September 18th, 2015
KAP 414
2:00 P.M. 3:00 P.M.

Professor Frederi Viens

(Purdue University)

"Parameter estimation for Gaussian sequences: long-memory motivations in finance, sharp asymptotic normality and non-normality"

Abstract: The notion of long memory in financial time series data has been documented and validated for discrete and continuous models repeatedly since the early 1990's. A building consensus is that, since this memory occurs at the level of squared returns, say, but is not visible when looking at correlations of returns themselves, semi-martingales are still appropriate for financial models, but the volatility process must exhibit the long memory. A popular choice for this purpose is the so-called mean-reverting process driven by a fractional Gaussian noise, also known, in the continuous-time context of stochastic differential equations, as a fractional-Brownian-motion-driven Ornstein-Uhlenbeck process. The estimation of this process's parameters is notoriously difficult. After mentioning briefly some recent works on this task which deal with the memory parameter (e.g. Chronopoulou and Viens, Quantitative Finance, 2012), we will shift to a finer analysis of estimation for other parameters, based on discrete-time observations. Using recent progress on how to measure total variation distance to normality on Wiener chaos, we develop a framework for estimating scale parameters for stationary and non-stationary Gaussian sequences via power-type variations, concentrating on the sharpness of total-variation convergence speeds for their asymoptotic normality or non-normality. Applications are given to Ornstein-Uhlenbeck processes

driven by fractional Gaussian noise, observed in discrete time, under long-horizon asymptotics, and to partially observed systems of such processes. The resulting estimators can be interpreted as least-squares estimators, and as generalized method of moments estimators. This represents joint work completed and in progress with Kh. es-Sebaiy and B. el Onsy (Marrakech).