



Institute for Pure and Applied Mathematics
University of California, Los Angeles presents a program in

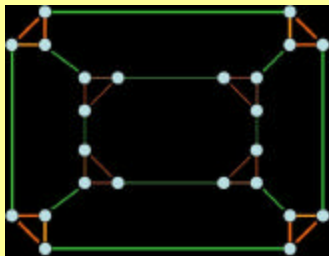
Automorphic Forms, Group Theory & Graph Expansion

February 9-13, 2004

Members of the Organizing Committee include **William Kantor** (University of Oregon), **Alexander Lubotzky**, Hebrew University), **Jon Rogawski** (UCLA), **Audrey Terras** (UCSD), and **Avi Wigderson** (Institute for Advanced Studies)

Scientific Overview:

In recent years, new and important connections have emerged between discrete subgroups of Lie groups, *automorphic forms* and arithmetic on the one hand, and questions in discrete mathematics, combinatorics, and graph theory on the other. One of the first examples of this interaction was the explicit construction of expanders (regular graphs with a high degree of connectedness) via Kazhdan's property T or via Selberg's theorem (λ_1 is greater than $3/16$). Some other important fruits of this interaction were the construction of Ramanujan graphs, using the Jacquet-Langlands correspondence and Deligne's theorem on Hecke eigenvalues (Ramanujan conjecture), construction of new finitely presented simple groups via ergodic theory of lattices (a la Margulis) in a product of two trees, and a conceptual approach to the Product Replacement Algorithm of computational group theory (the convergence properties of the algorithm are related to question of whether automorphism groups of free groups have property T). In each of these cases, an unexpected application to discrete mathematics was found by using ideas from number theory, Lie groups, representation theory and ergodic theory. Applications flow in the reverse direction as well. A new combinatorial construction of expander graphs was used recently to resolve a group theoretic question on expansion in Cayley graphs. One reason these connections have been slow to emerge is that the fields involved are quite far apart, at least from the traditional viewpoint. People working in one side of the Lie Group/Discrete Math dichotomy are often not aware of the relevance of their work to the other side. Furthermore, each field has its own language and conceptual framework, so there is often a formidable language barrier to communication. This workshop will bring together mathematicians from several of the above-mentioned areas in order to strengthen the ties between the fields and generate further collaborations.



Topics to be included:

- Ramanujan Complexes
- Finite simple groups
- The Product Replacement Algorithm
- Zigzag Product
- 3-Manifolds and Expanders

Speakers Include:

Cristina Ballantine (Holy Cross)
Donald Cartwright (Univ of Sydney)
Anton Deitmar (Exeter University)
Joel Friedman (Univ of British Columbia)
Alexander Gamburd (Stanford)
Bruce Jordan (Baruch College, NY)
William Kantor (University of Oregon)
W. C. Winnie Li (Penn State Univ)
Robert Liebler (Colorado State)

Nathan (Nati) Linial (Hebrew University)
Ron Livne (Hebrew University)
Alexander Lubotzky (Hebrew University)
Roy Meshulam (Technion)
Shahar Mozes (Hebrew University)
Igor Pak (MIT)
Jon Rogawski (UCLA)
Beth Samuels (Yale)
Peter Sarnak (Princeton)

Alireza Sarveniazi (Univ. of Göttingen)
Yehuda Shalom (Yale)
Tim Steger (UNISS, Italy)
Audrey Terras (UCSD)
Salil Vadham (Harvard)
Uzi Vishne (Bar-Ilan)
Avi Wigderson (Institute for Advanced Study)
David Zuckerman (Univ. of Texas, Austin)
Andrzej Zuk (University of Chicago)

Participation:

The program is open to the entire mathematical and scientific communities. Please visit our website for more information, including an online registration form and an application for support at: <http://www.ipam.ucla.edu/programs/agg2004>. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission and we welcome their applications.

Please visit our website at

<http://www.ipam.ucla.edu/programs/agg2004>

or email questions to agg2004@ipam.ucla.edu

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