

ПРОФЕСИОНАЛНА АВТОБИОГРАФИЯ

Валдемар Василев Цанов

Текущо назначение:

Изследовател, Международен Център по Математически Науки,
Институт по Математика и Информатика на Българската Академия на Науките.

Образование:

- Май 2020: Хабилизация по математика, Ruhr-Universität Bochum, Германия.
Хабилизационен труд: *Homogeneous projective varieties and invariant theory*.
- 2007-2011: Доктор по Математика, Queen's University, Канада.
Дисертация: *Embedding of flag manifolds and cohomological components of modules*.
Ръководител: Иван Димитров.
- 2004-2006: Магистър по математика и математична физика, Софийски Университет.
Дипломна работа: *Геометрия на торичните възли*.
Ръководител: Петко Николов.
- 1999-2004: Бакалавър по Математика, Софийски Университет.
- 2002-2003: Бакалавър (Maîtrise) по математика като студент по Еразъм, Université de Nantes.
Bachelor thesis: *Групи на възли*.
Ръководител: Sylvain Gervais.

Научна и образователна трудова дейност:

- От 1.2023: Институт по Математика и Информатика на Българска Академия на Науките,
Изследовател в Международния Център по Математически Науки.
- 1.2022-12.2022: Jacobs University Bremen,
Научен сътрудник към DFG-Project "Representation categories of infinite-dimensional Lie algebras and superalgebras, and automorphisms of homogeneous ind-spaces".
- 3.2018-12.2021: Ruhr-Universität Bochum,
Научен сътрудник в секция "Групи от Трансформации"
с участие в проект SFB/TR191 "Symplectic structures in geometry algebra and dynamics".
- 4.2016-2.2018: Universität Göttingen,
Научен сътрудник с личен проект DFG-Grant "Projective Geometry, Invariants and Momentum."
- 12.2015-3.2016: Universität Göttingen,
Научен и преподавателски сътрудник.
- 11.2014-11.2015: Universität Göttingen,
Научен сътрудник към DFG Priority Program 1388 "Representation theory".

- 9.2011-10.2014: Ruhr-Universität Bochum,
Научен сътрудник в секция “Групи от Трансформации”
с участие в проект DFG-SFB/TR12 Project “Symmetry and universality of mesoscopic systems”.
- 9.2007-8.2011: Queen’s University, Kingston, Канада,
докторант и преподавателски сътрудник.
- 9.2006-8.2007: Институт по Математика и Информатика на Българска Академия на Науките,
Математик в секция “Геометрия и Топология”.

Гостувания в научни институции:

- 9.2023: Ruhr-Universität Bochum, Германия.
- 9.2013: Center for Theoretical Physics of the Polish Academy of Sciences in Warsaw, Полша.
- 4.2011: Max-Planck Institute of Mathematics in Bonn, Германия.

Ръководство на научен проект:

- 04.2016-02.2018: Грант за изследователска позиция в Университет в Гьотинген по собствен проект DFG-AZ: TS 352/1-1 *Projective Geometry, Invariants and Momentum* към Deutsche Forschungsgemeinschaft.
<https://gepris.dfg.de/gepris/projekt/282475916>.

Участия в научни проекти като научен сътрудник / пост-докторант:

- от 01.2024: Научен сътрудник в Конструктор Университет в Бремен по проекта DFG-AZ/PE 980/9-1 *Universal tensor categories, representations of infinite-dimensional Lie algebras, and infinite-dimensional geometry* към Deutsche Forschungsgemeinschaft.
<https://gepris.dfg.de/gepris/projekt/518961449>.
- от 01.2023: Научен сътрудник в Международния Център по Математически Науки към Института по Математика и Информатика при БАН, София, по научна програма *Enhancing the Research Capacity in Mathematical Sciences* (РИКОМ), No. DO1-67/05.05.2022, финансирана от Министерството на Образованието и Науката, и Simons Foundation.
- 03.2018-12.2020: Научен сътрудник в Рурския Университет в Бохум по проекта DFG-CRC/TRR 191 *Symplectic Structures in Geometry, Algebra and Dynamics* към Deutsche Forschungsgemeinschaft, в под-проект C3 *Momentum polytopes, string polytopes and generalizations*.
<https://www.mi.uni-koeln.de/CRC-TRR191/>.
- 01.2022-12.2022: Научен сътрудник в Якобс Университет в Бремен по проекта DFG-AZ/PE 980/8-1 *Representation categories of infinite-dimensional Lie algebras and superalgebras, and automorphisms of homogeneous ind-spaces* към Deutsche Forschungsgemeinschaft.
<https://gepris.dfg.de/gepris/projekt/448324667>.
- 11.2014-11.2015: Научен сътрудник в Университета в Гьотинген по проекта DFG Priority Program 1388 *Representation Theory* към Deutsche Forschungsgemeinschaft, в под-проект *Asymptotic branching laws for finite dimensional representations of complex reductive Lie groups by geometric methods*.
<https://gepris.dfg.de/gepris/projekt/219517417>.
- 09.2011-10.2014: Научен сътрудник в Рурския Университет в Бохум по проекта DFG-SFB/TR12 *Symmetry and universality of mesoscopic systems* към Deutsche Forschungsgemeinschaft.
<https://gepris.dfg.de/gepris/projekt/5485756?language=en>.

Докторанти:

2020-2021: Johanna Neuhaus, докторантка ръководена съвместно Peter Heinzner в Университета в Бохум.
Дисертация: *Invariant theory for SL_2 -subgroups of classical groups*, Ruhr-Universität Bochum, 2021.

6-9.2016: Tomasz Maciążek, гост-докторант в Университета в Гьотинген от Института по Теоретична физика на Полската Академия на Науките.
Статия: *Quantum marginals from pure doubly excited states*, J. Phys. A: Math. Theor. 50 (2017) 465-504.

Публикации:

Partial convex hulls of coadjoint orbits and degrees of invariants,
V. Tsanov; Proc. XV International workshop “Lie theory and its applications in physics”,
ed. Vl. Dobrev, Springer Proceedings in Mathematics and Statistics, to appear. arXiv:2402.13893, 2024.

Representations of large Mackey Lie algebras and universal tensor categories,
I. Penkov, V. Tsanov; Abh. Math. Semin. Univ. Hamburg, 2024
<https://doi.org/10.1007/s12188-024-00280-6>. arXiv:2309.02522, 2024.

Unstable loci in flag varieties and variation of quotients,
H. Seppänen, V. Tsanov; IMRN **2022**, Issue 8, (2022), 5882–5934. arXiv:1607.04231.

Secant varieties and degrees of invariants,
V. Tsanov; Journal of Geometry and Symmetry in Physics **51** (2019) 73–85. arXiv:1811.12048.

Quantum marginals from pure doubly excited states,
T. Maciążek, V. Tsanov; J. Phys. A: Math. Theor. **50** (2017) 465-504. arXiv:1705.05445.

Geometric invariant theory for principal three-dimensional subgroups acting on flag varieties,
H. Seppänen, V. Tsanov; In: Representation theory - current trends and perspectives,
ed. H. Krause et al, Series of Congress Reports, EMS 2017, pp. 637-663. arXiv:1503.07105.

Homogeneous projective varieties with semi-continuous rank function,
A. Petukhov, V. Tsanov; Manuscripta Math. **147** (2015), 269–303. arXiv:1304.3322.

A link between quantum entanglement, secant varieties and sphericity,
A. Sawicki, V. Tsanov; J. Phys. A: Math. Theor. **46** (2013), 265-301. arXiv:1302.4459.

Embeddings of semisimple complex Lie groups and cohomological components of modules.
V. Tsanov; Journal of Algebra **373** (2013) 1-29. arXiv:1005.4225.

Triangle groups, automorphic forms, and torus knots.
V. Tsanov; L'Enseignement Mathématique (2) 59 (2013), 73-113. arXiv:1011.0461.

