

**Speaker:** Peter Sarnak

**Title:** Markoff triples, graphs and strong approximation

**Abstract:** The divisibility properties of lacunary sequences like Fermat's two to the two to the  $n$  plus one, or the integer part of  $\theta$  to the  $n$ , with  $\theta$  bigger than 1, are notoriously difficult to study. After reviewing some results and techniques developed by Harold Shapiro to study such problems, we turn to recent joint work with Bourgain and Gamburd concerning divisibility properties of Markoff numbers. These arise from Markoff triples which are an orbit of a group of (nonlinear) affine morphisms of affine 3-space. While a theory of an affine sieve for linear actions has been developed, the nonlinearity poses many new problems.

**RTG TALK** (by Alex Gamburd)

**ABSTRACT:** After a brief review of superstrong approximation and the affine linear sieve, I will discuss a recent result of Bourgain on the modular Szemerédi-Trotter theorem for hyperbolas. The latter plays an important role in the proof of strong approximation for Markoff graphs.