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Hilbert's tenth problem over number fields

Hilbert's tenth problem for rings of integers of number fields remains open in general, although a conditional negative solution was obtained by Mazur and Rubin assuming some unproved conjectures about the Shafarevich-Tate groups of elliptic curves. In this talk, we highlight how the non-vanishing of certain L-functions is related to this problem. In particular, we show that Hilbert's tenth problem for rings of integers of number fields is unsolvable assuming the automorphy of L-functions attached to elliptic curves and the rank part of the Birch and Swinnerton-Dyer conjecture. This is joint work with Hector Pasten.