



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week March 29<sup>th</sup> – April 2<sup>nd</sup>, 2010

#### MONDAY,

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY,

11:10-12:30PM, SURGE 284

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-5:00PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY,

10:10-11:00PM, SURGE 268

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:00PM, SURGE 277

\*10:10-11:00AM, SURGE 284

#### THURSDAY,

11:10-12:30PM, SURGE 268

\*11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

1:10-2:00PM, SURGE 277

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY,

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Aviv Censor)

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (James Stafney, UCR)

“The Schauder Fixed Point Theorem and a Nonlinear PDE”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**COMBINATORIAL NUMBER THEORY** (John Dusel, UCR)

“The Pigeonhole Principle and Some Number-Theoretic Applications”

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)

“The Inductive Formulation of the Cobordism Hypothesis”

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev, UCR)

“Formulation of the Problem. Overview of Goals”

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (James Kelliher)

**FRACTAL RESEARCH GROUP** (Jonathan Sarhad, UCR)

“Spectral Geometries of Sierpinski Gasket”

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (David Carfi)

“Quantum Mechanics in the Spaces of Tempered Distributions”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Farid Mandani, Paris Universitatis)

“Equivariant Yamabe Problem and Hebey-Vaugon Conjecture”

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)

\*\*\*\*Canceled for this Week\*\*\*\*



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 5<sup>th</sup> – 9<sup>th</sup>, 2010

#### MONDAY,

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

#### TUESDAY,

11:10-12:30PM, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

12:40-2:00PM, SURGE 268

**GROUPOIDS SEMINAR** (Aviv Censor)

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00PM, SURGE 172

**FUNCTIONAL ANALYSIS** (Theodore J. Barth)

“A Holomorphic Fixed Point Theorem for Convex Domains”

3:40-5:00PM, SURGE 277

**ALGEBRAIC GEOMETRY** (Sung Rak Choi, UCR)

“The Dual of Mobile Cone”

#### WEDNESDAY,

10:10-11:00AM, SURGE 284

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (James Kelliher)

10:10-11:00AM, SURGE 268

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)

“Proving the Cobordism Hypothesis from the Inductive Formula”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

2:10-3:00PM, SURGE 277

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev, UCR)

“Tangential Derivations, Special Derivations, Infinitesimal Braids, etc. I”

#### THURSDAY,

11:10-12:30PM, SURGE 268

**FRactal Research Group** (3 Speakers from CSU)

\*\*\* See flyers for information: each speaker will speak for 20 minutes\*\*\*

11:10-12:30, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

1:10-2:00PM, SURGE 277

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00, SURGE 268

**MATHEMATICAL PHYSICS** (Hafedh Herichi, UCR)

“The Spectral Operator and Some Conditions on its Invertibility”

3:40-5:00, SURGE 277

**ALGEBRAIC GEOMETRY** (Ziv Ran)

#### FRIDAY,

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**DIFFERENTIAL GEOMETRY** (Owen Dearnicott, UCR)

“The Curvature of Twisted Products and Biquotients”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

3:10-4:00PM, SURGE 268

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Fractal Research Group

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**Shane Gibson**  
(CSU Stanislaus)

"Dimensions of Related Fractal Strings"

-20 Minute Talk-

**Abstract:** The geometric zeta function of a fractal string and the Minkowski dimension of its boundary depend only on the sequence of lengths of the open intervals which make up the string. However, the Hausdorff dimension of the boundary depends on the arrangement of the intervals and not just their lengths. In this talk, it is shown that for certain related fractal strings, the topological zeta function yields the Hausdorff dimension of the boundary of a given string, and a generalization is given for the types of strings that this applies to.

**Thursday, April 8<sup>th</sup>, 2010**

**Surge 268**

**11:10-12:30pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Fractal Research Group

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**Michael Mackenzie**  
(CSU Stanislaus)

"Partition Zeta Functions of a Multinomial Measure"

-20 Minute Talk-

**Abstract:** Exploring the binomial measure on the Cantor set has resulted in the derivation of its multifractal spectrum from which we can produce a full family of real-valued dimensions associated with the multiscale behavior of the measure. Obtaining this multifractal spectrum can be done by analyzing the partition zeta functions of the measure. In this talk, I will discuss the derivation of the multifractal spectrum of a specific trinomial (Trident) measure, which in turn leads to more generalized multinomial measure.

**Thursday, April 8<sup>th</sup>, 2010**

**Surge 268**

**11:10-12:30pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Fractal Research Group

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**Kate Ellis**  
(CSU Stanislaus)

"Zeta Functions of a Measure of Cantor String"

-20 Minute Talk-

**Abstract:** Examination of the full family of partition zeta functions on a particular multifractal measure supported on the countable boundary of a specific Cantor String yields a nontrivial multifractal spectrum. The corresponding real-valued dimensions are extended to families of complex values exactly as it is done in the case of the complex dimension of fractal strings. This procedure results in the tapestry of complex dimensions which reflect the multiscale behavior of the multifractal measure.

