A weighted one-level density of families of L-functions

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We consider a weighted version of the one-level density of the non-trivial zeros of L-functions, tilted by a power of the L-function evaluated at the central point. More precisely, for three specific families of L-functions (order by log-conductor $c(L)$) with different symmetry types, assuming the Riemann Hypothesis and the ratio conjecture for these families, we investigate the quantity

$$\frac{1}{\sum\limits_{L\in\mathcal{F}} L(\frac{1}{2})^k} \sum_{L\in\mathcal{F}} \sum_{\gamma_L} f(c(L)\gamma_L) L(\tfrac{1}{2})^k$$

with k a positive integer, f a test function and γ_L the imaginary part of a generic non-trivial zero of L.