THE UNIVERSITY
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**The Weil Conjectures and A1-homotopy theory**

Kirsten Wickelgren (Duke)

**Abstract.** In a celebrated paper from 1948, André Weil proposed a beautiful connection between algebraic topology and the number of solutions to equations over finite fields: the zeta function of a variety over a finite field is simultaneously a generating function for the number of solutions to its defining equations and a product of characteristic polynomials of endomorphisms of cohomology groups. The ranks of these cohomology groups are the number of holes of each dimension of the associated complex manifold. This talk will describe the Weil conjectures and then enrich the zeta function to have coefficients in a group of bilinear forms. The enrichment provides a connection between the solutions over finite fields and the associated real and complex manifolds. It is formed using $A1$-homotopy theory. No knowledge of $A1$-homotopy theory is necessary. The new work in this talk is joint with Margaret Bilu, Wei Ho, Padma Srinivasan, and Isabel Vogt.