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Mordell–Lang, finite automata, and decidability in positive characteristic

If X is a semiabelian variety and Γ is a finitely generated subgroup of X, over base fields of characteristic zero, the Mordell-Lang conjecture (now a theorem) asserts that the intersection of Γ with a Zariski closed subset of X is a finite union of translates of subgroups of Γ. In positive characteristic, the situation is more complicated than in characteristic zero, due to the possibility of Frobenius orbits creating infinite intersections. In joint work with Dragos Ghioca and Rahim Moosa, we give a new proof of the isotrivial Mordell–Lang theorem and establish an effective version using finite automata. In particular, we show that the relevant intersections admit effective automata-theoretic descriptions, which allows us to answer algorithmic questions about rational points on subvarieties of isotrivial abelian varieties over function fields.