

Luis G. Gorostiza, CINVESTAV, México

Title:

Oscillatory fractional Brownian motion and related processes arising from particle systems

Abstract:

Oscillatory fractional Brownian motion with parameter $H \in (1/2, 1)$ is a centered Gaussian process $\xi = (\xi_t)_{t \geq 0}$ with covariance function

$$Cov(\xi_s, \xi_t) = \frac{1}{2} (s^{2H} h_s + t^{2H} h_t - |s - t|^{2H} h_{|s-t|}), \quad s, t \geq 0,$$

where

$$h_t = \sum_{j=-\infty}^{\infty} (ba^j t)^{-2H} (e^{-ba^j t} - 1 + ba^j t), \quad t > 0, \quad h_0 = 0,$$

constants $b > 0$ and $a \in (0, 1)$. The function h is periodic in logarithmic scale (i.e., $h_t = h_{at}, t > 0$), and oscillates between two positive values, slower as $t \rightarrow \infty$ and faster as $t \rightarrow 0$. This process is an oscillatory analogue of fractional Brownian motion with Hurst parameter H (which corresponds to $h \equiv 1$). A related process is an oscillatory analogue of sub-fractional Brownian motion.

In the talk we will show how these processes arise in occupation time fluctuation limits of systems of random walks on a hierarchical group. The oscillations are caused by the discrete and ultrametric structure of the group. Properties of these processes and comparisons with those of their non-oscillatory counterparts will be discussed.

(This is joint work with T. Bojdecki and A. Talarczyk, University of Warsaw).