and discuss algorithmic consequences. Graduate students are invited to look through http://www.cmi.univmrs.fr/~hamish/Papers/MSRInotes2004.pdf.

Wednesday, October 2nd, 2013
Surge 268
11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. Zhang-Dan Guan

UC Riverside

"Modification and the Cohomology of compact solvmanifolds II"

Abstract:

This is a continuation of our work with the same title in 2006, in which we proved the existence of the modification and applied it to the cohomology of the compact solvmanifolds. Especially, it reduced the classification of compact solvmanifold with symplectic structure to a topological one, i.e., almost symplectic (or cohomology symplectic).

In this work, we obtained a construction proof for the modification and refine our result on the calculation of cohomology to the cocompact discrete subgroup.

Friday, October 4th, 2013
Surge 268
11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of October 7th – 11th, 2013

MONDAY, 7th

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Dr. Kevin Costello, UCR)
Organizational Meeting

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR** (Jacob West, UCR)
"Auslander-Reiten theory in stable (∞, 1)-categories"

TUESDAY, 8th

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Jeffrey Wand, UCR)
"Modules with Demazure flags and character formulae"

WEDNESDAY, 9th

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Mei-Chu Chang, UCR)
"Equations mod p restricted to boxes"

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Owen Baker, UCR)
"Cannon-Thurston maps do not always exist"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Leonardo Kosloff, UCR)
"The fractional Laplacian in exterior domains and some applications to the dissipative 2D quasi-geostrophic equation"

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH IN THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM**
No Colloquium This Week

THURSDAY, 10th

11:10-12:00PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Ben Sanders)
"Framework for Single Image Super-resolution Methods and Digital Photograph Expansion for Natural Images"

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Lisa Schneider, UCR)
"Modules with Demazure flags and character formulae (cont.)"

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Leo Vu)
"Applications of Complexity Theory to Parallel Computation and Public Key Cryptography"

FRIDAY, 11th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY**
No Seminar This Week

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Graduate Student Seminar

Jacob West

UC Riverside

"Auslander-Reiten theory in stable (∞,1)-categories"

Abstract:

Auslander-Reiten theory was introduced by M. Auslander and I. Reiten in the early 1970's as a tool for understanding representations of Artin algebras (and in particular, finite dimensional algebras). Of central interest are the so-called Auslander-Reiten sequences, which are (roughly speaking) minimal non-split short exact sequences. In this talk, we introduce an analogue of Auslander-Reiten theory in stable (∞,1)-categories.

Monday, October 7th, 2013
Surge 284
4:10 p.m. - 5:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Lie Theory

Jeffrey Wand

UC Riverside

"Modules with Demazure flags and character formulae"

Abstract:

In these talks we study a family of finite-dimensional graded representations of the current algebra of sl2 which are indexed by partitions. We show that for ℓ sufficiently large, these representations admit a filtration by submodule where the successive quotients are Demazure modules which occur in a level ℓ integrable module for A(1)1. We associate to each partition and to each ℓ an edge-labeled directed graph which allows us to describe in a combinatorial way the graded multiplicity of a given level ℓ-Demazure module in the filtration. In the special case of the partition 1s and ℓ=2, we give a closed formula for the graded multiplicity of level two Demazure modules in a level one Demazure module. As an application, we use our result along with the results of K. Naoi and Lenart et al, to give the character of a g-stable level one Demazure module associated to B(1)n as an explicit combination of suitably specialized Macdonald polynomials. In the case of sl2, we also study the filtration of the level two Demazure module by level three Demazure modules and compute the numerical filtration multiplicities and show that the graded multiplicites are related to (variants) of partial theta series.

