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MATH+

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Press Information

ERC Advanced Grant for Bruno Klingler

MATH+ member Bruno Klingler, professor for Algebraic Geometry at Humboldt Universität zu Berlin, is awarded one of only eight ERC Advanced Grants in Mathematics. The ERC Advanced Grant is considered the most prestigious European award for established researchers working on innovative research projects.

On 22 April 2021, the European Research Council (ERC) announced which innovative research projects will be funded by the ERC Advanced Grant for established researchers. Out of 2678 proposals from across Europe and all scientific disciplines, only 209 projects (8%) were approved; these projects will be funded with in total 507 million euro over a five-year period.

Prof. Klingler's project "Tame geometry and transcendence in Hodge theory" (*TameHodge*) will be funded with more than 1.8 million euro. The project plans to attack fundamental questions in Hodge theory using tools coming from mathematical logic.

Hodge theory, as developed around the 1970s, has become the main tool for understanding the geometry and arithmetic of complex algebraic varieties, that is, solution sets of algebraic equations over the complex numbers. It can be thought as a dramatic linearisation, which associates to any complex algebraic variety a very simple object: a finite dimensional complex vector space, which encodes the periods of differential forms on the variety. At the heart of the theory lies the fundamental fact that, although Hodge's theory produces very simple objects, it is not itself given by a

simple algebraic recipe but requires transcendental operations. However, two major conjectures in mathematics, the Hodge conjecture and the Grothendieck period conjecture, predict that this transcendence is severely constrained.

Recent work of Prof. Klingler and his collaborators has shown the emergence of a spectacular link between Hodge theory and tame geometry. Tame geometry, whose possibility was suggested by Grothendieck in the 1980s and developed by logicians under the name o-minimal geometry, studies structures where every definable set has a finite geometric complexity. The goal of the project *TameHodge* is to show that moderate geometry is the natural framework for Hodge theory—with major applications to the transcendence of periods, atypical intersections, and non-abelian Hodge theory.

Since 2017, Bruno Klingler is professor for Algebraic Geometry at Humboldt-Universität zu Berlin. He is one of 20 Einstein professors in Berlin. Furthermore, Prof. Klingler is a member of the DFG Cluster of Excellence MATH+ and a faculty member of the Berlin Mathematical School. Before moving to Berlin, Bruno Klingler was a full professor at the Institut de Mathématiques de Jussieu-Paris Rive Gauche (IMJ-PRG), Université Paris, as well as assistant professor at University of Chicago and Yale University.

For additional information, please ask:

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