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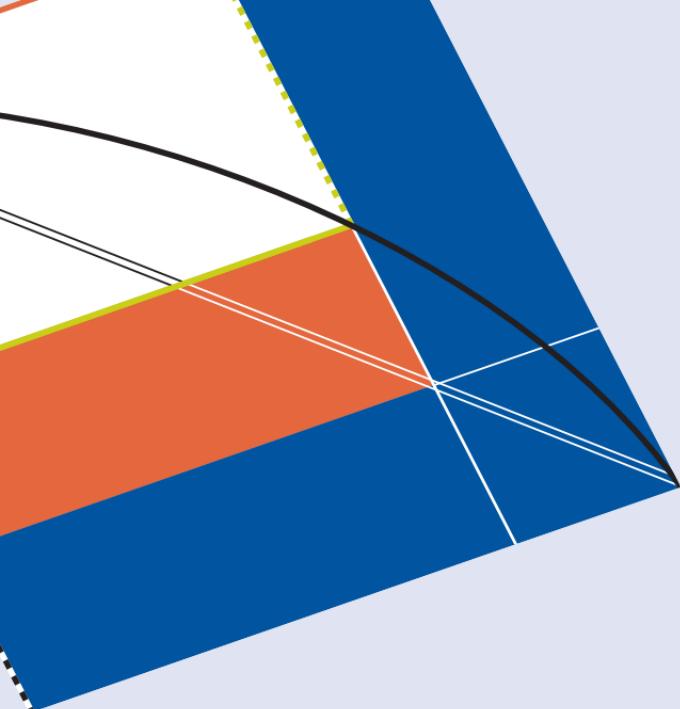
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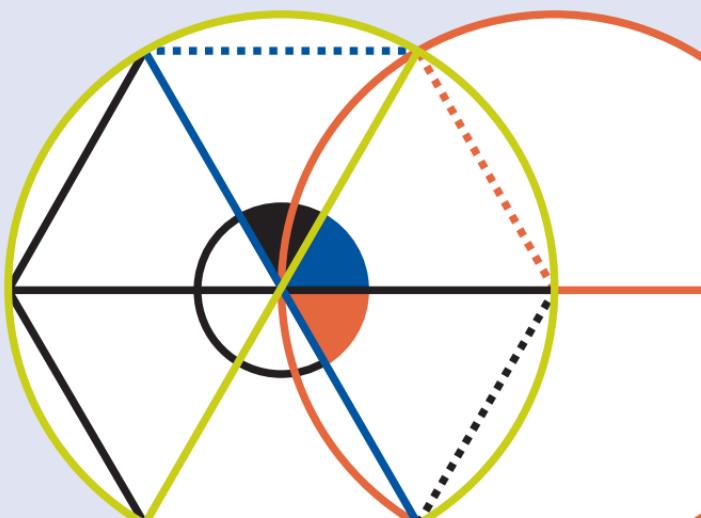
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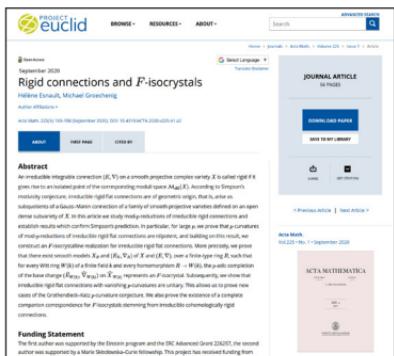


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September 2020
Rigid connections and F -isocrystals
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Abstract
An irreducible integrable connection (E, ∇) on a smooth projective complex variety X is called rigid if it gives rise to a W -isocrystal, where W is the ring of integers in a finite extension of \mathbb{Q}_p . According to Beilinson's conjecture, irreducible rigid connections are of generic singularities, that is, lie in an open submanifold of a Grothendieck connectedness of a family of smooth projective varieties defined on an open dense subvariety of X . In this article we study mod- p -reductions of irreducible rigid connections and their mod- p -reductions for p a prime number. We prove that the mod- p -reductions of irreducible rigid connections are of generic singularities. As an application, we prove that mod- p -reductions of irreducible rigid connections are complete. Building on this result, we construct an F -isocrystal equivalence between irreducible rigid connections. More precisely, we prove that for every finite extension K/\mathbb{Q}_p , there is a natural isomorphism $\mathcal{F}_{K/p} : \mathcal{C}^{\text{rigid}}(X, \nabla) \rightarrow \mathcal{C}^{\text{rigid}}(X, \nabla)$ for every finite extension K/\mathbb{Q}_p of a finite field and any very flat morphism $\mathbb{P}^1 \rightarrow W(K)$, where the preimage of the base change $(E_{K/p}, \nabla_{K/p})$ in X represents an F -isocrystal. Subsequently, we prove that irreducible rigid flat connections with semisimple automorphisms are unitary. This allows us to prove new results on mod- p -reductions of irreducible rigid connections. We also prove the existence of a complete compatibility correspondence for F -isocrystals, showing that mod- p reductions are unitarily rigid connections.

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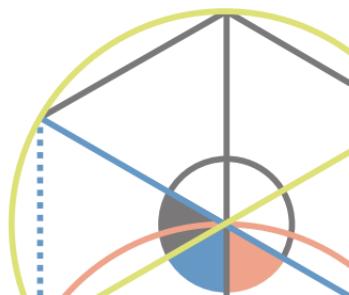
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