Tuesday, October 8th, 2013

Surge 284

1:00 p.m. - 2:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Partial Differential Equations & Applied Math

Dr. Leonardo Kosloff

UC Riverside

"The fractional Laplacian in exterior domains and some applications to the dissipative 2D quasi-geostrophic equation"

Abstract:

We develop an extension of the generalized Fourier transform for exterior domains due to T. Ikebe following the approach of M. Taylor for all dimensions greater than or equal to 2, and study the Laplacian and fractional Laplacian operators in such a domain. Using the harmonic extension approach due to L. Caffarelli and L. Silvestre, we can obtain a localized version of the "half-Laplacian" operator, so that it is precisely the square root of the Laplacian as a self-adjoint operator in the space of square integrable functions with Dirichlet boundary conditions. This allows us to obtain a maximum principle for solutions of the dissipative two-dimensional quasi-geostrophic equation in the exterior domain, which we apply to prove decay results using an adaptation of the Fourier Splitting method of M.E. Schonbek.

Wednesday, October 9th, 2013

Surge 268

1:10 p.m. - 2:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Topology

Dr. Owen Baker

UC Riverside

"Cannon-Thurston maps do not always exist"

Abstract:

Associated to any hyperbolic group is a topological space called its Gromov boundary. Cannon and Thurston showed that if M is a hyperbolic 3-manifold fibering over the circle S1 with fiber S, a hyperbolic surface, then the inclusion of fundamental groups π1(S)->π1(M) induces a map between their boundaries. Moreover, this map S1 ->S2 is a space-filling curve. We construct a hyperbolic group with a hyperbolic subgroup for which inclusion does not induce a continuous map of the boundaries. Joint with Tim Riley.

Wednesday, October 9th, 2013

Surge 268

11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Lie Theory

Lisa Schneider

UC Riverside

"Modules with Demazure flags and character formulae (contd.)"

Abstract:

In these talks we study a family of finite-dimensional graded representations of the current algebra of sl2 which are indexed by partitions. We show that for ℓ sufficiently large, these representations admit a filtration by submodule where the successive quotients are Demazure modules which occur in a level ℓ integrable module for A(1)1. We associate to each partition and to each ℓ an edge-labeled directed graph which allows us to describe in a combinatorial way the graded multiplicity of a given level ℓ-Demazure module in the filtration. In the special case of the partition 1s and ℓ=2, we give a closed formula for the graded multiplicity of level two Demazure modules in a level one Demazure module. As an application, we use our result along with the results of K. Naoi and Lenart et al, to give the character of a g-stable level one Demazure module associated to B(1)n as an explicit combination of suitably specialized Macdonald polynomials. In the case of sl2, we also study the filtration of the level two Demazure module by level three Demazure modules and compute the numerical filtration multiplicities and show that the graded multiplicites are related to (variants) of partial theta series.

Thursday, October 10th, 2013

Surge 284

1:00 p.m. - 2:00 p.m.

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of October 14th – 18th, 2013

MONDAY, 14th

12:10-1:00PM, SURGE 284	**REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)
3:10-4:00PM, SURGE 284	**MATH CLUB** (Dr. Kevin Costello, UCR) "The Math Major at UCR"
4:10-5:00PM, SURGE 284	**GRAD SEMINAR** TBA

TUESDAY, 15th

1:00-2:00PM, SURGE 284	**LIE THEORY** (Dr. Vyjayanthi Chari)

WEDNESDAY, 16th

10:10-11:00AM, SURGE 268	**COMBINATORIAL NUMBER THEORY** (Dr. Mei-Chu Chang, UCR) "Multiplicative Independence of Iterations of Polynomials"
11:10-12:00PM, SURGE 268	**TOPOLOGY** (Dr. Julie Bergner) TBA
12:10-1:00PM, SURGE 284	**REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)
12:10-1:00PM, SURGE 268	**FLUIDS SEMINAR** (Dr. Jim Kelliher)
1:10-2:00PM, SURGE 268	**PDE & APPLIED MATHEMATICS** (Dr. Juhi Jang) TBA
1:10-2:00PM, SURGE 284	**OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)
2:10-3:30PM, SURGE 277	**MATH AND THE ENVIRONMENT** (Dr. John Baez)
3:40-5:00PM, SURGE 284	**COLLOQUIUM** ***No Colloquium This Week***