Препринти:

On reductive subgroups of reductive groups having invariants in almost all representations,
Y. Staneva, V. Tsanov; arXiv:2110.11066, 2021.

On momentum images of representations and secant varieties,
E. Hristova, T. Maciążek, V. Tsanov; arXiv:1504.01110, 2015.

Участие в записки на лекционни курсове:

Equivariant K-theory of flag varieties, notes for a course by S. Kumar at the Workshop on Symplectic Geometry with Applications to Representation Theory, Jacobs University, Bremen, July 29 - August 3, 2012.

Spherical Varieties, notes for a course by M. Brion at the Summer School “Structures in Lie Representation Theory”, Jacobs University, Bremen, August 9-22, 2009 (written by R. Devyatov, D. Fratila and V. Tsanov). In Progress in Math. 295, *Highlights in Lie Algebraic Methods*, A. Joseph, A. Melnikov, I. Penkov, eds. Birkhäuser, 2012.

Организация на конференции:

- Joint Seminar on Complex Algebraic Geometry and Complex Analysis (Bochum-Essen-Köln-Wuppertal), quarterannual, съорганизатор от окт. 2020 до дек. 2021.
- RUByS 2019. Symmetries in action at the RUB, Bochum, 5-6 юли 2019 (съвместно със Stéphanie Cupit-Foutou).
- 51st Seminar Sophus Lie, Universität Göttingen, 30 юни - 1 юли 2017 (съвместно с Dorothea Bahns и Henrik Seppänen).

Преподавателска дейност и организация на семинари:

Ruhr-Universität Bochum:

- 2021, Лято: Курс лекции “Introduction to the theory of Lie Algebras”.
2019, Зима: Главен асистент за “Ordinary Differential Equations”.
2019, Лято: Курс лекции “Complex Analysis”.
2018, Зима: Асистент за “Linear Algebra and Geometry”.
2018, Лято: Главен асистент за “Mathematics II for Engineers”.

Universität Göttingen:

- 2017, Лято: Семинар Algebraic Geometry.
2016, Зима: Семинар Projective Algebraic Geometry.
2016, Лято: Семинар Geometric Invariant Theorie.
2015, Зима: Главен асистент за “Ordinary Differential Equations”.
Семинар Geometric Invariant Theorie.
2015, Лято: Курс лекции “Lie Algebras and their Representations”;
Семинар Toric Varieties.
2014, Зима: Семинар Toric Varieties.

Ruhr-Universität Bochum:

- 2014, Лято: Главен асистент за “Mathematics II for Engineers”;
Семинар Complex Geometry.
2014, Зима: Главен асистент за “Mathematics I for Engineers”;
Семинар Representation Theory;
Семинар Complex Geometry.
2013, Лято: Асистент за “Transformation Groups”;
Асистент за “Mathematics II for Engineers”;
Семинар Harmonic Analysis.
2012, Зима: Асистент за “Mathematics I for Engineers”.
2012, Лято: Асистент за “Complex Analysis”.

Queen's University:

- 2011, Лято: Асистент за “Real Analysis” and “Differential Equations”.
2010, Зима: Асистент за a graduate course in “Algebra”;
Асистент за a graduate course in “Combinatorics”;
Семинар Complex Geometry.
2009-2010: Курс лекции “Differential Equations for Electrical and Computer Engineers”.
2007-2009: Асистент за “Calculus” and “Linear Algebra”.

Софийски Университет:

- 2004-2007: Асистент на курсове по Анализ и Дифференциални Уравнения;
Семинар по Теория на Възлите.