**Thursday, April 8<sup>th</sup>, 2010**

**Surge 268**

**11:10-12:30pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Differential Geometry

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**Owen Dearthcott**  
(UCR)

"The Curvature of Twisted Products and Biquotients"

**Abstract:** In this series of two talks I first explain some simple general principles that utilize twisted products and O'Neill's formula to increase/improve the non-negative curvature of a biquotient. In the second talk I provide application of this technique to a biquotient that is diffeomorphic to an exotic 7-sphere.

**Friday, April 9<sup>th</sup>, 2010**  
**Surge 268**  
**1:10-2:00pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## COLLOQUIUM

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**Simon Willerton**  
(University of Sheffield)

"Measuring the Magnitude of Metric Spaces"

**Abstract:**

Tom Leinster defined the notion of the 'magnitude' of a finite metric space, which be thought of as something like the 'effective number of points' in the metric space. Leinster and I extended the notion to infinite metric spaces such as subsets of Euclidean spaces (like line segments, circles, Cantor sets\_ --- and Riemannian manifolds (like surfaces and n-spheres). I will try to give you some idea what this has to do with ecological biodiversity measures, geometric measure theory, category theory and penguins.

**Wednesday, April 7<sup>th</sup>, 2010**

**Surge 284**

**4:10-5:00pm**

*Tea Time at 3:40pm*



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 12<sup>th</sup> – 16<sup>th</sup>, 2010

#### MONDAY, 12th

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

#### TUESDAY, 13th

11:10-12:30PM, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

12:40-2:00PM, SURGE 268

**GROUPOIDS SEMINAR** (Daniele Grandini, UCR)

“From Psuedogroups to Groupoids via Jets”

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00PM, SURGE 172

**FUNCTIONAL ANALYSIS** (M.M. Rao, UCR)

“Denjoy on Riemann’s Hypothesis”

3:40-5:00PM, SURGE 277

**ALGEBRAIC GEOMETRY** (Ziv Ran, UCR)

“Separated Canonical Systems for Nodal Curves”

#### WEDNESDAY, 14th

10:10-11:00AM, SURGE 284

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Murugiah Muraleetharan, UCR)

“Evolution of Curvatures Under the Ricci Flow: Part II”

10:10-11:00AM, SURGE 268

**COMBINATORIAL NUMBER THEORY** (John Dusel, UCR)

“Ramsey’s Theorem for Finite Graphs”

10:10-11:00AM, SURGE 277

**OPERATOR ALGEBRAS & RELATED TOPICS** (Aviv Censor, UCR)

“Topological Degroupoidification”

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)

“Reducing the Unoriented Cobordism Hypothesis”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

2:10-3:30PM, SURGE 277

**KASHIWARA-VERGNE PROBLEM** (Christopher Rogers, UCR)

“Duflo Isomorphism Theorem”

#### THURSDAY, 15th

11:10-12:30PM, SURGE 268

**FRACTAL RESEARCH GROUP** (Jason Payne, UCR)

“Prime Number Theorem”

11:10-12:30, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran, UCR)

“Definition of Stacks”

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00, SURGE 268

**MATHEMATICAL PHYSICS** (Hafedh Herichi, UCR)

“On the Appolonian Integral Packet, Fractal Sprays and their Complex Dimensions”

3:40-5:00, SURGE 277

**ALGEBRAIC GEOMETRY** (Ziv Ran)

#### FRIDAY, 16th

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**DIFFERENTIAL GEOMETRY** (Owen Dearnicot, UCR)

“The Curvature of Twisted Products and Biquotients (Cont’d)”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

3:10-4:00PM, SURGE 268

**COMMUTATIVE ALGEBRA** (David Rush)





# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## COLLOQUIUM

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**Stephen Bigelow**  
(UC Santa Barbara)

"Homological Definitions of Polynomial Knot Invariants"

**Abstract:**

We give a definition of the Jones polynomial using an intersection pairing on homology of a configuration space. The Jones polynomial of an  $n$ -bridge knot is the intersection of two  $n$ -dimensional tori in the  $2n$ -dimensional configuration space of  $n$ -tuples in the  $2n$ -dimensional disk. I'll also talk about prospects for other knot invariants and categorification.

**Wednesday, April 14<sup>th</sup>, 2010**

**Surge 284**

**4:10-5:00pm**

*Tea Time at 3:40pm*



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 19<sup>th</sup> – 23<sup>rd</sup>, 2010

#### MONDAY, 19<sup>th</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 20<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-5:00PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 21<sup>st</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 22<sup>nd</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

1:10-2:00PM, SURGE 277

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 23<sup>rd</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Aviv Censor)

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Victor Shapiro, UCR)

“Variational Techniques for the Nonlinear Dirichlet Problem”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Edward Burkard, UCR)

“Minkowski Space-Time”

**COMBINATORIAL NUMBER THEORY** (John Dusel, UCR)

“Estimates of Symmetric Ramsey Numbers and the Theorems of Schur and Erdos-Szekeres”

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner)

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasiliy Dolgushev, UCR)

“Tangential Derivations, Special Derivations, Infinitesimal Braids, etc. II”

