Stanford University
Department of Statistics

SPECIAL SEMINAR

3pm, Friday, April 12, 2013
Sequoia Hall Room 200

Speaker: Michael Unser
Biomedical Imaging Group,
EPFL, Lausanne, Switzerland

Title: Sparse stochastic processes

Abstract:
We introduce an extended family of sparse processes that are specified by a generic (non-Gaussian) innovation model or, equivalently, as solutions of linear stochastic differential equations driven by white Lévy noise. We present the mathematical tools for their characterization. The two leading threads of the exposition are:

• the statistical property of infinite divisibility, which induces two distinct types of behavior, Gaussian vs. sparse, at the exclusion of any other;

• the structural link between linear stochastic processes and spline functions which is exploited to simplify the mathematical analysis.

This allows us to prove that these processes admit a parsimonious representation in some matched wavelet-like basis. Finally, we show that these models have predictive power for image compression and that they are applicable to the derivation of statistical algorithms for solving ill-posed inverse problems, including compressed sensing.