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Quasi-adelic measures, equidistribution and preperiodic points for families of rational maps

Motivated by a question of Zannier, it was shown by Baker and DeMarco that for any fixed complex numbers a and b and integer $d \geq 2$, there are infinitely many $t \in \mathbb{C}$ such that both a and b are preperiodic under iteration by $f_t(z) = z^d + t$ if and only if $a^d = b^d$. Their result was generalized to other 1-parameter families f_t of rational maps by various authors. A key ingredient in their proofs is an arithmetic equidistribution theorem for small points with respect to an adelic measure, proved independently by Baker–Rumely and Favre–Rivera-Letelier.

In this talk we show that most 1-parameter families of rational maps fail to satisfy the adelic hypothesis in the aforementioned equidistribution theorem. We generalize the notion of an adelic measure to that of a quasi-adelic measure and present an equidistribution theorem for quasi-adelic measures. We then connect our work back to questions arising in the theme of unlikely intersections and to an old question concerning the variation of the canonical height in families of rational maps.

This is joint work with Hexi Ye.