

# Adeel A. Khan

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## RESEARCH AREAS

Algebraic and arithmetic geometry; specifically: algebraic K-theory, motivic cohomology, and algebraic cycles.

## Employment

- 2018– UNIVERSITÄT REGENSBURG  
*Akademischer Rat auf Zeit*
- 2016–2018 UNIVERSITÄT REGENSBURG  
*Wissenschaftlicher Mitarbeiter*

## Education

- 2013–2016 **Dr. rer. nat., *summa cum laude* in Mathematics**  
*Universität Duisburg-Essen, Essen*  
Thesis: Motivic homotopy theory in derived algebraic geometry  
Advisor: Marc Levine  
Co-advisor: Denis-Charles Cisinski
- 2011–2013 **M.Sc. in Mathematics**  
*Freie Universität Berlin, Berlin*  
Advisor: H el ene Esnault
- 2007–2011 **B.Sc. in Mathematics**  
*University of Maryland, Baltimore County, Baltimore*
- 2009–10 **“Math in Moscow” exchange program**  
*Independent University of Moscow, Moscow*

## Visiting positions

- Feb. 2018 FREIBURG INSTITUTE FOR ADVANCED STUDIES  
Visitor, research focus “Cohomology in algebraic geometry and representation theory”  
Freiburg
- July – Sept. 2017 MAX PLANCK INSTITUTE FOR MATHEMATICS  
Post-doctoral fellow  
Bonn
- Jan. – Apr. 2017 INSTITUT MITTAG-LEFFLER  
Post-doctoral fellow, research program “Algebro-geometric and homotopical methods”  
Stockholm

## Preprints

- 2018 **Fundamental classes in motivic homotopy theory**, with Fr ed eric D eglise, Fangzhou Jin  
arXiv:1805.05920 (46 pages)
- 2018 **Virtual Cartier divisors and blow-ups**

- arXiv:1802.05702 (12 pages)
- 2017 **Motivic infinite loop spaces**, with Elden Elmanto, Marc Hoyois, Vladimir Sosnilo, Maria Yakerson  
arXiv:1711.05248 (73 pages, submitted)
- 2017 **Brave new motivic homotopy theory II: homotopy invariant K-theory**, with Denis-Charles Cisinski  
arXiv:1705.03340 (27 pages)
- 2016 **Brave new motivic homotopy theory I: the localization theorem**  
arXiv:1610.06871 (66 pages, submitted)
- 2014 **On derived categories and noncommutative motives of varieties**  
arXiv:1401.7222 (7 pages, master's thesis)

## Teaching

- SS 2018 **The Grothendieck–Riemann–Roch theorem**  
Lecture course, Universität Regensburg
- WS 2017/18 **Descent in algebraic K-theory**  
Lecture course, Universität Regensburg
- WS 2017/18 **Galois theory**  
Tutor for seminar, Universität Regensburg
- WS 2016/17–SS 2017 **Higher category theory and homotopical algebra**  
Master course (exercise sessions), Universität Regensburg
- SS 2016 **Algebraische Geometrie 2**  
Master course (exercise sessions), Universität Duisburg-Essen
- WS 2015/16 **Algebraische Topologie 2**  
Master course (exercise sessions), Universität Duisburg-Essen

## Conference and workshop talks

- Sept. 2018 **TBA**  
Conference “Motives and their applications”, Euler International Mathematical Institute
- Mar. 2017 **Homotopy K-theory of  $E_\infty$ -ring spectra**  
Annual Meeting (Jahrestagung) of the DFG-SPP 1786, Bergische Universität Wuppertal
- Aug. 2016  **$A^1$ -homotopy invariance in spectral algebraic geometry**  
Alpine Algebraic and Applied Topology Conference, Saas-Almagell
- June 2016 **Virtual fundamental classes via stable homotopy theory**  
Homotopical approaches to categories and geometry, Universität Freiburg
- Sept. 2014 **Derived categories and motives of varieties**  
Vector Bundles on Algebraic Curves (VBAC) 2014, Freie Universität Berlin

## Seminar talks

- June 2018 **The motivic Pontrjagin–Thom isomorphism**  
Topology seminar, Universität Osnabrück
- April 2018 **Производная теория пересечений**  
Seminar, Chebyshev Laboratory
- Jan. 2018 **Derived intersection theory**  
Seminar, Università di Firenze
- Jan. 2018 **Motivic infinite loop spaces**  
SFB-Seminar, Universität Regensburg
- Nov. 2017 **Motivic infinite loop spaces**  
Topology seminar, EPFL Lausanne

