

The Alfred Brauer Lectures, April 16-18, 2012

Alexander Lubotzky, Hebrew University

"EXPANDER GRAPHS IN PURE AND APPLIED MATHEMATICS"

Expander graphs are highly connected sparse graphs. They have been studied by computer scientists for over forty years, and have found numerous applications in areas like communication networks, and algorithms. Pure mathematicians have been attracted to the challenge of constructing explicit examples, using deep theories such as Kazhdan's Property T and the Ramanujan Conjecture. In the last decade, one has seen the use of expander graphs in very unexpected ways in a number of areas of pure mathematics.

The lectures will give an overview of these developments, trying to minimize the need for prior knowledge of computer science or mathematics.

Lecture 1: "EXPANDERS AND CODE" - Monday, April 16, 3:30-4:30 PM, Phillips 215

Lecture 2: "EXPANDERS IN NUMBER THEORY" - Tuesday, April 17, 4:00-5:00 PM, Phillips 332

Lecture 3: "EXPANDERS IN GEOMETRY" - Wednesday, April 18, 4:00-5:00 PM, Phillips 332

There will be a reception in the Mathematics Faculty/Student Lounge on the third floor of Phillips Hall, Room 330, starting at 4:45 P.M. on Monday, April 16th. Refreshments will be available at 3:30 before the second and third lectures.

About the 2012 Brauer Lecturer:

Professor Alexander Lubotzky, Weil Professor of Mathematics at Hebrew University, has made fundamental contributions in group theory and its applications to geometry, arithmetic and combinatorics. His interests include discrete subgroups of Lie groups, hyperbolic geometry, p -adic analytic groups, subgroup growth, pro-finite groups, and finite simple groups and their combinatorics. His work with Sarnak and Phillips on the explicit construction of Ramanujan graphs via modular forms and the problem of distributing points on the sphere were the subjects of Bourbaki reports and attracted attention in computer science and engineering.

Lubotzky received his Ph.D. at Bar-Ilan University in 1979 under the direction of Hillel Furstenberg. His various awards include the Erdős prize, the Rothschild prize, and twice the Ferran Sunyer L. Baloger prize for his research monographs *Discrete Groups, Expanding Graphs, and Invariant Measures* and *Subgroup Growth* (written with D. Segal). He was an invited speaker at the Zurich ICM in 1994, and has given the Woodward lectures at Yale (1998), the Ritt Lectures at Columbia (1999), the Eilenberg Lectures at Columbia (2000), the Porter

Lectures at Rice (2001), and the Mordell Lecture at Cambridge (2011). In addition, he gave the AMS Colloquium Lectures at the Joint Annual Meeting in New Orleans in 2011. In 2005, Lubotzky was elected to the American Academy of Arts and Sciences as a foreign honorary member, and in 2006 he received an honorary degree from the University of Chicago.

The Alfred Brauer Fund was established by the Department of Mathematics in 1984 on the occasion of Dr. Brauer's ninetieth birthday, and the Alfred Brauer Lectures began in 1985. The most recent Brauer Lecturers have been Peter Sarnak, Janos Kollár, Andrew Majda, Jeff Cheeger, Shing-Tung Yau, Percy Deift, Charles Fefferman, Claire Voisin, Alex Eskin, and Gérard Laumon.