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Computing zeta functions using p-adic cohomology

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Kedlaya (2001) gives an algorithm for computing the zeta function of a hyperelliptic curve using Monsky–Washnitzer cohomology. In this talk I'll describe an extension of this algorithm to higher dimensional varieties.

Suppose X is a smooth projective variety over $\mathbb{F}_q$ and let U be its complement. The zeta function of X can be extracted from the characteristic polynomial of Frobenius acting on the middle dimensional cohomology $H^n_{\mathrm{rig}}(U)$. I'll discuss some of the implementation difficulties in addition to the theoretical underpinnings of the algorithm.

This is joint with Timothy Abbott and Kiran Kedlaya.

Reference :

Timothy G. Abbott, Kiran S. Kedlaya, David Roe, *Bounding Picard numbers of surfaces using p-adic cohomology*, Arithmetic, Geometry and Coding Theory (AGCT 2005), Séminaires et Congrès **21**, SMF, 2009, 125–159.