THURSDAY, 17th

11:10-12:00PM, SURGE 268	**FRACTAL RESEARCH GROUP** (Tim Cobler, UCR) "Quantizing the Riemann Zeta Function"
1:00-2:00PM, SURGE 284	**LIE THEORY** (Dr. Liping Li, UCR) "Representations of modular skew group algebras"
3:40-5:00PM, SURGE 268	**MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Michael Dombroski) "A Finite Integer-Based Origin of Fermion and Boson Symmetries"

FRIDAY, 18th

11:10-12:00PM, SURGE 268	**DIFFERENTIAL GEOMETRY** (Dr. AJ Todd, UCR) "Hamiltonian Structures and G_2-Geometry"
12:10-1:00PM, SURGE 284	**REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)
3:10-4:00PM, SURGE 284	**COMMUTATIVE ALGEBRA** (Dr. David Rush)

Quarter: Fall 2013

Organizer: Dr. Kevin Costello

MATH CLUB

Monday, October 14th

3:10 - 4:00 p.m.

In Surge 284

"The Math Major at UCR"

Undergrad Student Volunteers:

- TBA

Snacks and Drinks will be served!

mathdept.ucr.edu/mathclub.html

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Lie Theory

Dr. Liping Li

UC Riverside

"Representations of modular skew group algebras"

Abstract:

Skew group algebras naturally generalize ordinary group algebras. Let A be a finite dimensional algebra and let G be a finite subgroup of the automorphism group of A. It has been shown that the skew group algebra AG and A share many important properties (such as finite representation type, finite global dimension, etc) if the order of G is invertible. However, when the order of G is not invertible, many results fail. Therefore, it is natural to ask under what conditions AG and A still share these properties for arbitrary G. The answer of this question will be described in this talk.

Thursday, October 17th, 2013
Surge 284
1:00 p.m. - 2:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. AJ Todd

UC Riverside

"Hamiltonian Structures and G_2-Geometry"

Abstract:

I will begin by discussing the basic properties of multisymplectic manifolds, defined using a natural generalization of symplectic 2-forms from symplectic geometry to general closed n-forms satisfying a nondegeneracy condition, and Hamiltonian multivector fields and differential forms on such manifolds based on work of Cantrijn, Ibort and de León. I will then give an introduction to G_2-geometry as a specific example of a multisymplectic geometry and make a number of remarks about Hamiltonian structures on a manifold with an integrable G_2-structure.

Friday, October 18th, 2013
Surge 268
11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of October 21st – 25th, 2013

MONDAY, 21st

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Jason Erbele, UCR)
"Applications of Categories to Diagrammatic Reasoning in Control Theory (a.k.a. Categories in Control)"

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR**
No Meeting This Week

TUESDAY, 22nd

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Jiarui Fei, UCR)
"Vanishing cycles and cluster transformations"

WEDNESDAY, 23rd

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Mei-Chu Chang, UCR)
"Group generated by iterations of polynomial maps"

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Julie Bergner)
TBA

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. James Kelliher, UCR)
"On the behavior of bounded vorticity, bounded velocity solutions to the 2D Euler equations"

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH AND THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM**
No Colloquium This Week

THURSDAY, 24th

11:10-12:30PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Alejandro Vélez-Santiago, UCR)
"Interior and Trace Embedding Results for Variable Exponent Sobolev and Maz'ya Spaces on "Bad" Domains"

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Jairui Fei, UCR)
"Vanishing cycles and cluster transformations"

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Stephen Muir, UCR)
"Thermodynamic Formalism for Expanding and Pseudoexpanding Dynamical Systems"

FRIDAY, 25th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. Feng Guan & Dr. Xiaojing Chen, UCLA)
"Hodge metric completion of the Teichmüller space of Calabi-Yau manifolds"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

Quarter: Fall 2013 Organizer: Dr. Kevin Costello

MATH CLUB

Monday, October 21st, 3:10 - 4:00 p.m.

