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The mean value of cubic L -functions over function fields

We present results about the first moment of L -functions associated to cubic characters over $\mathbb{F}_q(T)$ when $q \equiv 1 \pmod{3}$. The case of number fields was considered in previous work, but never for the full family of cubic twists over a field containing the third roots of unity. We will explain how to obtain an asymptotic formula with a main term, which relies on using results from the theory of metaplectic Eisenstein series about cancellation in averages of cubic Gauss sums over function fields. We will also discuss the case $q \equiv 2 \pmod{3}$.

This is joint work with C. David and A. Florea.