**FRACTAL RESEARCH GROUP** (Robert Niemeyer, UCR)

“A Characterization of  $\pi/3$  Orbits of the Koch Snowflake”

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Aviv Censor, UCR)

“Topological Degroupoidification cont’d”

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Nishu Lal, UCR)

“Self-Similar Sturm-Liouville Operator and Complex Dynamics in Higher Dimension”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Yunfeng Jiang, Utah)

“Donaldson-Thomas Type Invariants via L-infinity Algebras”

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Differential Geometry

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**Yunfeng Jiang**  
(Utah)

### "Donaldson-Thomas Type Invariants via L-infinity Algebras"

**Abstract:** Let  $L$  be a cyclic differential graded Lie algebra of dimension three. By "transfer theorem" there is a cyclic L-infinity algebra structure on the Cohomology  $H^*(L)$ . These two L-infinity algebras are quasi-isomorphic, hence induce isomorphic germ (local) moduli spaces. The cyclicity property on  $H^*(L)$  gives rise to a superpotential function on the first Cohomology  $H^1(L)$  so that the germ (local) moduli space is the critical locus of the superpotential function.

Donaldson-Thomas type invariants are virtual count of stable objects under some stability condition in the bounded derived category of coherent sheaves over Calabi-Yau threefolds. According to Behrend, the Donaldson-Thomas invariant is the weighted Euler characteristic weighted by Behrend constructible function on the moduli space. In this talk we will explain how the Donaldson-Thomas invariant is the Milnor Number of the superpotential function of the L-infinity algebra  $H^*(L)$ , which is the value of Behrend function at that point. Hence we prove that Behrend function only depends on the formal neighborhood of the moduli space.

**Friday, April 23<sup>rd</sup>, 2010**

**Surge 268**

**1:10-2:00pm**



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week May 3<sup>rd</sup> – 7<sup>th</sup>, 2010

#### MONDAY, 3<sup>rd</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 4<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-4:30PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 5<sup>th</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 6<sup>th</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 7<sup>th</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Aviv Censor)

\*\*\*No Meeting\*\*\*

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Yuchiro Kakihara, UCR)

“Weak Radon-Nikodym Derivatives for Vector Measures”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Benjamin Dodson, UCR)

“Solutions of the Defocusing Nonlinear Schrodinger Equation in One and Two Dimensions”

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)

“Morse Theory and Building  $Bord_n$  Via Generators and Relations”

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev)

\*\*\*CANCELED\*\*\*

**FRACTAL RESEARCH GROUP** (Rob Niemeyer, UCR)

“ $S(KS_n)$  As a Branched Cover of the Hexagonal Torus”

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Aviv Censor, UCR)

“How to Measure a Groupoid”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Owen Dearnicott, UCR)

“The Curvature of Twisted Products and Biquotients (Cont’d)”

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 5<sup>th</sup> – 9<sup>th</sup>, 2010

#### MONDAY,

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

#### TUESDAY,

11:10-12:30PM, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

12:40-2:00PM, SURGE 268

**GROUPOIDS SEMINAR** (Aviv Censor)

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00PM, SURGE 172

**FUNCTIONAL ANALYSIS** (Theodore J. Barth)

“A Holomorphic Fixed Point Theorem for Convex Domains”

3:40-5:00PM, SURGE 277

**ALGEBRAIC GEOMETRY** (Sung Rak Choi, UCR)

“The Dual of Mobile Cone”

#### WEDNESDAY,

10:10-11:00AM, SURGE 284

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (James Kelliher)

10:10-11:00AM, SURGE 268

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)

“Proving the Cobordism Hypothesis from the Inductive Formula”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

2:10-3:00PM, SURGE 277

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev, UCR)

“Tangential Derivations, Special Derivations, Infinitesimal Braids, etc. I”

#### THURSDAY,

11:10-12:30PM, SURGE 268

**FRactal Research Group** (3 Speakers from CSU)

\*\*\* See flyers for information: each speaker will speak for 20 minutes\*\*\*

11:10-12:30, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

1:10-2:00PM, SURGE 277

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00, SURGE 268

**MATHEMATICAL PHYSICS** (Hafedh Herichi, UCR)

“The Spectral Operator and Some Conditions on its Invertibility”

3:40-5:00, SURGE 277

**ALGEBRAIC GEOMETRY** (Ziv Ran)

#### FRIDAY,

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**DIFFERENTIAL GEOMETRY** (Owen Dearnicott, UCR)

“The Curvature of Twisted Products and Biquotients”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

3:10-4:00PM, SURGE 268

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Fractal Research Group

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**Shane Gibson**  
(CSU Stanislaus)

"Dimensions of Related Fractal Strings"

-20 Minute Talk-

**Abstract:** The geometric zeta function of a fractal string and the Minkowski dimension of its boundary depend only on the sequence of lengths of the open intervals which make up the string. However, the Hausdorff dimension of the boundary depends on the arrangement of the intervals and not just their lengths. In this talk, it is shown that for certain related fractal strings, the topological zeta function yields the Hausdorff dimension of the boundary of a given string, and a generalization is given for the types of strings that this applies to.

