

**MATHEMATICAL ASSOCIATION OF AMERICA
NORTHERN CALIFORNIA, NEVADA, AND HAWAII SECTION
Saturday, February 28, 2009
Mathematical Sciences Research Institute
Simons Auditorium unless specified otherwise**

PROGRAM

- 8:30–9:30 Registration, Coffee Hour, Book Sales—Lobby and atrium
Registration Fee: \$15 (\$5 for retirees; \$1 for students and unemployed)
- 9:30–10:20 **Robert Bryant**, MSRI; Section Vice Chair
“The Idea of Holonomy”
Presider: **TBA**
- 10:20–10:30 **MAA Section Business Meeting**
Presider: **Dean Gooch**, MSRI; Section Chair
- 10:30–11:00 **Student Poster Session**—Second and third floor hallways
- 11:00–11:50 **David Bressoud**, Macalester College; MAA President-Elect
“Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture”
Presider: **Ed Keppelmann**, University of Nevada, Reno; Section Secretary-Treasurer
- 12:00–1:10 **Luncheon***—Collect lunch in Commons Room and wander around the building to find a seat.
- 1:15–2:00 Presentation of the 2009 Section Award for Distinguished
College or University Teaching of Mathematics

Speaker: **Frank Farris**, Santa Clara University; Editor, *Mathematics Magazine*
“A Window on the Fifth Dimension”
Presider: **Steve Chiappari**, Santa Clara University; Section Newsletter Editor
- 2:10–3:00 **Kevin McCurley**, Google Research
“Information Modeling with Graphs”
Presider: **Dean Gooch**, Santa Rosa Junior College; Section Chair
- 3:10–4:00 **Hélène Barcelo**, MSRI
“Subspace Arrangements from a Combinatorial Point of View”
Presider: **Tatiana Shubin**, San José State University; Section Program Chair

*Advance reservation for luncheon (\$20.00) is required. No other food is available at MSRI.

Section web site: <http://wolfweb.unr.edu/homepage/keppelma/maanc.html>

Program Abstracts

Robert Bryant, MSRI; Section Vice Chair; “The Idea of Holonomy”

The notion of ‘holonomy’ in mechanical systems has been around for over one hundred years and gives insight into daily operations as mundane as steering and parallel parking and in understanding the behavior of balls (or more general objects) rolling on a surface with friction. A sample question is this: What is the best way to roll a ball over a flat surface, without stirring or slipping, so that it arrives at a given point with given orientation? In geometry, holonomy has turned up in many surprising ways in the last 100 years and continues to be explored as a fundamental invariant of geometric structures. In this talk I illustrate the fundamental ideas in the theory of holonomy using familiar physical objects and explain how it is related to group theory and symmetries of basic geometric objects.

David Bressoud, Macalester College; MAA President-Elect
“Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture”

What is the role of proof in mathematics? Most of the time the search for proof is less about establishing truth than it is about exploring unknown territory. In finding a route from what is known to the result one believes is out there, the mathematician often encounters unexpected insights into seemingly unrelated problems. I illustrate this point with an example of recent research into a generalization of the permutation matrix known as the “alternating sign matrix.” This story began with Charles Dodgson (aka Lewis Carroll); matured at the Institute for Defense Analyses (aka Center for Communications Research); drew in researchers from combinatorics, analysis, and algebra; and ultimately was solved with insights from statistical mechanics. It has spawned a host of questions that sit at the intersection of statistical mechanics, representation theory, and combinatorics.

Frank Farris, Santa Clara University; Editor, *Mathematics Magazine*
“A Window on the Fifth Dimension”

Have you enough mathematics in your home? To help me in that inevitable moment when guests ask me why I spend my life on mathematics, I commissioned artist Hans Schepker to realize in glass an image from my work. The story of the resulting window involves a trip to the fifth dimension in search of a color tool for visualizing complex functions.

Kevin McCurley, Google Research
“Information Modeling with Graphs”

For over a decade Google has used a mathematical model of the web as a directed graph to provide a static ranking on pages called PageRank. In this model the vertices are web pages, the edges are links from one page to another, and edges are added to make the graph fully connected. The ranking is derived from the stationary distribution of a random walk on this graph, but there are numerous variations in this basic approach, and the evolving nature of the web has imposed a number of challenges along the way. The link model of the web is merely one example of a graphical model that can be used to improve our understanding of information. In modeling the relationships between terms and documents, between people and documents, or between ads and user queries, we have seen that each of these can be represented by bipartite graphs, and inference about these relationships comes down to understanding the characteristics of such graphs. In this talk I describe some of the basic problems that arise, and I show how we have only scratched the surface of mathematical models surrounding these relationships.

Hélène Barcelo, MSRI
“Subspace Arrangements from a Combinatorial Point of View”

During the last thirty years the study of subspace arrangements has been a very active area of research in combinatorics. In this talk I present some selected results and techniques that I believe convey the depth and beauty of the subject. One example will be how to “compute the continuous discretely”.