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Simple zeros of primitive Dirichlet $L$-functions and the asymptotic large sieve

Assuming the Generalized Riemann Hypothesis, we show using the asymptotic large sieve that 91% of the zeros of primitive Dirichlet $L$-functions are simple. This improves on earlier work of Ozluk which gives a proportion of at most 82%. We further compute an $q$-analogue of the Pair Correlation Function $F(\alpha)$ averaged over all primitive Dirichlet $L$-functions in the range $|\alpha| < 2$. Previously such a result was available only when the average included all the characters $\chi$. This is a joint work with Yoonbok Lee, Sheng-Chi Liu and Maksym Radziwill.