**Thursday, April 8<sup>th</sup>, 2010**

**Surge 268**

**11:10-12:30pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Fractal Research Group

---

**Michael Mackenzie**  
(CSU Stanislaus)

"Partition Zeta Functions of a Multinomial Measure"

-20 Minute Talk-

**Abstract:** Exploring the binomial measure on the Cantor set has resulted in the derivation of its multifractal spectrum from which we can produce a full family of real-valued dimensions associated with the multiscale behavior of the measure. Obtaining this multifractal spectrum can be done by analyzing the partition zeta functions of the measure. In this talk, I will discuss the derivation of the multifractal spectrum of a specific trinomial (Trident) measure, which in turn leads to more generalized multinomial measure.

**Thursday, April 8<sup>th</sup>, 2010**

**Surge 268**

**11:10-12:30pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Fractal Research Group

---

**Kate Ellis**  
(CSU Stanislaus)

"Zeta Functions of a Measure of Cantor String"

-20 Minute Talk-

**Abstract:** Examination of the full family of partition zeta functions on a particular multifractal measure supported on the countable boundary of a specific Cantor String yields a nontrivial multifractal spectrum. The corresponding real-valued dimensions are extended to families of complex values exactly as it is done in the case of the complex dimension of fractal strings. This procedure results in the tapestry of complex dimensions which reflect the multiscale behavior of the multifractal measure.

**Thursday, April 8<sup>th</sup>, 2010**

**Surge 268**

**11:10-12:30pm**





# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Differential Geometry

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**Owen Dearthcott**  
(UCR)

"The Curvature of Twisted Products and Biquotients"

**Abstract:** In this series of two talks I first explain some simple general principles that utilize twisted products and O'Neill's formula to increase/improve the non-negative curvature of a biquotient. In the second talk I provide application of this technique to a biquotient that is diffeomorphic to an exotic 7-sphere.

**Friday, April 9<sup>th</sup>, 2010**  
**Surge 268**  
**1:10-2:00pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## COLLOQUIUM

---

**Simon Willerton**  
(University of Sheffield)

"Measuring the Magnitude of Metric Spaces"

**Abstract:**

Tom Leinster defined the notion of the 'magnitude' of a finite metric space, which be thought of as something like the 'effective number of points' in the metric space. Leinster and I extended the notion to infinite metric spaces such as subsets of Euclidean spaces (like line segments, circles, Cantor sets\_ --- and Riemannian manifolds (like surfaces and n-spheres). I will try to give you some idea what this has to do with ecological biodiversity measures, geometric measure theory, category theory and penguins.

**Wednesday, April 7<sup>th</sup>, 2010**

**Surge 284**

**4:10-5:00pm**

*Tea Time at 3:40pm*



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 12<sup>th</sup> – 16<sup>th</sup>, 2010

#### MONDAY, 12th

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 13th

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-5:00PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 14th

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 15th

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 16th

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Daniele Grandini, UCR)  
"From Psuedogroups to Groupoids via Jets"

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (M.M. Rao, UCR)  
"Denjoy on Riemann's Hypothesis"

**ALGEBRAIC GEOMETRY** (Ziv Ran, UCR)  
"Separated Canonical Systems for Nodal Curves"

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Murugiah Muraleetharan, UCR)  
"Evolution of Curvatures Under the Ricci Flow: Part II"

**COMBINATORIAL NUMBER THEORY** (John Dusel, UCR)  
"Ramsey's Theorem for Finite Graphs"

**OPERATOR ALGEBRAS & RELATED TOPICS** (Aviv Censor, UCR)  
"Topological Degroupoidification"

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)  
"Reducing the Unoriented Cobordism Hypothesis"

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Christopher Rogers, UCR)  
"Duflo Isomorphism Theorem"

**FRACTAL RESEARCH GROUP** (Jason Payne, UCR)  
"Prime Number Theorem"

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran, UCR)  
"Definition of Stacks"

**LIE THEORY** (Vyjayanthi Chari)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Hafedh Herichi, UCR)  
"On the Appolonian Integral Packet, Fractal Sprays and their Complex Dimensions"

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Owen Dearnicot, UCR)  
"The Curvature of Twisted Products and Biquotients (Cont'd)"

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## COLLOQUIUM

---

**Stephen Bigelow**  
(UC Santa Barbara)

"Homological Definitions of Polynomial Knot Invariants"

**Abstract:**

We give a definition of the Jones polynomial using an intersection pairing on homology of a configuration space. The Jones polynomial of an  $n$ -bridge knot is the intersection of two  $n$ -dimensional tori in the  $2n$ -dimensional configuration space of  $n$ -tuples in the  $2n$ -dimensional disk. I'll also talk about prospects for other knot invariants and categorification.

