University of California, Riverside
Department of Mathematics
Calendar of Events Spring 2003
Week of June 9-June 13, 2003

FINALS WEEK
NO SEMINARS

CONGRATULATIONS
CLASS OF 2003!!!
Monday
June 2
4:10-5:00 pm Surge 268  
Seminar: QUANTUM GRAVITY  
Speaker: Alissa Crans of UCR  
Title: "Lie 2-Algebras and 2-Braids"

Tuesday
June 3
3:40-4:30 pm Surge 268  
Seminar: FUNCTIONAL ANALYSIS  
Speaker: Dr. Leslaw Skrzypek of Jagiellonian University, Krakow, Poland  
Title: "On the Cheney-Light type of Projections"

3:40-4:30 pm Surge 268  
Seminar: QUANTUM GRAVITY  
Speaker: John Baez  
Title: "Quarks and the Standard Model"

4:40-6:00 pm Surge 268  
Seminar: REPRESENTATIONS AND GEOMETRY  
Speaker: Professor Dijana Jakelic of UCR  
Title: "Crystal Bases and Completions of Some Representations of Quantum Groups"  
NOTE THIS IS AN ADDITIONAL SEMINAR

Wednesday
June 4
10:10-12:00 pm Surge 268  
Seminar: TOPOLOGY  
Speaker: Sam Nelson of Whittier College  
Title: "Virtual Knot Theory (continued)"

Thursday
June 5
3:40-4:30 pm Surge 268  
Seminar: MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS  
Speaker: Miguel Carrion-Alvarez of UCR  
Title: "The Phase Space of Classical Field Theories"

4:40-6:00 pm Surge 268  
Seminar: REPRESENTATIONS AND GEOMETRY  
Speaker: Dimitar Grantcharov of UCR  
Title: "Defense of Ph.D. Thesis of Dimitar Grantcharov"

Friday
June 6
Differential Geometry  
NO MEETING THIS WEEK

12:10-2:00 pm Surge 268  
Seminar: CATEGORY THEORY  
Speaker: James Dolan  
Title: "Dynkin Diagrams"

3:10-4:00 pm Surge 268  
Seminar: COMMUTATIVE ALGEBRA  
Speaker: TBA  
Title: TBA
### Monday
**May 26**

**3:40-4:30 pm**
 Séminaire: Surge 268  
Séminaire: *Functional Analysis*  
Présentateur: Professeur Bruce Chalmers de l'UCR  
Titre: "n-dimensional Spaces Maximal with Respect to Projection Constants and Equi-angled Lines"

**4:10-5:00 pm**
 Séminaire: Surge 275  
Séminaire: *Quantum Gravity*  
Présentateur: Jeffrey Morton de l'UCR  
Titre: "Jordan Algebras"

### Tuesday
**May 27**

**5:10-6:00 pm**
 Séminaire: Surge 275  
Séminaire: *Quantum Gravity*  
Présentateur: Professeur John Baez de l'UCR  
Titre: "The Eightfold Way"

### Wednesday
**May 28**

**10:10-11:00 am**
 Séminaire: Surge 268  
Séminaire: *Topology*  
Présentateur: Sam Nelson de Whittier College  
Titre: "Virtual Knot Theory"

**11:10-12:00 pm**
 Séminaire: Surge 268  
Séminaire: *Topology*  
Présentateur: Dr. Robert Gompf, de l'Université du Texas à Austin, Candidat pour le poste de professeur  
Titre: "Symplectic Topology"

**4:10-5:30 pm**
 Séminaire: Surge 268  
Séminaire: *Mathematics Colloquium*  
Présentateur: Laura Matusevich de l'Université Harvard  
Titre: "Toric Varieties: How Combinatorial Provides Examples to Algebraic Geometry"