Доклады на конференции и семинари:

- 60th Seminar Sophus Lie, University of Paderborn, 16-19.9.2024.
Title: Nonconvexity of momentum images.
- XXIV International conference “Geometry, Integrability and Quantization”, Varna, 6-13.6.2024.
Title: A numerical criterion for non-emptiness of Kempf-Ness sets.
- II. Annual meeting of COST action CaLISTA, Sofia, 27-31.5.2024.
Title: Linear embeddings between flag varieties.
- ICMS Seminar, IMI, BAS, Sofia, 14,16,21,23.11.2023.
Minicourse: Invariant theory, homogeneous projective varieties, and momentum maps.
- Seminar on Complex Geometry, Ruhr-Universität Bochum, 12,20,27.9.2023.
Title: Mackey Lie algebras and universal tensor categories.
Title: On partial convex hulls of coadjoint orbits.
Title: On nonconvexity of momentum map images.
- Conference “Mathematics day in Sofia”, Sofia, 10-14.7.2023.
Title: On partial convex hulls of coadjoint orbits of compact groups.
- XV. international workshop “Lie theory and its applications in physics”, Varna, 19-25.6.2023.
Title: On the nonconvexity of momentum map images.
- A scientific session on the occasion of the 75-th birthday of Petko Nikolov, INRNE, Sofia, 22.5.2023.
Title: Mackey Lie algebras and tensor representations.
- Conference “Quantum toric geometry, generalized geometries and O-minimality”, University of Miami, 1-5.5.2023.
Title: On some fans and toric varieties related to branching laws for reductive groups.
- Student mathematics club “Polygon” at the American University of Blagoevgrad, 19.4.2023.
Title: What shapes can soap bubbles spanned on a knotted ring have? (expository)
- Joint seminar on Analysis, Geometry and Topology and ICMS seminar, IMI, BAS, 21.2.2023.
Title: Variations of GIT-quotients of flag varieties.
- Algebra and Logic Seminar, IMI, BAS, 17.2.2023.
Title: Invariant theory for reductive subgroups of reductive groups.
- Conference “Lie theory in Prato: frontiers, algorithms and applications”, University of Trento and Monash University at Prato, Italy, 10-13.1.2023.
Title: Constructive and algorithmic aspects of Hesselink-type stratifications.
- Seminario di Algebra e Geometria, Sapienza Università di Roma, 2.3.2022.
Title: Weyl chambers and Geometric Invariant Theory.
- Oberseminar "Komplexe Geometrie Ruhr-Universität Bochum, 25.8.2020.
Title: Cycles in the Kempf-Ness set.
- Project workshop on “Symplectic structures in algebra, geometry and dynamics”, Rauischholzhausen, 16-20.9.2019.
Title: Nonconvexity of momentum images and projective geometry.
- Conference “Perspectives on representations of semi-simple Lie algebras”, Ruhr-Universität Bochum, 22-24.5.2019.
Title: Geometric Invariant Theory on Flag Varieties.
- Seminar on Quantum Information Theory, University of Tbilisi, 7.3.2019.
Title: Some applications of representation theory and projective geometry in the theory of quantum information.
- Joint Seminar on Complex Algebraic Geometry and Complex Analysis (Bochum - Essen - Köln - Wuppertal), Essen, 18.1.2019.
Title: On the degrees of generating invariants.
- Emmy-Noether-Seminar, Universität Erlangen, 25.5.2018.
Title: VGIT on flag varieties.
- Yearly Meeting of the German Math. Society, Paderborn, 5-9 March, 2018.
Title: Geometric Invariant Theory on Homogeneous Varieties.
- Lie Theory Seminar, Jacobs University Bremen, 7.2.2018.
Title: On the structure of the Littlewood-Richardson cone.
- X. International Symposium Quantum Theory and Symmetries, Varna 19-25 Juni, 2017.

