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Existence of persistence exponent for Gaussian stationary functions

Abstract:

Let Z(t) be a Gaussian stationary function on the real line, and fix a level L>0.

We are interested in the asymptotic behavior of the persistence probability: P(T) = P( Z(t) > L, for all t in [0,T] ).

One would guess that for "nice processes", the behavior of P(T) should be exponential. For non-negative correlations this may be established via sub-additivity arguments. However, so far, not a single example with sign-changing correlations was known to exhibit existence of the limit of {Log P(T)}/T, as T approaches infinity (that is, to have a true "persistence exponent").

In the talk I will present a proof of existence of the persistence exponent, for processes whose spectral measure is monotone on [0,?) and is continuous and non-vanishing at 0. This includes, for example, the sinc-kernel process (whose covariance function is sin(t)/t ).

Joint work with Ohad Feldheim and Sumit Mukherjee.