

**$p$ -Adic periods in Chabauty-Kim theory**

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Abstract: For  $X$  a smooth scheme over an arithmetic base and  $p$  a prime of good reduction, Chabauty-Kim theory uses various unipotent completions of the fundamental group to construct certain locally analytic functions on the space of  $p$ -adic points of  $X$ . These functions, known as "Kim functions", are typically presented as linear combinations of  $p$ -adic iterated integrals over the  $p$ -adic numbers. The iterated integrals themselves are in a certain sense rationally defined, while the coefficients tend to be highly transcendental.

Kim functions are particularly well understood in the mixed Tate setting, due, in large part, to the availability of a theory of  $p$ -adic periods of mixed Tate motives. In ongoing joint work with David Corwin, we extend aspects of this theory beyond the mixed Tate setting, with particular emphasis on the "mixed elliptic" case. As an application worked out by Corwin, we obtain new information on Kim functions for certain punctured elliptic curves. Their coefficients have yet to be understood.