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**Hyperelliptic curves,  $L$ -polynomials, and random matrices.** (English) [Zbl 1233.11074](#)

Lachaud, Gilles (ed.) et al., Arithmetic, geometry, cryptography and coding theory. Proceedings of the 11th international conference, CIRM, Marseilles, France, November 5–9, 2007. Providence, RI: American Mathematical Society (AMS) (ISBN 978-0-8218-4716-9/pbk). Contemporary Mathematics 487, 119-162 (2009).

Summary: We analyze the distribution of unitarized  $L$ -polynomials  $L_p(T)$  (as  $p$  varies) obtained from a hyperelliptic curve of genus  $g \leq 3$  defined over  $\mathbb{Q}$ . In the generic case, we find experimental agreement with a predicted correspondence (based on the Katz-Sarnak random matrix model) between the distributions of  $L_p(T)$  and of characteristic polynomials of random matrices in the compact Lie group  $\mathrm{USp}(2g)$ . We then formulate an analogue of the Sato-Tate conjecture for curves of genus 2, in which the generic distribution is augmented by 22 exceptional distributions, each corresponding to a compact subgroup of  $\mathrm{USp}(4)$ . In every case, we exhibit a curve closely matching the proposed distribution, and can find no curves unaccounted for by our classification.

For the entire collection see [\[Zbl 1166.11003\]](#).

**MSC:**

- [11G40](#)  $L$ -functions of varieties over global fields; Birch-Swinnerton-Dyer conjecture
- [11G30](#) Curves of arbitrary genus or genus  $\neq 1$  over global fields
- [11M50](#) Relations with random matrices

Cited in 7 Documents

**Keywords:**

[Sato-Tate conjecture](#); [trace of Frobenius](#); [zeta-function](#); [Haar measure](#); [moment sequence](#)

**Full Text:** [arXiv](#)