### Thursday
**May 29**

**Seminar:** *Mathematical Physics and Dynamical Systems*  
**Cancelled this week**

**Seminar:** *Representations and Geometry*  
**Rescheduled for next Tuesday, 6/3/03**

**Seminar:** *Algebraic Geometry*  
**Cancelled this week**

**4:40-5:30 pm**
 Séminaire: Surge 268  
Séminaire: *Mathematics Colloquium*  
Présentateur: Dr. Robert Gompf, de l'Université du Texas à Austin, Candidat pour le poste de professeur  
Titre: "20 Years of Exotic R^4's"

### Friday
**May 30**

**11:30-12:30 pm**
 Séminaire: Surge 275  
Séminaire: *Differential Geometry*  
Présentateur: Ludmil Katzarkov de l'Université de California, Irvine  
Titre: "Homological Mirror Symmetry for Fano's and Beyond"

**Please note time and location change**

**12:10-2:00 pm**
 Séminaire: Surge 268  
Séminaire: *Category Theory*  
Présentateur: James Dolan  
Titre: "Dynkin Diagrams"

**3:10-4:00 pm**
 Séminaire: Surge 268  
Séminaire: *Commutative Algebra*  
Présentateur: TBA  
Titre: TBA
Dr. Robert Gompf
University of Texas at Austin
F. Burton Jones Chair Candidate

Thursday, May 29, 2003 from 4:40-5:30 pm
Tea Time starts at 4:10 pm
Surge 268

TITLE: "20 Years of Exotic $R_4$'s"

ABSTRACT: Manifold topology naturally divides into two very
different subfields: low- and high-dimensional topology. The border
region is occupied by 4-manifolds, which exhibit particularly complex and
mysterious behavior. One of the strangest phenomena to arise here is
the existence of "exotic $R_4$'s", smooth manifolds homeomorphic to
Euclidean space $R_4$ but not diffeomorphic to it. We will discuss the
construction of such oddities, survey what has been discovered over the
course of their 20-year history, and indicate some of the numerous open
questions about them.
MATHEMATICS COLLOQUIUM

Laura Matusevich

Harvard University

Wednesday, May 28, 2003 from 4:10-5:30 pm
Tea Time starts at 3:40pm
Surge 268

TITLE: "Toric Varieties: How Combinatoric Provides Examples to Algebraic Geometry"
TOPOLOGY SEMINAR

Dr. Robert Gompf
University of Texas at Austin
F. Burton Jones Chair Candidate

Wednesday, May 28, 2003 from 11:10 a.m.-12:00 p.m.
Surge 268

TITLE: "Symplectic Topology"

ABSTRACT: Symplectic manifolds originated in Hamiltonian mechanics and algebraic geometry, but they can also be thought of as skew-symmetric analogs of constant-curvature Riemannian manifolds. As such, it makes sense to study them from a topological viewpoint. We will explore how cut-and-paste and fiber bundle techniques have vastly expanded our view of symplectic manifolds, and the extent to which symplectic structures can be classified in terms of topology.
Monday
May 19
4:10-6:00 pm  Surge 268
Seminar: QUANTUM GRAVITY
Speaker: John Baez
Title: "Isospin, Hypercharge and Strangeness"

Tuesday
May 20
3:40-4:30 pm  Surge 268
Seminar: FUNCTIONAL ANALYSIS
Speaker: Professor Grzegorz Lewicki of Jagiellonian University, Krakow, Poland
Title: "Codimension-One Minimal Projections"
4:10-6:00 pm  Surge 275
Seminar: QUANTUM GRAVITY
Speaker: John Baez
Title: "More Theories of Particle Physics"

Wednesday
May 21
10:10-12:00 pm  Surge 268
Seminar: TOPOLOGY
Speaker: Professor Xiao-Song Lin
Title: "Torsion Numbers and Finite Cyclic Coverings"
4:10-5:30 pm  Surge 268
Seminar: MATHEMATICS COLLOQUIUM
Speaker: Roberto Longo of University of Rome Tor Vergata
Title: "Von Neumann Algebras and Conformal Field Theory"