**Wednesday, April 14<sup>th</sup>, 2010**

**Surge 284**

**4:10-5:00pm**

*Tea Time at 3:40pm*



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 19<sup>th</sup> – 23<sup>rd</sup>, 2010

#### MONDAY, 19<sup>th</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 20<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-5:00PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 21<sup>st</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 22<sup>nd</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

1:10-2:00PM, SURGE 277

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 23<sup>rd</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Aviv Censor)

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Victor Shapiro, UCR)

“Variational Techniques for the Nonlinear Dirichlet Problem”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Edward Burkard, UCR)

“Minkowski Space-Time”

**COMBINATORIAL NUMBER THEORY** (John Dusel, UCR)

“Estimates of Symmetric Ramsey Numbers and the Theorems of Schur and Erdos-Szekeres”

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner)

“Categorical Chain Complexes and Skeletal Sequences”

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasiliy Dolgushev, UCR)

“Tangential Derivations, Special Derivations, Infinitesimal Braids, etc. II”

**FRACTAL RESEARCH GROUP** (Robert Niemeyer, UCR)

“A Characterization of  $\pi/3$  Orbits of the Koch Snowflake”

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Aviv Censor, UCR)

“Topological Degroupoidification cont’d”

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Nishu Lal, UCR)

“Self-Similar Sturm-Liouville Operator and Complex Dynamics in Higher Dimension”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Yunfeng Jiang, Utah)

“Donaldson-Thomas Type Invariants via L-infinity Algebras”

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Differential Geometry

---

**Yunfeng Jiang**  
(Utah)

### "Donaldson-Thomas Type Invariants via L-infinity Algebras"

**Abstract:** Let  $L$  be a cyclic differential graded Lie algebra of dimension three. By "transfer theorem" there is a cyclic L-infinity algebra structure on the Cohomology  $H^*(L)$ . These two L-infinity algebras are quasi-isomorphic, hence induce isomorphic germ (local) moduli spaces. The cyclicity property on  $H^*(L)$  gives rise to a superpotential function on the first Cohomology  $H^1(L)$  so that the germ (local) moduli space is the critical locus of the superpotential function.

Donaldson-Thomas type invariants are virtual count of stable objects under some stability condition in the bounded derived category of coherent sheaves over Calabi-Yau threefolds. According to Behrend, the Donaldson-Thomas invariant is the weighted Euler characteristic weighted by Behrend constructible function on the moduli space. In this talk we will explain how the Donaldson-Thomas invariant is the Milnor Number of the superpotential function of the L-infinity algebra  $H^*(L)$ , which is the value of Behrend function at that point. Hence we prove that Behrend function only depends on the formal neighborhood of the moduli space.

**Friday, April 23<sup>rd</sup>, 2010**

**Surge 268**

**1:10-2:00pm**



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week April 26<sup>th</sup> – 30<sup>th</sup>, 2010

#### MONDAY, 26<sup>th</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 27<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-5:00PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 28<sup>th</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 29<sup>th</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 30<sup>th</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Chris Rogers, UCR)  
"Introduction to Differentiable Stacks"

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Victor Shapiro, UCR)  
"The Saddle Point Theorem"

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Edward Burkard, UCR)  
"Minkowski Space-Time – Part 2"

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Aviv Censor, UCR)  
"Topological Degroupoidification [cont'd]"

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner)

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev, UCR)  
"Kashiwara-Vergne Lie Algebra and the Grothendieck-Teichmüller Lie Algebra"

**FRACTAL RESEARCH GROUP** (Jonathan Sarhad, UCR)  
TBD

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Rob Niemeyer, UCR)  
\*\*Informal Meeting\*\*

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Owen Dearnicott, UCR)  
"The Curvature of Twisted Products and Biquotients (Cont'd)"

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week May 3<sup>rd</sup> – 7<sup>th</sup>, 2010

#### MONDAY, 3<sup>rd</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 4<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-4:30PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 5<sup>th</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 6<sup>th</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 7<sup>th</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Aviv Censor)

\*\*\*No Meeting\*\*\*

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Yuchiro Kakihara, UCR)

"Weak Radon-Nikodym Derivatives for Vector Measures"

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Benjamin Dodson, UCR)

"Solutions of the Defocusing Nonlinear Schrodinger Equation in One and Two Dimensions"

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julia Bergner, UCR)

"Morse Theory and Building  $Bord_n$  Via Generators and Relations"

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev)

\*\*\*CANCELED\*\*\*

**FRACTAL RESEARCH GROUP** (Rob Niemeyer, UCR)

" $S(KS_n)$  As a Branched Cover of the Hexagonal Torus"

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Aviv Censor, UCR)

"How to Measure a Groupoid"

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Owen Dearnicott, UCR)

"The Curvature of Twisted Products and Biquotients (Cont'd)"

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)





# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week May 10<sup>th</sup> – 14<sup>th</sup>, 2010

#### MONDAY, 10<sup>th</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 11<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-4:30PM, SURGE 172

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 12<sup>th</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 13<sup>th</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 14<sup>th</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Laura Scull, Fort Lewis College)  
"Equivariant Homotopy and Orbifold Invariants"

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Yuchiro Kakihara, UCR)  
"Weak Radon-Nikodym Derivatives for Vector Measures: Part 2"

