1046-60-2131 **Gunnar Martinsson*** (martinss@colorado.edu), Department of Applied Mathematics, University of Colorado at Boulder, 526 UCB, Boulder, CO 80309-0526. *Fast Matrix Computations via Randomized Sampling*

Matrix computations lie at the heart of many algorithms for extracting information from the massively large data sets that arise in applications such as the study of large networks (e.g. the world wide web) and analysis of genomic data. A core outstanding challenge is the construction of algorithms for performing these matrix computations rapidly and accurately.

In developing such algorithms, valuable lessons can be learned from existing fast techniques for matrix computations such as the Fast Multipole Method, multigrid, etc. However, almost all such techniques that we currently know rely on special structure in the problem that is known in advance, for instance that the matrix under consideration represents the discretization of a PDE with known spectral properties. In the new applications that we face, such a priori information is typically not available.

In this talk, we will describe some situations in which the use of randomized sampling techniques has enabled the construction of fast algorithms even when little a priori information about the structure of the data is available. We will discuss connections between this work and other randomized algorithms; in particular the connection to recent work in functional analysis and probability theory (by Johnson and Lindenstrauss, Bourgain, and others) utilizing random projections to embed objects into low-dimensional Euclidean spaces, while preserving important geometrical properties of the objects. (Received October 01, 2008)