Thursday
May 22
3:40-4:30 pm  Surge 268
Seminar: MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS
Speaker: Mr. John Rock of UCR
Title: "Similarity in Physics: Multifractals"
4:10-5:30 pm  Surge 275
Seminar: REPRESENTATIONS AND GEOMETRY
Speaker: Professor G. Zuckerman of Yale University
Title: OPEN DISCUSSION
4:30-6:00 pm  Surge 268
Seminar: ALGEBRAIC GEOMETRY
Speaker: TBA
Title: TBA

Friday
May 23
Seminar: DIFFERENTIAL GEOMETRY
NO MEETING THIS WEEK
12:10-2:00 pm  Surge 268
Seminar: CATEGORY THEORY
Speaker: James Dolan
Title: "Dynkin Diagrams"
3:10-4:00 pm  Surge 268
Seminar: COMMUTATIVE ALGEBRA
Speaker: Yongwei Yao of MSRI
Title: "Some Basic Properties of Primary Decomposition"
MATHEMATICS COLLOQUIUM

Roberto Longo

University of Rome Tor Vergata

Wednesday, May 21, 2003 from 4:10-5:30 pm
Tea Time starts at 3:40pm
Surge 268

TITLE: “Von Neumann Algebras and Conformal Field Theory”
Monday
May 12
4:10-6:00 pm
Seminar:
Speaker:
Title:
Surge 275
QUANTUM GRAVITY
John Baez
"Theories of Particle Physics"

Tuesday
May 13
3:40-4:30 pm
Seminar:
Speaker:
Title:
Surge 268
MATHEMATICS COLLOQUIUM & FUNCTIONAL ANALYSIS
JOINT SEMINAR
Professor Liming Ge of University of New Hampshire
"Generator Problem and Free Entropy for Von Neumann Algebras"

4:10-6:00 pm
Seminar:
Speaker:
Title:
Surge 275
QUANTUM GRAVITY
John Baez
"More Theories of Particle Physics"

Wednesday
May 14
10:10-12:00 pm
Seminar:
Speaker:
Title:
Surge 268
TOPOLOGY
Ismar Volic of Brown University
"Finite Type Knot Invariants and Calculus of Functors"

4:10-5:30 pm
Seminar:
Speaker:
Title:
Surge 268
MATHEMATICS COLLOQUIUM
Peter Littelmann of University of Wuppertal and MSRI
"Representation Theory and Combinatorics, from Young Tableaux to Affine Grassmannian"

Thursday
May 15
3:40-4:30 pm
Seminar:
Speaker:
Title:
Surge 268
MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS
Mr. Erin Pearse of UCR
"Characterizing the Measurability of Fractal Strings (abridged)"

4:10-5:30 pm
Seminar:
Speaker:
Title:
Surge 275
REPRESENTATIONS AND GEOMETRY
Discussion with enrolled students

4:30-6:00 pm
Seminar:
Speaker:
Title:
Surge 268
ALGEBRAIC GEOMETRY
TBA
TBA

Friday
May 16
11:10-12 pm
Seminar:
Speaker:
Title:
Surge 268
DIFFERENTIAL GEOMETRY
Professor Yat Sun Poon of UCR
"CYT Structures on Toric Bundles"

12:10-2:00 pm
Seminar:
Speaker:
Title:
Surge 268
CATEGORY THEORY
James Dolan
"Dynkin Diagrams"

3:00-4:00 pm
Seminar:
Speaker:
Title:
Surge 268
COMMUTATIVE ALGEBRA
TBA
TBA
Professor Giming Le

University of New Hampshire

Tuesday, May 13, 2003 from 3:40-4:30pm
Tea Time starts at 3:00pm
Surge 268

TITLE: "The Generator Problem and Free Entropy for Von Neumann Algebras"
Peter Littelmann