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Steve Warneke, University of Indiana)  
"Relativity and the Schwarzschild Metric"

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julie Bergner, UCR)  
"The Framed Function Version of the Cobordism Hypothesis"

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev, UCR)  
"Drinfeld Associators and the Knizhnik-Zamolodchikov Connection"

**FRactal RESEARCH GROUP** (Nishu Lal, UCR)  
"The Spectrum of the Sturm-Liouville Operator and the Renormalization Map"

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Jonathan Sarhad, UCR)  
"Spectral Geometries of the Sierpinski Gasket"

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Zhang-Dan Guan, UCR)  
"Geodesic Stability, Sasakian Einstein Metrics and Football Models"

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (Jason McCullough, UCR)  
"Ideals with Large Projective Dimension"



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Groupoids Seminar

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**Laura Scull**  
(Fort Lewis College)

### "Equivariant Homotopy and Orbifold Invariants"

**Abstract:** An orbifold is representable if it can be presented as the orbit space of a manifold by the action of a compact Lie group. A large class of orbifolds is known to be representable. In this talk I will discuss an ongoing project, joint with D. Pronk of Dalhousie University, to devise a framework for generalizing results of equivariant homotopy theory to obtain orbifold homotopy invariants for representable orbifolds.

To do this, we represent orbifolds using Lie groupoids where two such groupoids represent the same orbifold if and only if they are Morita equivalent. A representable orbifold can be obtained from a translation groupoid created from the action of a Lie group on a manifold.

The idea of this project is to examine the notion of Morita equivalence for translation groupoids. We have used this point of view to develop a method for deciding when equivariant results apply to orbifolds.

I will explain our results and discuss the applications we are currently working with.

**Tuesday, May 11<sup>th</sup>, 2010**

**Surge 268**

**12:40-2:00pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Topics in Partial Differential Equations

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**Steve Warneke**  
(University of Indiana)

"Relativity and the Schwarzschild Metric"

**Abstract:**

The Special and General Theories of Relativity, created by Albert Einstein in the early 20th century, make extensive use of partial differential equations and differential geometry. The

Special Theory assumes a flat space-time curvature, and uses the Minkowski metric. Its solutions allow time travel, mass-energy equivalence, and the proof that everything travels through space-time at the speed of light. The General Theory, or Einstein's theory of gravity, is fully contained in the Einstein Field Equation, relating the stress-energy tensor to the Einstein tensor. This is another way to say that mass or energy bends space, creating the effect of gravity. The Einstein tensor is a combination of the Ricci tensor, Ricci scalar, and the metric.

Given a metric, the Einstein tensor can be written as a set of partial differential equations involving the metric and (usually 4) space-time coordinates. In its total form, the Einstein Field Equation is a system of 10 nonlinear partial differential equations. The first solution to General Relativity makes use of the Schwarzschild metric, which admits the existence of black holes.

This "black hole" solution is spherically symmetric and static. The Schwarzschild metric also predicts the slowing of time in a gravitational field.

**Wednesday, May 12<sup>th</sup>, 2010**

**Surge 284**

**10:10-11:00am**



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week May 17<sup>th</sup> – 21<sup>st</sup>, 2010

#### MONDAY, 17<sup>th</sup>

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 18<sup>th</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-4:30PM, SURGE 172

3:40-5:00PM, SURGE 277

**\*4:10-5:00PM, SURGE 268**

#### WEDNESDAY, 19<sup>th</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 20<sup>th</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 21<sup>st</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COMPLEX MANIFOLDS** (Bun Wong)

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Chris Rogers, UCR)

“Introduction to Differentiable Stacks – cont’d”

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (Lucas Randall, UCR)

“The Reiman-Lebesgue Lemma and an Application of the Fourier Transform”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPOLOGY SEMINAR** (Charles Rezk, University of Illinois, Urbana-Champaign)

“What is an Infinity Category?”

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Jennifer Loftus, UCR)

“Gaussian Upper Bound of an Equation Derived from the Navier-Stokes Equations”

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Chris Rogers, UCR)

“Obstruction Theory ( $\infty$ ,  $n$ )-categories”

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM**

\*\*\*Canceled for this week\*\*\*\*

**FRACTAL RESEARCH GROUP** (Michael Maroun, UCR)

TBD

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Samuel Chamberlin, UCR)

“A Generalization of Results of H. Garland”

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Dr. David Carfi)

“Applications of Super Position Theory”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Chris Rogers, UCR)

“L-infinity Algebras and Multisymplectic Geometry”

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Special Seminar: Topology

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**Charles Rezk**  
(University of Illinois, Urbana-Champaign)

"What is an Infinity Category?"

**Abstract:**

An  $n$ -category is a gadget with objects, morphisms, morphisms between morphisms,  $\dots$ ,  $(\text{morphisms between})^{n-1}$  morphisms. An infinity-category is supposed to be what you get when you set " $n$ -infinity". Examining this using the prism of  $(\text{infinity}, n)$ -categories, I'll explore this idea. It turns out there are several different possible interpretations of the notion of infinity category.