In Surge 284

Undergrad Student Volunteers:

- TBA

Jason Erbele, UC Riverside

"Applications of Categories to Diagrammatic Reasoning in Control Theory (a.k.a. Categories in Control)"

If a picture is worth a thousand words, it is not surprising that diagrams and networks appear in many contexts. Category theory provides a natural language to work with diagrams used in other disciplines via string diagrams. In Control theory, signal flow diagrams are used to gain insight into control processes.

Reinterpreting them as string diagrams, they can be viewed as representing a symmetric monoidal category of control processes.

Snacks and Drinks will be served!

mathdept.ucr.edu/mathclub.html

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Lie Theory

Dr. Jiarui Fei

UC Riverside

"Vanishing cycles and cluster transformations"

Abstract:

For a quiver with potential, we can associate a vanishing cycle to each representation space. If there is a nice torus action on the potential, the vanishing cycles can be expressed in terms of truncated Jacobian algebras. We study how these vanishing cycles change under the mutation of Derksen-Weyman-Zelevinsky. The wall-crossing formula leads to a categorification of quantum cluster algebras under the assumption of existence of certain potential. This is a special case of A. Efimov's result, but our approach is more concrete and down-to-earth. We also obtain a formula relating the representation Grassmannians under sink-source reflections. In this talk, I will start with basic definitions and examples of vanishing cycles, Hall algebras, and quivers with potentials.

Tuesday, October 22nd, 2013

&

Thursday, October 24th, 2013

Surge 284

1:00 p.m. - 2:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Partial Differential Equations & Applied Math

Dr. James Kelliher

UC Riverside

"On the behavior of bounded vorticity, bounded velocity solutions to the 2D Euler equations"

Abstract:

I will discuss the properties of the pressure for weak solutions to the 2D Euler equations in the exterior of a single obstacle having bounded velocity and bounded vorticity. This will involve an investigation of the properties of Neumann functions on such domains.

Wednesday, October 23rd, 2013
Surge 268
1:10 p.m. – 2:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. Feng Guan & Dr. Xiaojing Chen

UC Los Angeles

"Hodge metric completion of the Teichmüller space of Calabi-Yau manifolds"

Abstract:

In this talk, we will discuss some properties of Hodge metric completion of the Teichmüller space of Calabi-Yau manifolds. We will prove that the Hodge metric completion of the Teichmüller space of polarized and marked Calabi-Yau manifolds is a complex affine manifold. We also show that the extended period map from the completion space is injective into the period domain, and that the completion space is a domain of holomorphy and admits a complete Kähler-Einstein metric. This is a joint work with Professor Kefeng Liu and Xiaojing Chen from UCLA.

Friday, October 25th, 2013

Surge 284

11:00 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of October 28th – November 1st, 2013

MONDAY, 28th

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Dr. Kevin Costello, UCR)
Integration Bee

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR** (Oliver Thistlethwaite, UCR)
"Alexander Polynomials of 3-manifolds"

TUESDAY, 29th

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

WEDNESDAY, 30th

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Kevin Costello, UCR)
"Broadcasting with interference but without feedback"

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Julie Bergner)

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Juhi Jang)

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH AND THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM** – Dr. Julie Bergner, UCR
"Homotopy theory and higher categories"

THURSDAY, 31st

11:10-12:00PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Jonathan Sarhad, UCR)
"A Lower Bound on the Spectrum of a Certain Quantum Graph Laplacian"

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

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Stephen Muir, UCR)
"Thermodynamic Formalism for Expanding and Pseudoexpanding Dynamical Systems (con't)"

FRIDAY, 1st

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. Gordon Heier, University of Houston)
"Projective Kaehler manifolds of semi-negative holomorphic sectional curvature"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **COMMUTATIVE ALGEBRA** (Dr. Augustine O'Keefe, University of Kentucky)
"An algebraic study of Cameron-Walker graphs"

Quarter: Fall 2013 Organizer: Dr. Kevin Costello

MATH CLUB

Monday, October 28th, 3:10 - 4:00 p.m.

