Stanford University  
Departments of Mathematics and Statistics

PROBABILITY SEMINAR

4:15pm, Monday, April 14, 2014  
Sequoia Hall Room 200
Cookies served at 3:45pm, 1st Floor Lounge.

Speaker: Marco Aymone  
*Department of Mathematics,*  
*Universidade Federal de Minas Gerais, Brazil*

Title: Partial sums of the random Möbius function

Abstract:

The Möbius function is the multiplicative function which at each prime equals to $-1$ and has support on the square free numbers. The *random Möbius function* is defined as follows: its values at the primes are given by $\{-1, 1\}$ valued independent random variables and on the natural numbers is defined accordingly to the multiplicative rule of the Möbius function.

In 1944 A. Wintner proved a theorem concerning the asymptotics of the partial sums of the random Möbius function in the case where the values on the primes are i.i.d. random variables with zero expectation. Later A. Wintner’s theorem has received improvements by P. Erdős in 1961, by G. Halász in 1982. Y. Lau, G. Tenenbaum and J. Wu in 2013 showed that these partial sums have an asymptotics which resembles the law of iterated logarithm for sums of independent random variables. In 2012 S. Chatterjee and K. Soundararajan proved a Gaussian approximation to these partial sums restricted to short intervals.

In my lecture I will present a series of new results for cases in which the values of the random Möbius function at the primes have negative expectation. Intuitively one would expect to maintain the J.E. Littlewood criterium for the validity of the Riemann hypothesis when these expectations are close to $-1$ and to extend A. Wintner’s theorem when these expectations are close to zero. Our results show that this is almost a correct guess.

This is joint work with Vladas Sidoravicius.