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Low-lying zeros of quadratic Dirichlet L-functions

In this talk we study the 1-level density of low-lying zeros of Dirichlet L-functions attached to real primitive characters of conductor at most X. We obtain an asymptotic expansion of this quantity with lower order terms in descending powers of $\log X$. We show that this is valid under GRH when the support of the Fourier Transform of the implied even test function ϕ is contained in $(-2, 2)$. We also uncover a phase transition when the supremum of the support of $\widehat{\phi}$ reaches 1, where a new lower order term appears. This is joint work with Daniel Fiorilli and Anders Södergren.