In Surge 284

Integration Bee

Undergrad Student Volunteers:

- TBA

The Math Club will be holding our annual integration bee this Monday at 3:10 PM in Surge 284.

Join us for a little friendly competition, including prizes, refreshments, and copious amounts of candy!

mathdept.ucr.edu/mathclub.html

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Graduate Student Seminar

Oliver Thistlethwaite

UC Riverside

"Alexander Polynomials of 3-manifolds"

Abstract:

The Alexander polynomial originally arose as a knot invariant but was later extended by Turaev to an invariant for 3-manifolds. We will define this invariant as well as discuss some of the results obtained by using it.

Monday, October 28th, 2013
Surge 284
4:10 p.m. - 5:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Colloquium

Dr. Julie Bergner

UC Riverside

"Homotopy theory and higher categories"

Abstract:

A recent trend in homotopy theory is to consider homotopical categories themselves as objects of study. Such structures can arise as model categories, or more general categories with weak equivalences, or alternatively as categories up to homotopy, often called $(\infty, 1)$-categories. There are many different models for these structures, but their respective model categories are all known to be equivalent. A more difficult problem is generalizing these models to homotopical versions of higher categories, or (∞, n)-categories. In this talk we consider the known models for these structures and the comparisons between them.

Wednesday, October 30th, 2013

Surge 284

Tea Time: 3:40 p.m. / Talk: 4:10 – 5:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. Gordon Heier

University of Houston

"Projective Kaehler manifolds of semi-negative holomorphic sectional curvature"

Abstract:

We will discuss semi-positivity theorems for the canonical class of projective Kaehler manifolds of semi-negative holomorphic sectional curvature. The structure of such manifolds can be understood especially well under the additional assumption of positive (in particular, maximal) Albanese dimension. The methods used are a mixture of differential geometric and algebraic geometric techniques. This is joint work with Steven Lu and Bun Wong.

Friday, November 1st, 2013
Surge 268
11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Commutative Algebra

Dr. Augustine O'Keefe

University of Kentucky

"An algebraic study of Cameron-Walker graphs"

Abstract: Let G be a finite simple graph with vertex set $V(G) = \{x_1, , dots, x_n\}$ and edge set $E(G)$. We then define the edge ideal of G to be the

$$I(G) = \langle x_i x_j \ : \ \{x_i, x_j\} \in E(G) \rangle \subset S = k[x_1, \ldots, x_n].$$

When studying edge ideals one would like to characterize algebraic invariants and properties of the the edge ideal $I(G)$ in terms of the combinatorial structure of the graph G and vice versa. In this talk we will focus on graphs for which the matching number, $m(G)$, is equal to the induced matching number $i(G)$ which were characterized by Cameron and Walker in 2005. These invariants are of particular interest because they provide upper and lower bounds, respectively, for the Castelnuovo-Mumford regularity of the quotient of the edge ideal $S/I(G)$. In particular, we will characterize for which Cameron-Walker graphs the associated edge ideal is (sequentially) Cohen-Macaulay, (pure) shellable, and (pure) vertex decomposable.

Friday, November 1st, 2013

Surge 284

3:10 p.m. - 4:00 p.m.

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of November 4th – 8th, 2013

MONDAY, 4th

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Dr. Kevin Costello, UCR)
"(Some of) the Math behind Google's Pagerank"

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR** (Thomas Schellhous, UCR)
"Weak derivatives of distributions and applications to PDE"

TUESDAY, 5th

12:40-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari, UCR)
"Introduction to affine Lie algebras"

WEDNESDAY,6th

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Costello/Dr. Chang)

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Julie Bergner, UCR)
TBA

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Juhi Jang)

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH AND THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM** – Dr. Chanwoo Kim, University of Cambridge
"Some recent progress in boundary problems in Boltzmann theory"