**Tuesday, May 18<sup>th</sup>, 2010**

**Surge 268**

**4:10-5:00pm**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Lie Theory

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# Samuel Chamberlin (UCR)

"A Generalization of Results of H. Garland"

**Abstract:**

Given a finite-dimensional, simple Lie algebra  $\mathfrak{g}$  of rank  $n$  with Chevalley basis

$$\{x_{\alpha}^{\pm}, h_i : \alpha \in R^+, i \in \{1, \dots, n\}\}$$

H. Garland in 1978 found formulas in the universal enveloping algebra of the loop algebra for

$$(x_{\alpha}^+ \otimes 1)^{(k-r)} (x_{\alpha}^- \otimes t)^{(k)}$$

for all  $k, r \in \mathbb{Z}_{\geq 0}$  with  $r \leq k$ . We have generalized this result for  $r \in \{0, 1\}$  modulo  $\mathbf{U}(\mathfrak{g} \otimes A)(\mathfrak{n}^+ \otimes A)$ . I will discuss this generalization and some applications to Weyl modules.

**Thursday, May 20<sup>th</sup>, 2010**

**Surge 284**

**12:40-2:00pm**



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week May 24<sup>th</sup> – 28<sup>th</sup>, 2010

#### MONDAY, 24<sup>th</sup>

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

#### TUESDAY, 25<sup>th</sup>

11:10-12:30PM, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Vyjayanthi Chari)

12:40-2:00PM, SURGE 268

**GROUPOIDS SEMINAR** (Aviv Censor, UCR)

“Inverse Semigroupoids and Groupoids”

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-4:30PM, SURGE 268

**FUNCTIONAL ANALYSIS** (Larry Harper, UCR)

“Morphisms for Resistive Electrical Networks”

3:40-5:00PM, SURGE 277

**ALGEBRAIC GEOMETRY** (Ziv Ran)

#### WEDNESDAY, 26<sup>th</sup>

10:10-11:00AM, SURGE 284

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Gung-Min Gie, Indiana University)

“Asymptotic Analysis of the Linearized Navier-Stokes Equations in a General Domain”

10:10-11:00AM, SURGE 268

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

10:10-11:00AM, SURGE 277

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**COBORDISM & TOPOLOGICAL FIELD THEORY**

\*\*\* Canceled this week\*\*\*

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

2:10-3:30PM, SURGE 277

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev, UCR)

“Drinfeld Associators, GRT, Knizhnik-Zamolodchikov Connection II”

#### THURSDAY, 27<sup>th</sup>

11:10-12:30PM, SURGE 268

**FRactal Research Group** (Dr. Clahane, Fullerton Junior College)

“Composition Operators on the Hilbert Space Adelic Product in Prime or Fibonacci Membranes”

11:10-12:30, SURGE 277

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

12:40-2:00PM, SURGE 284

**LIE THEORY** (Jacob Greenstein, UCR)

“On Quantum Foldings”

2:10-3:00PM, SURGE 173

**CATEGORY THEORY** (John Baez)

3:40-5:00, SURGE 268

**MATHEMATICAL PHYSICS** (Michael Maroun, UCR)

“The Three Dimensional Feynman Integral”

3:40-5:00, SURGE 277

**ALGEBRAIC GEOMETRY** (Ziv Ran)

#### FRIDAY, 28<sup>th</sup>

11:10-12:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

1:10-2:00PM, SURGE 268

**DIFFERENTIAL GEOMETRY** (Stefano Vidussi, UCR)

“Symplectic 4-Manifolds with Trivial Canonical Class”

2:10-3:00PM, SURGE 268

**COMPLEX MANIFOLDS** (Bun Wong)

3:10-4:00PM, SURGE 268

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Topics in Partial Differential Equations

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**Gung-Min Gie**  
(Indiana University)

"Asymptotic Analysis of the Linearized Navier-Stokes  
Equations in General Domain"

**Abstract:** We study the asymptotic behavior of the solutions of the linearized Navier-Stokes equations (LNSE), when the viscosity is small, in a general (curved) bounded and smooth domain in three dimensions, with a characteristic boundary. We will see that the solution of LNSE behaves like the corresponding Euler solution except in a thin region near the boundary, where a certain heat solution is added as a corrector. This is a joint work with Makram Hamouda and Roger Temam.

**Wednesday, May 26<sup>th</sup>, 2010**

**Surge 284**

**10:10-11:00am**





# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Lie Theory

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**Jacob Greenstein**  
(UCR)

### "On Quantum Foldings"

**Abstract:** A classical result in the Lie theory stipulates that a simple finite dimensional Lie algebra of type BDFG can be constructed as the subalgebra of a Lie algebra type ADE fixed by an admissible diagram automorphism of the latter. This construction is known as folding and extends to Kac-Moody Lie Algebras. Although foldings do not admit direct quantum analogues, it can be shown that there exists an embedding of crystals for the corresponding Langlands dual Lie algebra. The aim of this talk is to introduce algebraic analogues and generalizations of folding in the quantum setting which yield new flat quantum deformations of non-semisimple Lie algebras and of Poisson algebras (joint work with A. Berenstein).