- Aug. 2017 **Motivic infinite loop spaces**  
K-theory trimester seminar, Hausdorff Institute for Mathematics
- July 2017 **Motivic cohomology of algebraic varieties**  
MPI-Oberseminar, Max-Planck-Institut für Mathematik
- May 2017 **Gysin maps and recognition of infinite loop spaces in motivic homotopy theory**  
Oberseminar, Universität München
- Dec. 2016 **Virtual fundamental classes via motivic homotopy theory**  
Arbeitsgruppenseminar U. Bunke, Universität Regensburg
- Nov. 2016 **Virtual fundamental classes via motivic homotopy theory**  
Topology Seminar, Universität Wuppertal
- Nov. 2016 **Virtual fundamental classes via motivic homotopy theory**  
Mittagsseminar zur Arithmetik, Universität Münster
- Nov. 2016 **Brave new motivic homotopy theory**  
SFB-Seminar, Universität Regensburg
- Sept. 2016 **Brave new motivic homotopy theory**  
Universitetet i Oslo, Topology Seminar
- Feb. 2016 **Motives and algebraic cycles in derived algebraic geometry**  
Séminaire d'arithmétique, ENS Lyon
- May 2014 **Orlov's theorem via noncommutative motives**  
Algebra and number theory seminar, Universität Augsburg
- May 2014 **Orlov's theorem via noncommutative motives**  
Antwerp algebra seminar, Universiteit Antwerpen
- July 2013 **DG categories of coherent sheaves and motives of varieties**  
Graduate college colloquium, Universität Regensburg

## Selected expository talks

- Jan. 2018 **The Tate-valued Frobenius I**  
Higher Invariants Oberseminar "Topological cyclic homology", Universität Regensburg
- Dec. 2017 **Absolute purity with rational coefficients**  
Oberseminar "Motivic sheaves", Universität Regensburg
- June 2017 **The localization and relative purity theorems of Morel-Voevodsky**  
Oberseminar "Motivic sheaves", Universität Regensburg
- Dec. 2016 **Motivic cohomology and motivic Eilenberg-MacLane spectra**  
Oberseminar über den Hopkins-Morel-Hoyois-Isomorphismus, Universität Regensburg
- June 2016 **Derived de Rham algebras mod  $p^n$  I**  
Research Seminar Arithmetic Geometry, Universität Duisburg-Essen
- June 2016 **The motivic cohomology of chromatic quotients of MGL**  
Motives seminar, Universität Duisburg-Essen
- Nov. 2015 **K-theory of finite fields, II: Rational and mod  $p$  homology of  $BGL(\mathbf{F}_q)$**   
Student seminar: K-theory of fields, Universität Duisburg-Essen
- Nov. 2015 **Motivic cohomology, purity, and Voevodsky's contraction**  
Motives seminar, Universität Duisburg-Essen
- Nov. 2015 **Betti realization and Morel's  $A^1$ -connectivity theorem**  
Motives seminar, Universität Duisburg-Essen
- May 2015 **Failure of the integral Hodge conjecture**  
Motives seminar, Universität Duisburg-Essen
- Jan 2015 **The existence theorem**  
Research seminar: Class field theory for varieties over finite fields, Universität Duisburg-Essen
- Dec. 2014 **Applications: the theorem of the fixed part following Deligne, and the Abel-Jacobi map following Arapura**

Student seminar: Hodge theory, Universität Duisburg-Essen

- Oct. 2014 **Beilinson-Deligne cohomology**  
Motives seminar, Universität Duisburg-Essen
- Mar. 2014 **Introduction to algebraic cobordism and oriented theories**  
MIT Talbot Workshop: Motivic homotopy theory, Pigeon Forge
- Jan. 2014 **Symmetric spectra and non-effective motives**  
Learning seminar on motives, Universität Duisburg-Essen
- Jan. 2014 **Effective motives**  
Learning seminar on motives, Universität Duisburg-Essen
- Dec. 2013 **Properties of the intersection product, part 2**  
Student seminar: Intersection theory, Universität Duisburg-Essen
- Nov. 2013  **$(\infty, 1)$ -Categories**  
Winter school: Derived algebraic geometry, Flumserberg
- Nov. 2013 **DG-categories, II**  
Learning seminar on motives, Universität Duisburg-Essen
- May 2013 **Sites, sheaves and the comparison lemma of Beilinson**  
Research seminar:  $p$ -adic periods and derived de Rham cohomology, FU Berlin

## Service

- 2017– Referee for various journals
- May 2016 Co-organization of a mini-course on motives and derived algebraic geometry (with Peter Arndt)  
Universität Duisburg-Essen  
URL: <https://www.preschema.com/motives-dag-2016/>
- WS 2015/16 Co-organization of a learning seminar on geometric Langlands following Gaitsgory (with Niels Uit de Bos)  
Universität Duisburg-Essen
- WS 2013/14 Co-organization of a learning seminar on motives (with Jin Cao and Brad Drew)  
Universität Duisburg-Essen

## Awards and grants

- 2017 **Institut Mittag-Leffler Post-doctoral Fellowship**

## Languages

*English* (native)  
*Urdu* (native)  
*Russian* (fluent)  
*German* (conversational)  
*French* (basic)