

The Bloch-Esnault-Kerz Fiber Square

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A theorem of Bloch-Esnault-Kerz published in 2014 states that the formal part of the Fontaine-Messing p -adic variational Hodge conjecture holds for schemes smooth and proper over an unramified local number ring. The theorem states that a class in the rational p -adic Grothendieck group of the special fiber admits a lifting to the rational p -adic continuous Grothendieck group of the formal completion along the special fiber if and only if the image of its crystalline Chern class under the de Rham-crystalline comparison isomorphism lies in the appropriate part of the Hodge filtration. In a paper also published in 2014, Beilinson generalized the equivalence of the relative rational p -adic K -theory and cyclic homology, implicit in the Bloch-Esnault-Kerz paper. As much else, this work, was greatly clarified by the Bhatt-Morrow-Scholze unification of p -adic Hodge theory and topological cyclic. Indeed, Antieau-Mathew-Morrow-Nikolaus showed that Beilinson's equivalence is given by the map of horizontal fibers in a square in which the map of vertical fibers is an equivalence by the Nikolaus-Scholze Tate-Orbit-Lemma. In this talk, I will recall how said cartesian square appears from the Nikolaus-Scholze Frobenius of \mathbb{Z} and explain a proposal by Clausen for how it may lead to a definition of the Hodge-Tate period map that does not require any calculational input.

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