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On the Mazur–Tate element for abelian varieties of GL_2-type

In 1987, Mazur and Tate stated refinements of the classical Birch–Swinnerton-Dyer conjectures for elliptic curves over $\mathbb{Q}$. The role of the Hasse–Weil L-function is played by the so-called Mazur–Tate element, which is an element in the group ring $\mathbb{Q}[G]$, where G is the Galois group of an abelian number field. In this talk, we present a generalization of the Mazur–Tate conjectures to abelian varieties of GL_2-type. For such an abelian variety A, the main difference from the classical setting is that our construction depends on the choice of an order $\mathcal{R} \subseteq \mathrm{End}^0_{\mathbb{Q}}(A)$. The behavior of these conjectures while $\mathcal{R}$ varies resembles the compatibility of the equivariant Tamagawa Number Conjecture (eTNC) under change of order. Furthermore, we will state theoretical evidence supporting these conjectures, by relating these refined conjectures to the conjectures of Bloch and Kato. Finally, we will present numerical evidence supporting a vanishing conjecture regarding the Mazur–Tate element and certain discrepancies found in the original statement of Mazur and Tate.