University of Wuppertal and MSRI

Wednesday, May 14, 2003 from 4:10-5:00pm
Tea Time starts at 3:40pm
Surge 268

TITLE:  
"Representation Theory and Combinatorics, from Young Tableux to Affine Grassmannian"

ABSTRACT: A little more than 100 years ago, Issai Schur published his work on the representations of the complex matrix group. At the same time, Alfred Young introduced what later came to be known as the Young tableaux. The tableaux turned out to be an extremely useful combinatorial tool in representation theory, but they are also a very convenient instrument for the investigation of geometric problems related to Grassmann varieties. This talk will explore a few of these appearances of the ubiquitous Young tableaux in representation theory, and we will sketch how (at least some aspects of) the notion of a Young tableaux can be generalized to other semisimple algebraic groups using alcoves, galleries, apartments and buildings, etc.
### University of California, Riverside
Department of Mathematics
Calendar of Events Spring 2003
Week of May 5 - May 9, 2003

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<th>Day</th>
<th>Time</th>
<th>Location</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>Monday</td>
<td>4:10-6:00 pm</td>
<td>Surge 268</td>
<td>John Bozzi</td>
<td>&quot;Spinors and the Standard Model&quot;</td>
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<tr>
<td>Tuesday</td>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>Borislav Yordanov</td>
<td>&quot;Asymptotic Behavior of Solutions Hyperbolic Equations&quot;</td>
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<td>4:10-6:00 pm</td>
<td>Surge 275</td>
<td>Miguel Carrión Alvarez</td>
<td>&quot;The Weyl Algebra and Fock Space&quot;</td>
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<tr>
<td>Wednesday</td>
<td>10:10-12:00 PM</td>
<td>Surge 268</td>
<td>Joe-Wook Chung</td>
<td>&quot;Selfert Surfaces and Alexander Polynomial of Knots&quot;</td>
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<td>MATHMATICS COLLOQUIUM</td>
<td>NO COLLOQUIUM THIS WEEK</td>
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<tr>
<td>Thursday</td>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>Erin Pearse</td>
<td>&quot;Characterizing the Measurability of Fractal Strings (con't)&quot;</td>
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<td>4:30-6:00 pm</td>
<td>Surge 268</td>
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<tr>
<td>Friday</td>
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<td>Surge 268</td>
<td>James Dolan</td>
<td>&quot;Dynkin Diagrams&quot;</td>
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<td>Surge 268</td>
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### University of California, Riverside
#### Department of Mathematics
**Weekly Calendar Spring 2003**
**Week of April 28 - May 2, 2003**

**Monday**
*April 28*
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<tr>
<th>Time</th>
<th>Seminar</th>
<th>Speaker</th>
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<tr>
<td>4:10-6:00 pm</td>
<td>Surge 268</td>
<td>Toby Bartels of UCR</td>
<td>&quot;Quaternionic Quantum Mechanics&quot;</td>
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**Tuesday**
*April 29*
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<th>Time</th>
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<tr>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>Professor Bruce Chalmers of UCR</td>
<td>&quot;n-Dimensional Spaces with the Maximal Number (n + 1) of Equal-Angled Lines&quot;</td>
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<tr>
<td>4:10-6:00 pm</td>
<td>Surge 275</td>
<td>John Boez</td>
<td>&quot;Spinors and the Standard Model&quot;</td>
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**Wednesday**
*April 30*
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<th>Time</th>
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<tr>
<td>10:10-12:00 pm</td>
<td>Surge 268</td>
<td>Professor Xiao-Song Lin</td>
<td>&quot;Knot Groups&quot;</td>
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<tr>
<td>4:10-5:30 pm</td>
<td>Surge 268</td>
<td>Kris Galicki of University of New Mexico</td>
<td>&quot;Transverse Fano Structures and Positive Ricci Curvature&quot;</td>
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**Thursday**
*May 1*
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<th>Speaker</th>
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<tr>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>Mr. Erin Pearse of UCR</td>
<td>&quot;Characterizing the Measurability of Fractal Strings&quot;</td>
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**Friday**
*May 2*
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<th>Seminar</th>
<th>Speaker</th>
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<tr>
<td>11:10-12 pm</td>
<td>Surge 268</td>
<td>Kris Galicki of University of New Mexico</td>
<td>&quot;New Einstein Metrics via Contact Geometry&quot;</td>
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<tr>
<td>12:10-2:00 pm</td>
<td>Surge 268</td>
<td>James Dolan</td>
<td>&quot;Dynkin Diagrams&quot;</td>
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<td>3:10-4:00 pm</td>
<td>Surge 268</td>
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**November 30**
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<th>Time</th>
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<tr>
<td>4:10-5:00 pm</td>
<td>Surge 268</td>
<td>Philippe Souplet of Université de Picardie and Université de Versailles, France</td>
<td>&quot;Lp,δ Spaces, Heat Semigroups and Applications to Nonlinear Parabolic and Elliptic Problems&quot;</td>
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MATHEMATICS COLLOQUIUM

