

# VLADIMIR GULETSKII

## CURRICULUM VITAE

Department of Mathematical Sciences  
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### Education

*PhD 1996* Institute of Mathematics, Belarus Academy of Sciences

*MSc 1991* Belarus State University. Faculty of Mechanics and Mathematics (MEXMAT)

### Employment record

*2012 - present* Reader in Mathematics, Department of Mathematical Sciences, University of Liverpool

*2006 - 2012* Lecturer in Mathematics, Department of Mathematical Sciences, University of Liverpool

*2004 - 2006* Member of the School of Mathematics, Institute for Advanced Study, Princeton, USA

*1994 - 2004* Researcher, Institute of Mathematics, Belarus Academy of Sciences, Minsk, Belarus

### Teaching experience

#### *Current*

MATH344 Combinatorics, MATH444 Elliptic curves

#### *Past*

MATH244 Linear Algebra and Geometry, MATH302 History of Mathematics, MATH342 Number Theory and MATH448 Algebraic Geometry

#### *Always*

Individual project supervision in algebraic geometry and algebraic number theory (MATH399, MATH490 and MATH499)

**Collegial experience***Current*

Deputy of the Head of Pure Mathematics

*Past*

Director of Postgraduate Research in the Department of Mathematical Sciences

GTA coordinator and postgraduate admissions tutor

Annual Review of PhD students coordinator

Chair of Academic Environment & Estate Committee

**Memberships**

Member of the London Mathematical Society

Member of the Editorial Board of the European Journal of Mathematics

**Research interests***Primary*

My research interest lies in the area of arithmetic algebraic geometry, more specifically in the study of rational equivalence of 0-cycles on algebraic surfaces over a field (Bloch's conjecture and similar problems). Due to Severi in characteristic 0, and more recently due to Suslin and Voevodsky in mixed characteristic, this rational equivalence can be understood as  $\mathbb{P}^1$ -connectivity on symmetric powers of smooth projective surfaces over a field, and the aim is to find first rational curves on symmetric powers in positive characteristic and then lift them to zero one. This research involves the study of rational equivalence of 0-cycles on surfaces over the closure of Laurent series with coefficients in  $\mathbb{F}_p$ , schemes parametrizing rational curves on symmetric powers of surfaces and their punctual Hilbert schemes, the smoothening of such schemes, good and bad reduction of algebraic surfaces, arithmetic threefolds arising from relative curves over bi-Dedekind schemes, Bertini-type theorems in arithmetic setup, spaces of 0-cycles, constructed as group completions (in the category of sheaves on the Nisnevich site) of infinite symmetric powers of schemes over a base, and other things.

*Secondary*

I am also interested in applications of 0-cycles to birational geometry. An important direction here is to study transcendental motives of smooth projective surfaces, their integral indecomposability, and the relevance of the latter to birational geometry of 4-fold hypersurfaces in  $\mathbb{P}^5$ . The philosophy is the same: prove first  $\mathbb{Z}$ -indecomposability of transcendental motives in characteristic  $p > 0$ , and then lift it to characteristic 0.

**PhD students***Current*

Lucas de Souza das Dores (Science without Borders, Brazilian Government scholarship) Global properties of schemes of rational curves on normal varieties over a field

Hangyu Mao (GTA) Smoothing of schemes of rational curves on symmetric powers of surfaces over a DVR

*Former*

Oliver Eivind Anderson (EPSRC) Chow schemes in mixed characteristic

Anwar Alameddin (GTA) Motivic spaces with proper support

Joe Palacios Baldeon (EPSRC) Geometric symmetric powers in the homotopy categories of schemes over a field

Kalyan Banerjee (GTA) One-dimensional algebraic cycles on nonsingular cubic fourfolds in  $\mathbb{P}^5$

**Grants**

2011 - 2014 EPSRC grant EP/I034017/1 “Lambda-structures in stable categories”

2008 University of Liverpool induction grant RDF 6677

2006 INTAS-05-96-4634

2005 - 2006 NSF Grant DMS-0111298 (USA)

2005 Grant of the Japan Society for the Promotion of Science

2004 - 2006 the grant provided by *The von Neumann Fund* and *The Ellentuck Fund* (awarded by the Institute for Advanced Study, Princeton, USA)

2001 - 2002 INTAS-99-00817

1998 - 2002 TMR ERB FMRX CT-97-0107

1998 - 2004 several grants of SFB 343 ”Diskrete Strukturen in der Mathematik”

**Workshops organized**

Edge Days 2016. Workshop on birational geometry and reduction to positive characteristic methods. June 2016. University of Edinburgh (with I. Cheltsov)

Birational geometry and algebraic cycles. June 2015. University of Liverpool

**Selected talks and research trips**

*16 - 18 September 2019* VII Escuela IMCA: Algebraic Geometry. Advances in algebraic cycles (Lima, Peru). Motivic obstruction to rationality in dimension 4 (three lectures)

*23 November 2017* Max Plank Institute in Bonn (Germany) Motivic obstruction to rationality of a very general cubic hypersurface in  $\mathbb{P}^5$

*30 June 2017* Edge Days Workshop in Algebraic Geometry. University of Edinburgh (Scotland, UK) Motivic obstruction to rationality of a very general cubic hypersurface in  $\mathbb{P}^5$

