

THE PRIME NUMBER AND STATISTICS



Andrei Jorza

University of Notre Dame

**Thursday, February 25, 2016
5:00PM; 101 Jordan Hall**

In a letter from 1849 Gauss wrote that as a young boy he wanted to count the prime numbers, which he could do if he pretended the prime numbers are distributed randomly among the integers. Gauss also wrote down, for the first time, a formula for the probability that an integer number is prime. Seventy years later Hardy and Littlewood remarked that this statement is more philosophical than mathematical, but the statistical point of view on how prime numbers behave has revolutionized number theory from the celebrated (not yet proven) Riemann hypothesis to cryptography. We will look at a number of different statistical models governing the behavior of prime numbers and statistically predict potential theorems, which include Euclid's twin prime conjecture, as well as an estimate on how many primes numbers are good for cryptography. There is no hope that statistics can ever prove such theorems about prime numbers, but nevertheless having precise expectations for how prime numbers are distributed can be of enormous value in research



UNIVERSITY OF
NOTRE DAME

College of Science