KRIS GALICKI

University of New Mexico

Wednesday, April 30, 2003 from 4:10-5:00pm
Tea Time begins at 3:40 pm
Surge 268

TITLE: "Transverse Fano Structures and Positive Ricci Curvature"
MATHEMATICS COLLOQUIUM

Phillipe Souplet
Université de Picardie and Université de Versailles, France

Friday, May 2, 2003 from 4:10-5:00pm
Tea Time begins at 3:40 pm
Surge 268

TITLE: "$L_p \Delta$ Spaces, Heat Semigroups and Applications to Nonlinear Parabolic and Elliptic Problems"

ABSTRACT: The spaces $L_p \Delta$, weighted by the function $\Delta (x)=$ distance to the boundary, have recently proved to be an efficient tool in the study of various questions concerning parabolic and elliptic problems with Dirichlet boundary conditions.

We shall discuss properties of the heat semigroup in these spaces and present some applications to nonlinear problems:

1. for parabolic equations: smoothing properties, instantaneous attractors for global solutions, initial blow-up rates;
2. for elliptic systems: a priori estimates and existence of solutions.
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<tr>
<td>Monday</td>
<td>April 21</td>
<td>4:10-6:00 pm</td>
<td>Surge 268</td>
<td>John Baez</td>
<td>QUANTUM GRAVITY: Normed Division Algebras: R, C, H and O</td>
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<td>Tuesday</td>
<td>April 22</td>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>Professor James Stafney of UCR</td>
<td>FUNCTIONAL ANALYSIS: The Distribution of Eigenvalues of the Dirichlet Laplacian (continued)</td>
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<td>4:10-6:00 pm</td>
<td>Surge 275</td>
<td>John Baez</td>
<td>QUANTUM GRAVITY: Compact Lie Groups</td>
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<tr>
<td>Wednesday</td>
<td>April 23</td>
<td>10:10-12:00 pm</td>
<td>Surge 268</td>
<td>Lisa Hernandez of UCR</td>
<td>TOPOLOGY: Knot Groups</td>
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<td>Thursday</td>
<td>April 24</td>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>Mr. Jeffrey Morton of UCR</td>
<td>MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS: Nonexistence Results for the Einstein Dirac-Maxwell Equation (continued)</td>
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<td>4:10-5:30 pm</td>
<td>Surge 275</td>
<td>TBA</td>
<td>REPRESENTATIONS AND GEOMETRY: TBA</td>
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<td>ALGEBRAIC GEOMETRY: TBA</td>
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<td>Friday</td>
<td>April 25</td>
<td>12:10-2:00 pm</td>
<td>Surge 268</td>
<td>James Dolan</td>
<td>CATEGORY THEORY: Dynkin Diagrams</td>
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<td>COMMUTATIVE ALGEBRA: TBA</td>
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<td>4:10-5:00 pm</td>
<td>Surge 268</td>
<td>TBA</td>
<td>MATHEMATICS COLLOQUIUM: Uniqueness of Minimal Projections</td>
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GRZEGORZ LEWICKI
Jagiellonian University, Krakow, Poland