*21 December 2016* Center for Geometry and Physics, Institute for Basic Science (Pohang, South Korea) A new cycle-theoretic obstruction to rationality in dimension 4

*14 - 18 July 2014* Frontiers of Rationality Workshop. Longyearbyen, Spitsbergen (Norway) Towards cycle-theoretic obstruction to rationality in dimension four

*20 December 2013* High School of Economics, Moscow (Russian Federation) Symmetric powers in  $\mathbb{A}^1$ -homotopy theory of schemes

*10 - 14 June 2013* Birational Geometry and Galois Groups. Bogomolov's Lectures. University of Edinburgh (Scotland, UK) 0-cycles on intersections of quadrics and cubics in  $\mathbb{P}^4$ , Prymians and relevant motivic stuff

*19 - 23 September 2011* Colloquium of the Croatian Mathematical Society, the Institut Ruder Boskovic (Zagreb, Croatia) The 2-points principle in Bloch's conjecture

*November 2010* Warwick Algebraic Geometry Seminar (England, UK) Transcendence degree of algebraic cycles and non-trivial elements in Abel-Jacobi kernels

*November 2010* Edinburgh-Glasgow-Aberdeen (EGA) algebraic geometry seminar (Scotland, UK) Non-trivial elements in the Abel-Jacobi kernels of higher dimensional varieties

*April 2010* Conference "Geometry at Large", University of Vienna (Austria) Symmetric powers in stable homotopy categories

*December 2009* Department of Mathematics, University of Vienna (Austria) Motives of threefolds over a field

*August 2009* Department of Mathematics, Hiroshima University (Japan) Motives of Fano threefolds

*February 2009* Workshop on Finiteness for Motives and Motivic Cohomology, University of Regensburg (Germany) Zeta-functions with coefficients in a stable homotopy category

*May 2008* Algebraic Geometry Seminar, University of Cambridge (UK) Algebraic cycles on threefolds fibered over a curve by surfaces with geometric genus zero

*April 2007* Pure Mathematics Seminars at Exeter University (UK) On the continuous part of codimension 2 algebraic cycles on certain threefolds

*March 2007* Workshop on the Homotopy Theory of Schemes, Toronto (Canada) Algebraic cycles on certain threefolds over a field

*June 2006* Great Lake  $K$ -theory meeting and Northwestern University (USA) Zeta-functions in triangulated categories

*December 2005* Steklov Mathematical Institute of the Russian Academy of Sciences, Moscow (Russian Federation) Finite-dimensional motives and algebraic cycles in codimension two

*June - July 2005* Lectures on  $\mathbb{A}^1$ -homotopy theory of schemes at Maths Department, Hiroshima University (Japan)

*July 2005* Hiroshima Algebra-Geometry Symposium, Hiroshima University (Japan) Combinatorial powers of algebraic cycles

*July 2005* Nagoya University (Japan) Combinatorial powers of algebraic cycles

*June 2005* Tokyo University (Japan) Combinatorial powers of algebraic cycles

*16 March 2005* The Institute for Advanced Study (Princeton, USA) Motivic Cohomology (the seminar on the Bloch-Kato Conjecture)

*2004* Motives,  $K$ -theory and Arithmetic Geometry. Summer School and Workshop. Sestri Levante (Genova, Italy) Motives of relative curves

*2003* Algebraic groups seminar, SFB Institute, Bielefeld University (Germany) Nilpotent Algebraic Cycles

*2003* Algebraic/Complex geometry seminar at Max Planck Mathematical Institute (Bonn, Germany) Nilpotent algebraic cycles

*2002* Seminar of Maths. Department, John Hopkins University, Baltimore (USA) Motivic finite dimensionality and Bloch's conjecture

*2001* Algebraic Geometry Conference in memory of Paolo Francia (Genova, Italy) The Chow-motive of the Godeaux surface

### **Recent papers and preprints**

The tangent space to the space of 0-cycles. [ArXiv:1803.02907](#)

Motivic obstruction to rationality of a very general cubic hypersurface in  $\mathbb{P}^5$ . [ArXiv:1605.09434](#)

Étale monodromy and rational equivalence for 1-cycles on cubic hypersurfaces in  $\mathbb{P}^5$ . *Matematicheskii Sbornik*. Volume 211, Issue 2 (2020) 161 - 200 (with K. Banerjee)

Chow motives of abelian type over a base. *European Journal of Mathematics*. Volume 4, Issue 3 (2018) 1065 - 1086

Positive model structures for abstract symmetric spectra. *Applied Categorical Structures*. Volume 26, Issue 1 (2018) 29 - 46 (with S. Gorchinskiy)

$\mathbb{A}^1$ -connectivity on Chow monoids v.s. rational equivalence of algebraic cycles. *European Journal of Mathematics*. Volume 2, Issue 1 (2016) 169 - 195 Spitsbergen Volume

Symmetric powers in abstract homotopy categories. *Advances in Mathematics*. Volume 292 (2016) 707 - 754 (with S. Gorchinskiy)

Algebraic cycles on quadric sections of cubics in  $\mathbb{P}^4$  under the action of symplectomorphisms. *Proc. of the Edinburgh Math. Soc.* 59 (2016) 377 - 392 (with A. Tikhomirov)