- Title: Group actions on flag varieties: invariants and geometry.*
- 50th Seminar Sophus Lie, Będlewo, 25 Sep - 1 Okt, 2016.
- Title: Geometric Invariant Theory on flag varieties.*
- Seminar on Representation Theory and Algebraic Geometry, Università di Bologna, 23 Feb, 2016.
- Title: Geometric Invariant Theory on flag varieties.*
- Conference “Lie groups and algebraic groups”, Universität Bielefeld, 22-24 Jul, 2015.
- Title: Momentum images of representations, secant varieties and invariants.*
- Seminar on Representation Theorie, Universität Bonn, 20-21 Nov, 2014.
- Title: Momentum image of representation spaces and projective geometry of flag varieties.*
- Journées $SL(2, \mathbb{R})$, Reims, 20-21 Nov, 2014.
- Title: Geometric branching laws.*
- 47th Seminar Sophus Lie, Schloß Rauischholzhausen, 29-31 May, 2014.
- Title: Cohomological components of modules.*
- Conference of DFG Priority Programm 1388 “Representation Theory”, Soltau, 24-27 March, 2014.
- Title: Homogeneous projective varieties with tame secant varieties.*
- Colloquium, Universität Göttingen, 23 Jan, 2014.
- Title: Branching laws and the Borel-Weil-Bott theorem.*
- Colloquium, Universität Göttingen, 3 Jul, 2013.
- Title: Rank.*
- ARTY Workshop, Universität Erlangen-Nürnberg, 23-25 May, 2013.
- Title of Talk: Branching laws, flag varieties and Lie algebra cohomology.*
- Title of Poster: Homogeneous projective varieties with tame secant varieties; with A. Petukhov.*
- Workshop on Symplectic Geometry with Applications to Representation Theory, Jacobs University, Bremen, 29 Jul - 3 Aug, 2012.
- Title: Cohomological branching laws.*
- Algebra and Lie Theory Seminar, Jacobs University, Bremen, 3 Nov, 2011.
- Title: On cohomological components.*
- Oberseminar, Max-Planck-Institut, Bonn, 21 Apr, 2011.
- Title: Behaviour of the Borel-Weil-Bott construction under pullbacks.*
- Prof. Manin’s Seminar on Algebra Geometry and Physics, Max-Planck-Institut, Bonn, 19 Apr 2011.
- Title: Automorphic cusp forms and cuspidal singularities.*
- Algebra and Lie Theory Seminar, Jacobs University, Bremen, 25 March, 2011.
- Title: Behaviour of the Borel-Weil-Bott construction under pullbacks.*
- Algebraic Geometry Seminar, Queen’s University, 7 March, 2011.
- Title: Automorphic cusp forms and cuspidal singularities.*
- Algebraic Geometry Seminar, Université de Québec à Montréal, 26 Jan, 2011.
- Title: Cusp forms for triangle groups and singular plane curves.*
- Algebra Seminar, Stony Brook University, 1 Dec, 2010.
- Title: Behavior of the Borel-Weil-Bott construction under pullbacks.*
- Workshop on Arithmetic and Geometric of Algebraic Varieties, The Fields Institute, 6-7 Nov 2010.
- Title: Triangle groups, cusp forms, and torus knots.*
- Lie Theory Seminar, University of Ottawa, 7 Oct, 2010.
- Title: Behavior of the Borel-Weil-Bott construction under pullbacks.*
- Canadian Young Researchers Conference, University of Alberta, 18-20 May, 2010.
- Title: Embeddings of flag varieties and pullback maps.*
- Workshop on Algebraic Varieties, The Fields Institute, 31 Oct - 1 Nov, 2009.
- Title: Equivariant pullbacks in cohomology of flag varieties.*
- 19-th annual “Route 81” Conference in Algebraic Geometry and Commutative Algebra, Syracuse University, 17 Oct, 2009.
- Title: Embeddings of flag varieties and cohomological components in representations of Lie algebras.*
- The Curves Seminar at Queen’s University. Dec-Jan 2008/2009.
- Series of expository talks: Dimensions and ideals of secant varieties to Segre and Veronese varieties.*
- Algebraic Geometry Seminar at Queen’s University, Feb 2008.

Title: Curve singularities, torus knots, and triangular groups.

- Acad. Todorov's Seminar on Quantum Field Theory, Bulgarian Academy of Sciences, Sofia, Oct 2006.

Title: Geometry of 3-manifolds and knots.

Чужди езици: английски, френски, немски, руски.

София, Септември 2024.