Friday, April 25, 2003 from 4:10-5:00 pm
Tea Time starts at 3:40 pm
Surge 268

TITLE: “Uniqueness of Minimal Projections”

ABSTRACT: Let $X$ be a Banach space and let $Y \subset X$ be a closed linear subspace. Denote by $\mathcal{P}(X,Y)$ the set of all linear, continuous projections from $X$ onto $Y$. Set

$$\lambda(X,Y) = \inf \{ \| P \| : P \in \mathcal{P}(X,Y) \}.$$ 

The constant $\lambda(X,Y)$ is called the relative projection constant. A projection $P_o \in \mathcal{P}(X,Y)$ is called minimal if

$$\| P_o \| = \lambda(X,Y).$$

There exists a huge number of papers concerning various aspects of the theory of minimal projections. Mainly the following problems have been considered:

a. existence of minimal projections;

b. uniqueness of minimal projections;

c. concrete formulas for minimal projections;

d. estimates of the relative projection constant.

The aim of this talk is to present a survey of results concerning the problem of uniqueness of minimal projections.
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<td>Monday</td>
<td>4:10-6:00 pm</td>
<td>Surge 268</td>
<td>QUANTUM GRAVITY</td>
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<td>April 14</td>
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<td>John Baez</td>
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<td>&quot;Clifford Algebras and the Spin Group&quot;</td>
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<td>Tuesday</td>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>FUNCTIONAL ANALYSIS</td>
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<td>April 15</td>
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<td>Professor James Stafney of UCR</td>
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<td>&quot;The Distribution of Eigenvalues of the Dirichlet Laplacian&quot;</td>
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<td>4:10-6:00 pm</td>
<td>Surge 275</td>
<td>QUANTUM GRAVITY</td>
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<td>John Baez</td>
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<td>&quot;Spinors&quot;</td>
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<td>Wednesday</td>
<td>10:10-12:00 pm</td>
<td>Surge 268</td>
<td>TOPOLOGY</td>
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<td>April 16</td>
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<td>Catherine Crockett of UCR</td>
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<td>&quot;Simple Closed Curves on the Torus&quot;</td>
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<td>4:10-5:30 pm</td>
<td>Surge 268</td>
<td>MATHEMATICS COLLOQUIUM</td>
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<td>Professor Van Vu of UCSD</td>
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<td>&quot;Erdos-Folkman Conjecture&quot;</td>
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<tr>
<td>Thursday</td>
<td>3:40-4:30 pm</td>
<td>Surge 268</td>
<td>MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS</td>
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<td>April 17</td>
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<td>Mr. Jeffrey Morton of UCR</td>
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<td>&quot;Nonexistence Results for the Einstein Dirac-Maxwell Equation&quot;</td>
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<td>4:10-5:30 pm</td>
<td>Surge 275</td>
<td>REPRESENTATIONS AND GEOMETRY</td>
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<td>Dimitar Grantcharov of UCR</td>
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<td>&quot;An Introduction to Weight Modules of Lie Superalgebras (continued)&quot;</td>
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<td>4:30-6:00 pm</td>
<td>Surge 268</td>
<td>ALGEBRAIC GEOMETRY</td>
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<td>Professor Nick Nirschl</td>
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<td>&quot;A Plane Curve with Nonresidually Finite Fundamental Group of the Complement (cont'd)&quot;</td>
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<td>Friday</td>
<td>11:10-12 pm</td>
<td>Surge 268</td>
<td>DIFFERENTIAL GEOMETRY</td>
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<td>April 18</td>
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<td>Jiaping Wang of University of Minnesota</td>
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<td>&quot;Manifolds with Positive Spectrum&quot;</td>
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<td>12:10-2:00 pm</td>
<td>Surge 268</td>
<td>CATEGORY THEORY</td>
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<td>James Dolan</td>
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<td>&quot;Dynkin Diagrams&quot;</td>
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<td>3:10-4:00 pm</td>
<td>Surge 268</td>
<td>COMMUTATIVE ALGEBRA</td>
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MATHMATICS
COLLOQUIUM

