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Zeta polynomials for modular form periods

Ken Ono
Emory University

Abstract: Yuri Manin has been developing a theory of zeta-polynomials, polynomials which are arithmetic geometric in origin which also satisfy a functional equation and the Riemann Hypothesis. He conjectured the existence of such functions for all newforms which arise from critical values of L-functions. We confirm his conjecture by constructing a Bloch-Kato complex using weighted moments of orders of Tate-Shafarevich groups. Surprisingly, for fixed weights, as levels tend to infinity we find these zeta-polynomials converge to Earhart polynomials for classical polytopes. This is joint work with Larry Rolen and Florian Sprung.

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