THURSDAY, 7th

11:10-12:00PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Michel Lapidus)
TBA

12:40-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari, UCR)
"Introduction to affine Lie algebras"

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Michel Lapidus)
TBA

3:40-5:00PM, SURGE 284 — **COLLOQUIUM** – Dr. Juhi Jang, UCR
"Stability theory of polytropic gaseous stars"

FRIDAY, 8th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. Catherine Searle, Oregon State)
"Orientation and Symmetries of Alexandrov spaces with applications to positive curvature"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 268 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

Quarter: Fall 2013 Organizer: Dr. Kevin Costello

MATH CLUB

Monday, November 4th, 3:10 - 4:00 p.m.

In Surge 284

(Some of) the Math behind Google's Pagerank

Undergrad Student Volunteers:

- TBA

Suppose you have a network of nodes, some of which link to each other. Given such a network, how can you rank which nodes are "popular" (or "important", or "your favorite adjective")?

The answer involves a bit of graph theory and some linear algebra, along with some fancy footwork to deal with the issue that the networks people care about may be enormous. I will be discussing some of the mathematics involved in a Math Club talk this Monday (November 4) at 3:10 in Surge 284.

Snacks and drinks served!

mathdept.ucr.edu/mathclub.html

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Colloquium

Dr. Chanwoo Kim

University of Cambridge

"Some recent progress in boundary problems in Boltzmann theory"

Abstract:

We consider the Boltzmann equation in bounded domain with various boundary conditions. A genuine non-equilibrium steady state is established via constructing the solution of the steady Boltzmann equation with non-constant boundary temperature. We also discuss the validity of the Fourier law in the kinetic regime. Next we discuss the Sobolev regularity of Boltzmann solutions in convex domains.

Wednesday, November 6th, 2013

Surge 284

Tea Time: 3:40 p.m. / Talk: 4:10 – 5:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Colloquium

Dr. Juhi Jang

UC Riverside

"Stability theory of polytropic gaseous stars"

Abstract:

I'll discuss the stability theory of Lane-Emden equilibrium stars under the Euler-Poisson or Navier-Stokes-Poisson system. A linear stability can be characterized by the polytropic exponent. A nonlinear instability will be also discussed.

Thursday, November 7th, 2013

Surge 284

Tea Time: 3:40 p.m. / Talk: 4:10 – 5:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. Catherine Searle

Oregon State

"Orientation and Symmetries of Alexandrov spaces with applications to positive curvature"

Abstract:

Alexandrov geometry is a natural synthetic generalization of Riemannian geometry and has proven to be a powerful tool for better understanding Riemannian geometry, as witnessed by Perelman's solution to the Poincare Conjecture. However, with greater generality comes the loss of many of the tools we rely upon so heavily in Riemannian geometry.

In this talk I will discuss two new tools we have developed for use in Alexandrov geometry and will apply them to the classification of compact positively curved Alexandrov spaces with maximal symmetry rank, a classification that yields new insights into the corresponding classification of positively curved Riemannian manifolds. This is joint work with John Harvey.

Friday, November 8th, 2013

Surge 268

11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of November 11th – 15th, 2013

MONDAY, 11th

HOLIDAY — **VETERANS DAY**

TUESDAY, 12th

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari, UCR)
"Introduction to affine Lie algebras"

WEDNESDAY, 13th

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Costello/Dr. Chang)

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Julie Bergner)
TBA

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Juhi Jang)

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH AND THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM**
No Colloquium This Week

THURSDAY, 14th

11:10-12:00PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Stephen Muir, UCR)
"Pressure and Zeta Functions for Graph Directed Markov Systems, 2"

1:00-2:00PM, SURGE 284 — **LIE THEORY** (Dr. Vyjayanthi Chari, UCR)
"Introduction to affine Lie algebras"

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Tim Cobler, UCR)
"Functional Analysis in Number Theory"

FRIDAY, 15th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. Fred Wilhelm, UCR)
"How to lift Positive Ricci curvature"

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 268 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Differential Geometry

Dr. Fred Wilhelm

UC Riverside

"How to lift Positive Ricci curvature"

Abstract:

We show how to lift positive Ricci and almost non-negative curvatures from an orbit space M/G to the corresponding G-manifold, M. We apply the results to get new examples of Riemannian manifolds that satisfy both curvature conditions simultaneously.