PROFESSOR VAN VU
University of California, San Diego

Wednesday, April 16, 2003
Tea Time starts at 3:40 pm
Surge 268

TITLE: "Erdos-Folkman Conjecture"

ABSTRACT: A sequence $A$ of positive integers is complete if one can represent every sufficiently large positive integer as a sum of different elements of $A$. In 1962, Erdos conjectured that if $A$ has density at least $cn^{\frac{1}{2}}$ (where $c$ is a large constant) and $A$ satisfies a trivial modularity condition, then $A$ is complete. Erdos proved that the conjecture holds under the stronger assumption that $A$ has density at least $cn^{\frac{1}{618}}$. The conjecture was reformulated few years later by Folkman, who made progress by showing that one can replace .618 by $\frac{1}{2} + E$ for any positive constant $E$. The exponent $\frac{1}{2}$ is sharp, as shown by Cassel.

Recently, together with Szemeredi, we proved Erdos-Folkman conjecture. In this talk, we survey the main ideas behind the proof.
University of California, Riverside
Spring 2003
Calendar of Events
Week of April 7-April 11, 2003

Monday
April 7
4:10-6:00 pm  Surge 275
Seminar: QUANTUM GRAVITY
Speaker: Aaron Lauda of UCR
Title: "2-Groups"

Tuesday
April 8
3:40-4:30 pm  Surge 268
Seminar: FUNCTIONAL ANALYSIS
Speaker: Professor M.A. Rass
Title: "Hermite Functions, Wick Products and Random Integrals (continued)"

4:10-6:00 pm  Surge 275
Seminar: QUANTUM GRAVITY
Speaker: Alissa Crans of UCR
Title: "Quandles"

Wednesday
April 9
10:10-11:00 am  Surge 268
Seminar: TOPOLOGY
Speaker: Professor Xiao-Song Lin
Title: "Reading of Rolfsen's 'Knots and Links'"

11:10-12:00 pm  Surge 268
Seminar: TOPOLOGY
Speaker: Jialing Cao of University of Notre Dame
Title: "Euler Number of Compact Kähler Manifolds with Non-positive Curvature"

4:10-5:30 pm  Surge 268
Seminar: MATHEMATICS COLLOQUIUM
Speaker: Mark Burgin of University of California, Los Angeles
Title: "Hypernumbers, Hyperfunctionals, and Feynman Integral"

Thursday
April 10
11:10-12:00 pm  Surge 275
Seminar: DIFFERENTIAL GEOMETRY
Speaker: Lei Ni of University of California, San Diego
Title: "Plurisubharmonic Functions and Structure of Complete Kähler Manifolds"

Seminar: MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS
NO MEETING THIS WEEK

4:10-5:30 pm  Surge 275
Seminar: REPRESENTATIONS AND GEOMETRY
Speaker: Dimitor Grantcharov of UCR
Title: "An Introduction to Weight Modules of Lie Superalgebras"

4:30-6:00 pm  Surge 268
Seminar: ALGEBRAIC GEOMETRY
Speaker: Nick Kuhn of UCR
Title: "A Plane Curve with Nonresidually Finite Fundamental Group of the Complement (continued)"

Friday
April 11
11:10-12 pm  Surge 268
Seminar: DIFFERENTIAL GEOMETRY
Speaker: Conan N-C Leung of University of Minnesota
Title: "Geometric over R, C, H, O"

12:10-2:00 pm  Surge 268
Seminar: CATEGORY THEORY
Speaker: James Dolan
Title: "Dynkin Diagrams"

