1056-68-1303 **Chris Umans*** (umans@cs.caltech.edu), Computer Science MC 305-16, California Institute of Technology, Pasadena, CA 91125. *Group-Theoretic Algorithms for Matrix Multiplication.*

I'll outline a group-theoretic approach to devising fast algorithms for matrix multiplication, developed by H. Cohn, R. Kleinberg, B. Szegedy and myself in papers appearing in FOCS 2003 and FOCS 2005. In this framework, one devises algorithms for matrix multiplication by constructing finite groups with certain properties. The algorithms themselves are easy to describe, and they make critical use of the Discrete Fourier Transform over non-abelian groups.

I'll outline some progress toward an improved algorithm using this new approach and state a self-contained conjecture that would lead to an essentially optimal nearly-quadratic algorithm. (Received September 21, 2009)