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# Characteristic Classes of Étale Local Systems

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Given an étale $\mathbb{Z}_p$-local system of rank $n$ on an algebraic variety $X$, continuous cohomology classes of the group $\mathrm{GL}_n(\mathbb{Z}_p)$ give rise to classes in (absolute) étale cohomology of the variety with coefficients in $\mathbb{Z}_p$. These characteristic classes can be thought of as $p$-adic analogs of Chern-Simons characteristic classes of vector bundles with a flat connection. For a smooth projective variety over complex numbers, Reznikov proved that the usual Chern-Simons classes in degrees $> 1$ of all $\mathbb{C}$-local systems are torsion. It turns out that characteristic classes of étale $\mathbb{Z}_p$-local systems on algebraic varieties over non-closed fields are often non-zero even rationally. In particular, if $X$ is a smooth variety over a $p$-adic field, and the local system is de Rham, then its characteristic classes are related to Chern classes of the graded quotients of the Hodge filtration on the associated vector bundle with connection. This relation can be established through considering an analog of Chern classes for vector bundles on the pro-étale site of $X$. This is a joint work with Lue Pan.

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