**Thursday, May 27<sup>th</sup>, 2010**

**Surge 284**

**12:40-2:00pm**



# UNIVERSITY OF CALIFORNIA, RIVERSIDE

## Department of Mathematics

### Calendar of Events For the Week May 31<sup>st</sup> – June 4<sup>th</sup>, 2010

#### MONDAY, 31<sup>st</sup> – Memorial Day

11:10-12:00PM, SURGE 268

2:10-3:00PM, SURGE 268

#### TUESDAY, 1<sup>st</sup>

11:10-12:30PM, SURGE 277

12:40-2:00PM, SURGE 284

12:40-2:00PM, SURGE 268

2:10-3:00PM, SURGE 173

3:40-4:30PM, SURGE 268

3:40-5:00PM, SURGE 277

#### WEDNESDAY, 2<sup>nd</sup>

10:10-11:00AM, SURGE 284

10:10-11:00AM, SURGE 268

10:10-11:00AM, SURGE 277

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

2:10-3:30PM, SURGE 277

#### THURSDAY, 3<sup>rd</sup>

11:10-12:30PM, SURGE 268

11:10-12:30, SURGE 277

12:40-2:00PM, SURGE 284

2:10-3:00PM, SURGE 173

3:40-5:00, SURGE 268

3:40-5:00, SURGE 277

#### FRIDAY, 4<sup>th</sup>

11:10-12:00PM, SURGE 268

1:10-2:00PM, SURGE 268

2:10-3:00PM, SURGE 268

3:10-4:00PM, SURGE 268

**NON RIGID STRUCTURE ON 3-MANIFOLDS**

\*\*\*Canceled – Memorial Day\*\*\*

**COMPLEX MANIFOLDS**

\*\*\*Canceled – Memorial Day\*\*\*

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**GROUPOIDS SEMINAR** (Aviv Censor)

**CATEGORY THEORY** (John Baez)

**FUNCTIONAL ANALYSIS** (James Stafney, UCR)

“On the Eigenvalues Dirichlet Laplacian”

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**TOPICS IN PARTIAL DIFFERENTIAL EQUATIONS** (Evan Davis, UCR)

“The Inverse Scattering Transform”

**COMBINATORIAL NUMBER THEORY** (Mei Chu Chang)

**OPERATOR ALGEBRAS & RELATED TOPICS** (Marta Asaeda)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**COBORDISM & TOPOLOGICAL FIELD THEORY** (Julie Bergner)

**COMPLEX MANIFOLDS** (Bun Wong)

**KASHIWARA-VERGNE PROBLEM** (Vasily Dolgushev)

**FRACTAL RESEARCH GROUP** (Dr. Childress, UCR)

TBD

**COHOMOLOGY OF ALGEBRAIC VARIETIES** (Ziv Ran)

**LIE THEORY** (Vyjayanthi Chari)

**CATEGORY THEORY** (John Baez)

**MATHEMATICAL PHYSICS** (Jason Payne, UCR)

TBD

**ALGEBRAIC GEOMETRY** (Ziv Ran)

**NON RIGID STRUCTURE ON 3-MANIFOLDS** (Reinhard Schultz)

**DIFFERENTIAL GEOMETRY** (Ruxandra Moraru, University of Waterloo, Canada)

“Compact Moduli Spaces of Stable Bundles on Kodaira Surfaces”

**COMPLEX MANIFOLDS** (Bun Wong)

**COMMUTATIVE ALGEBRA** (David Rush)



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Topics in Partial Differential Equations

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**Evan Davis**  
(UCR)

### "The Inverse Scattering Transform"

**Abstract:** The inverse scattering transform is one of the most important developments in mathematical physics of the past half century. It allows one to construct solutions to exactly solvable nonlinear partial differential equations (PDEs) by solving two linear equations. The Korteweg-de Vries (KdV) equation, which has important applications to the propagation of shallow water waves and ion-acoustic plasma waves, is one such equation that can be solved by the inverse scattering transform. The KdV equation also admits strongly interacting solutions called solitons that behave surprisingly like solutions to linear PDEs. In this talk, the KdV equation will be heuristically derived, properties of solitons will be reviewed, the general theory of the inverse scattering transform will be discussed, and the inverse scattering transform will be used to solve the KdV equation with particular initial conditions.

**Wednesday, June 2<sup>nd</sup>, 2010**

**Surge 284**

**10:10-11:00am**



# UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

## Differential Geometry

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**Ruxandra Moraru**  
(University of Waterloo, Canada)

"Compact Moduli Spaces of Stable Bundles on Kodaira Surfaces"

**Abstract:** In this talk, I will examine the geometry of moduli spaces of stable bundles on Kodaira surfaces, which are non-Kähler compact surfaces that can be realised as torus fibrations over elliptic curves. These moduli spaces are interesting examples of holomorphic symplectic manifolds whose geometry is similar to the geometry of Mukai's moduli spaces on K3 and abelian surfaces.

**Friday, June 4<sup>th</sup>, 2010**

**Surge 284**

**1:10-2:00pm**