3:10-4:00 pm  Surge 268
Seminar: COMMUTATIVE ALGEBRA
Speaker: TBA
Title: TBA
MATHEMATICS
COLLOQUIUM

MARK BURGIN
University of California, Los Angeles

Wednesday, April 9, 2003 from 4:10-5:00 pm
Tea Time starts at 3:40 pm
Surge 268

TITLE: “Hypernumbers, Hyperfunctionals, and Feynman Integral”

ABSTRACT: The theory of hypernumbers and hyperintegration emanated from physically directed thinking and was derived by a natural extension of the classical approach to the real number universe construction. Namely, an important class of problems that appear in contemporary physics and involve infinite values inspired this theory. As it is known, many mathematical models, which are used in modern theories of elementary particles (such as gauge theories), imply divergence of analytically calculated properties of physical systems. The simplest example is the case of a free electron when its interaction with photons changes the energy of the electron so that the energy becomes infinite (in a model). Mathematical investigation of many physical problems gives rise to divergent integrals and series that are such mathematical constructions that have, in some sense, infinite values. However, physical measurements give, as the result, only finite values. That is why, many methods of divergence elimination (regularization), i.e., of elimination of infinity, have been elaborated. Nevertheless the majority of them were not well grounded mathematically because they utilized operations with formal expressions that had neither mathematical nor physical meaning. Moreover, there are such models in physics that contain infinities that cannot be eliminated by these methods based on existing mathematical theories. Only in the theory of hyperintegration, based on the theory of hypernumbers, all divergent integrals and series that appear in the calculations with physical quantities become correctly grounded as strict mathematical objects.

In addition to this, theory of hyperintegration suggests a new approach to Feynman integral. An important peculiarity of this approach is that Feynman integral is treated as ordinary integrals in which hypermeasures are used instead of ordinary measures. Moreover, it is possible to apply this approach to develop an integral calculus for arbitrary functional spaces.

The new theory provides also new facilities for mathematics. For example, there was time when mathematicians (such as L. Euler) manipulated with divergent series (that have infinite values) in the same way as they treated convergent series (that have finite values). However, later it was demonstrated (in the context of real and complex numbers) that such manipulations were not mathematically correct and led to contradictions. Transition to hypernumbers provides correct mathematical means to deal with such constructions in a proper way.

Other mathematical problems that are facilitated by application of the theory of hypernumbers, hyperintegration, and extrafunctions are connected with definitions of norms and distances for unbounded functions and operators.
Monday
March 31
4:10-6:00 pm Surge 275
Seminar: QUANTUM GRAVITY
Speaker: John Baez
Title: "Categorified Gauge Theory"

Tuesday
April 1
3:40-4:30 pm Surge 268
Seminar: FUNCTIONAL ANALYSIS
Speaker: Professor M.M. Rao of UCR
Title: "Hermite Functions, Wick Products and Random Integrals"

4:10-6:00 pm Surge 275
Seminar: QUANTUM GRAVITY
Speaker: John Baez
Title: "Categorified Gauge Theory"

Wednesday
April 2
10:10-12:00 pm Surge 268
Seminar: TOPOLOGY
Speaker: Professor Xiao-Song Lin
Title: Organizational Meeting
Seminar: MATHEMATICS COLLOQUIUM
NO COLLOQUIUM THIS WEEK

Thursday
April 3
3:40-4:30 pm Surge 268
Seminar: MATHEMATICAL PHYSICS and DYNAMICAL SYSTEMS
Speaker: Professor Michel Lapidus
Title: Organizational Meeting

4:10-5:30 pm Surge 275
Seminar: REPRESENTATIONS AND GEOMETRY
Speaker: TBA
Title: TBA

Friday
April 4
Seminar: DIFFERENTIAL GEOMETRY
NO MEETING THIS WEEK
3:10-4:00 pm Surge 268
Seminar: COMMUTATIVE ALGEBRA
Speaker: TBA
Title: TBA