Abstract:

In 1938, Rankin gave a lower bound for the order of the maximal gap between consecutive prime numbers less than x. Since then, there have been improvements only to the constant and it has been conjectured by Paul Erdos, who assigned a prize of 10000 USD, that the result holds for ANY constant.

This conjecture was just recently proved by the speaker in joint work with Ben Green, Sergei Konyagin and Terence Tao (and at about the same time, independently by James Maynard). We will describe the proof, and also outline some further ideas for replacing c with an explicit function of x. An emphasis will be given on how tools from various areas come into play, such as sieve methods from number theory, primes in arithmetic progressions, probabilistic methods, and combinatorial methods.