

Talk Title: Angle ranks of abelian varieties

Abstract: The angle rank of an abelian variety over a finite field measures multiplicative relations between Frobenius eigenvalues; it appeared implicitly in foundational work of Tankeev and Lenstra-Zarhin before being formally defined by Zarhin. For "most" abelian varieties the angle rank takes the maximum allowed value, and the Tate conjecture is known to hold for such abelian varieties.

We describe a strong refinement of the results of Tankeev and Lenstra-Zarhin that gives some additional constraints relating the angle rank to the Newton polygon. This establishes some new cases of the Tate conjecture and also explains some numerical observations made when compiling tables of abelian varieties over finite fields in the LMFDB (L-Functions and Modular Forms Database). We also obtain an effective version of a recent theorem of Zarhin which bounds the coefficients of multiplicative relations among Frobenius eigenvalues.

Joint work with Taylor Dupuy (Vermont) and David Zureick-Brown (Emory).