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Alexander Lubotzky* (alexlub@math.huji.ac.il), The Hebrew University of Jerusalem, Jerusalem, Israel. *Expander graphs in pure and applied mathematics, II*. Preliminary report.

Expander graphs in pure and applied mathematics II

Till the mid 90's essentially all the work on expander graphs was done by computer scientists who used them for various applications and by pure mathematicians who took the challenge of using deep mathematical theories to provide the computer scientists with better and better expanding graphs (e.g. the so-called Ramanujan graphs).

In the last 13 years, CS started to pay back its debt ... Expander graphs have started to play an increasing role in pure mathematics - in geometry, group theory and number theory.

In the 2nd talk we will present some of these applications to number theory and group theory. Most notably is the "affine sieve method", promoted by Sarnak. This is a far reaching extension and a non-commutative version of Dirichlet theorem on primes in arithmetic progressions. The recent works of Helfgott, Bourgain, Breuillard, Green, Tao, Pyber, Szabo, Salehi-Golsefidy and Varju brought this method to a quite satisfactory point, with various entertaining applications, such as appolonian circles and more.

An even more recent application is adapting analogous sieve methods to the study of purely group theoretical problems on arithmetic groups, linear groups and the mapping class groups. (Received September 16, 2010)