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The ℓ -Rank Structure of a Global Function Field

For any prime ℓ , it is possible to construct global function fields whose Jacobians, when viewed as finite Abelian groups, have high ℓ -rank by moving to a sufficiently large constant field extension. Previously, Bauer, Jacobson, Lee and the speaker provided two main results in this context: an upper bound on the size of the field of definition of the ℓ -torsion $\mathcal{J}[\ell]$ of the Jacobian \mathcal{J} , and a lower bound on the increase in the base field size that guarantees a strict increase in ℓ -rank. In this talk, we provide improvements to both these results, and demonstrate that our techniques have the potential to yield the entire “ ℓ -rank structure” of a function field. In other words, we can deduce the ℓ -rank over any intermediate field of the field of definition of $\mathcal{J}[\ell]$, including base fields that might be too large to be handled directly by computer algebra packages.

This is joint work with L. Berger, J.L. Hoelscher, Y. Lee, and J. Paulhus.