Stanford University
Departments of Mathematics and Statistics

Probability Seminar

*** Special Event ***
3:30pm, Monday, October 31, 2016
Jordan Hall, Building 01-420 Room 041
Cookies served at 3pm, Sequoia Hall Lounge.

Speaker: Gregory Schehr, Université de Paris-Sud

Title: Exact statistics of record increments of random walks and Lévy flights

Abstract:
In this talk, I will present an analytical study of the statistics of increments in record values in a time series \( \{x_0 = 0, x_1, x_2, \ldots, x_n\} \) generated by the positions of a random walk (discrete time, continuous space) of duration \( n \) steps. For arbitrary jump length distribution, including Lévy flights, we show that the distribution of the record increment becomes stationary, i.e., independent of \( n \) for large \( n \), and compute it explicitly for a wide class of jump distributions. In addition, we compute exactly the probability \( Q(n) \) that the record increments decrease monotonically up to step \( n \). Remarkably, \( Q(n) \) is universal (i.e., independent of the jump distribution) for each \( n \), decaying as \( Q(n) \sim A/\sqrt{n} \) for large \( n \), with a universal amplitude \( A = e/\sqrt{\pi} = 1.53362 \ldots \). If time allows, I will also discuss the case where the time series \( \{x_0 = 0, x_1, x_2, \ldots, x_n\} \) is generated by i.i.d. random variables.