DEPARTMENT OF MATHEMATICS
SECOND RAMANUJAN COLLOQUIUM

Photo Courtesy C. J. Mozzochi

Sieves, the Generalized Ramanujan Conjectures and Expander Graphs

presented by

Professor Peter Sarnak

Princeton University and The Institute for Advanced Study

With opening remarks by Ambassador Dennis Jett (Retired), Dean, UF International Center

ABSTRACT: We review various classical problems concerning the existence of primes or numbers with few prime factors as well as some of the developments towards resolving these long standing questions. We then put these problems in a natural and general geometric/group theoretic context of actions by morphisms on affine n-space and indicate what can be established there. The methods used to develop a combinatorial sieve in this context involve automorphic forms and especially the generalized Ramanujan Conjectures, expander graphs and unexpectedly, arithmetic combinatorics. Applications to classical problems such as the divisibility of areas of Pythagorean triangles and of curvatures of circles in integral Apollonian packings will be given. In the first lecture we will give a general overview (for a general audience), in the second lecture* we discuss the interesting special cases for which approximations to the general Ramanujan Conjectures can be used effectively in the analysis and in the third lecture* we explain the role of arithmetic combinatorics in dealing with the general problem. *After the Ramanujan colloquium, Professor Sarnak will give two Number Theory Seminars on the same topic at 1:55 pm on Thursday, March 20, and Friday, March 21 in Little Hall 339.

ABOUT THE SPEAKER: Professor Peter Sarnak is one of the most influential mathematicians in the world, due to his fundamental contributions to various aspects of analytic number theory, and by his many leadership roles in the profession. After receiving his BS at the University of Witwatersrand in South Africa, he went to Stanford where he received his PhD in 1980. He then held a tenured position at the Courant Institute (NYU), and a Professorship at Stanford before moving to Princeton in 1991 as Fine Professor of Mathematics. Very recently he has been appointed also as a Permanent Member at the Institute for Advanced Study in Princeton. For his many outstanding contributions, he has received several awards and recognitions including the 2001 Ostrowski Prize, the 2003 Conant Prize and the 2005 Cole Prize of the American Mathematical Society, and the Polya Prize of the Society of Industrial and Applied Mathematics. In 2002 he was elected both as Fellow of the Royal Society (FRS) and as Member of the National Academy of Sciences. He has served on several advisory boards - for the IHES (France), MSRI (Berkeley), the Fields Institute and the NSF. He serves on the Editorial Boards of several journals including the very prestigious Duke Journal and the Annals of Mathematics.

Wednesday, March 19, 2008
4 pm, Little Hall 121
Refreshments will be served after the talk in Little 339

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