Friday, November 15th, 2013
Surge 268
11:10 a.m. - 12:00 noon

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of December 2nd – 6th, 2013

MONDAY, 2nd

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 284 — **MATH CLUB** (Dr. Kevin Costello)
"Movie Night"

4:10-5:00PM, SURGE 284 — **GRAD SEMINAR** – Soheil Safii, UCR
"Equivariant and Isovariant Function Spaces"

TUESDAY, 3rd

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

WEDNESDAY, 4th

10:10-11:00PM, SURGE 268 — **COMBINATORIAL NUMBER THEORY** (Dr. Mei-Chu Chang, UCR)
"Multiplicative orders on varieties (continued)"

11:10-12:00PM, SURGE 268 — **TOPOLOGY** (Dr. Julie Bergner)
TBA

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

12:10-1:00PM, SURGE 268 — **FLUIDS SEMINAR** (Dr. Jim Kelliher)

1:10-2:00PM, SURGE 268 — **PDE & APPLIED MATHEMATICS** (Dr. Alejandro Vélez-Santiago, UCR)
"Solvability of boundary value problems with nonlocal Wentzell boundary conditions over C(Ω)"

1:10-2:00PM, SURGE 284 — **OPERATOR ALGEBRAS & RELATED TOPICS** (Dr. Feng Xu)

2:10-3:30PM, SURGE 277 — **MATH AND THE ENVIRONMENT** (Dr. John Baez)

3:40-5:00PM, SURGE 284 — **COLLOQUIUM**
No Colloquium

THURSDAY, 5th

11:10-12:30PM, SURGE 268 — **FRACTAL RESEARCH GROUP** (Dr. Michel Lapidus)

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

3:40-5:00PM, SURGE 268 — **MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS** (Dr. Michel Lapidus)

3:40-5:00PM, SURGE 284 — **BLOCK LECTURE SERIES – Dr. V.S. Varadarajan, UC Los Angeles**
"The micro-structure of space-time and super Lie theory"

FRIDAY, 6th

11:10-12:00PM, SURGE 268 — **DIFFERENTIAL GEOMETRY** (Dr. Fred Wilhelm)
No Meeting This Week

12:10-1:00PM, SURGE 284 — **REP. THEORY OF SEMISIMPLE & AFFINE LIE ALGEBRAS** (Dr. Vyjayanthi Chari)

3:10-4:00PM, SURGE 268 — **COMMUTATIVE ALGEBRA** (Dr. David Rush)

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Graduate Student Seminar

Soheil Safii

UC Riverside

"Equivariant and Isovariant Function Spaces"

Abstract:

When working with topological spaces, we have equivalence given by homeomorphisms but also a weaker notion of equivalence given by homotopy. When considering G-Spaces (topological spaces with an added group action), in addition to equivariant homotopy equivalences, which are analogous to homotopy equivalences in topological spaces, we also have a slightly stronger condition of isovariant homotopy equivalence. In this talk, we hope to discuss the two different notions and in particular, the conditions under which they are the same.

Monday, December 2nd, 2013
Surge 284
4:10 p.m. - 5:00 p.m.

UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Partial Differential Equations & Applied Math

Dr. Alejandro Vélez-Santiago

UC Riverside

"Solvability of boundary value problems with nonlocal Wentzell boundary conditions over C(Ω)"

Abstract:

In this talk we will discuss the solvability and global regularity of weak solutions, for a class of linear elliptic and parabolic equations with general nonlocal Wentzell boundary conditions.

Wednesday, December 4th, 2013
Surge 268
1:10 p.m. - 2:00 p.m.