

Karine Kuyumzhiyan

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Higher School of Economics,

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Personal

Born on February 10, 1986 in Rostov-on Don, Russia

Citizenship: Russia

Research interests

Affine Algebraic Geometry, Actions of Automorphism Groups, Torus Actions, Algebraic Groups, Infinite-Transitive Actions, Invariant Theory, Representation Theory

Education

School No 8, Rostov-on-Don, 2000 – 2003

Moscow State University, Faculty of Mechanics and Mathematics, Chair of Higher Algebra, Diploma in Mathematics (cum laude), 2003 – 2008

Scientific supervisor I. V. Arzhantsev

The diploma work is devoted to the question of finding all finite-dimensional simple modules of a classic algebraic group G in which all closures of maximal torus orbits are normal.

Université Joseph Fourier, Grenoble, Docteur en Mathématiques (PhD), 2008-2011

Thesis: Actions of Algebraic Groups on Affine Varieties and Normality of Orbits Closures

The thesis is devoted to two questions. First, we classify all finite-dimensional simple modules of a simple algebraic group G in which all closures of maximal torus orbits are normal. Second, we construct varieties with infinite transitive action of their automorphism group.

Scientific advisors: I. V. Arzhantsev, M. Zaidenberg

Referees: F. Kutzschebauch, N. Ressayre

Moscow State University, PhD, 2008-2011

Thesis: Normality of Closures of Maximal Torus Orbits

In the thesis, we classify all finite-dimensional simple modules of a simple algebraic group G in which all closures of maximal torus orbits are normal.

Scientific advisor: I. V. Arzhantsev

Referees: D. N. Akhiezer, V. N. Zhgoon

Thesis defended in the Institute for Information Transmission Problems in January, 2013

Current affiliations

National Research University Higher School of Economics, Laboratory of Algebraic Geometry and its Applications, Moscow, researcher & adjoint professor

Poncelet Laboratory (UMI 2615 of CNRS), Moscow, postdoc

Publications

Papers

- K. Kuyumzhiyan, Simple $SL(n)$ -modules with normal closures of maximal torus orbits. *Journal of Algebraic Combinatorics*, 30, 4 (2009), 515–538
- K. Kuyumzhiyan, F. Mangolte, Very transitive actions on real affine suspensions. arXiv:1012.1961, *Journal of Pure and Applied Algebra* 216 (2012), 2106–2112
- I. V. Arzhantsev, K. Kuyumzhiyan, M. Zaidenberg, Flag varieties, toric varieties, and suspensions: three instances of infinite transitivity. arXiv:1003.3164, *Sbornik:Mathematics*, 203:7 (2012), 923–949
- I. Bogdanov, K. Kuyumzhiyan, Simple modules of exceptional linear groups with normal closures of maximal torus orbits. arXiv:1105.4577, *Mathematical Notes* September 2012, 92 (3–4), 445–457
- K. G. Kuyumzhiyan, Simple modules of classical linear groups with normal closures of maximal torus orbits, *Siberian Mathematical Journal*, 2012, 53 (6), 1089–1104, 2012
- F. Bogomolov, I. Karzhemanov, K. Kuyumzhiyan, Unirationality and existence of infinitely transitive models. arXiv:1204.0862, in: *Birational geometry, rational curves, and arithmetic*. Boston : Birkhauser, 2013. No. 4. P. 77–92

Awards, prizes, and grants

- First diploma at All-Russian Math. Olympiad (Orel), 2003
- The grant of "Dynasty" foundation for graduate students and young scientists with only an undergraduate degree, 2010
- RFBR grant 12-01-31342 "Infinitely transitive actions of automorphism groups and locally nilpotent derivations", 2012–2013
- Simons-IUM fellowship, 2013

Teaching

- Spring 2009, September–October 2009, September 2010, Fall 2011, Fall 2013 – tutoring in Algebra, Independent University of Moscow
- Spring 2010 – tutorat L3, Integral Calculus, Université Joseph Fourier
- Spring 2010 – tutorat L3, Geometry, Université Joseph Fourier
- Fall 2010 – tutorat L3, Topology, Université Joseph Fourier
- Spring 2013 – Lie groups and Lie algebras, Independent University of Moscow
- Spring 2013 – Probability theory and mathematical statistics, Management Department, HSE
- Fall 2013 – Calculus II, HSE-NES
- Fall 2013 & Spring 2014 – Discrete Mathematics, Philology department, HSE
- Fall 2014 & Spring 2015 – Algebra I, Faculty of Mathematics, HSE
- Fall 2014 & Spring 2015 – Calculus II, Faculty of Mathematics, HSE
- Fall 2014 – Commutative Algebra, Faculty of Mathematics, HSE
- Fall 2014 – Lie Groups and Lie Algebras, Faculty of Mathematics, HSE

Conferences, Workshops, Talks

International Conference "Transformation Groups" dedicated to the 70-th anniversary of Ernest B. Vinberg, Moscow, Russia, December 2007

Poster: "Simple $SL(n)$ -modules with normal closures of maximal torus orbits"

International algebraic conference on the occasion of 100th anniversary of Professor A.G. Kurosh, Moscow, Russia, May-June 2008

Talk: "Simple $SL(n)$ -Modules with Normal Closures of Maximal Torus Orbits"

Summer school-conference "Lie Algebras, Algebraic Groups and Invariant Theory", Samara, Russia, June 2009

Talk: "Simple Modules of Classical Groups with Normal Closures of Maximal Torus Orbits"

Autumn school "Algebraic torus actions", Lukecin, Poland, September 2009

Talk: "Simple Modules of Classical Groups with Normal Closures of Maximal Torus Orbits"

Université de Savoie, France, March 2010

Talk: "The property of m -transitivity and affine suspensions".

Workshop "Automorphisms of Affine Spaces", Dijon, France, March 2010

Talk: "Infinite-transitivity for cones over flag varieties"

Workshop "Automorphisms of Affine Spaces", Lyon, France, October 2010

Talk: "Flag varieties, toric varieties and suspensions: three instances of infinite transitivity"

Moscow State University, seminar "Lie Groups and Invariant Theory", October 2010

Talk: "Infinite transitivity of the action of automorphism group of affine algebraic varieties"

Université d'Angers, France, December 2010

Talk: "La propriété de m -transitivité des suspensions affines"

School-conference "Lie Algebras, Algebraic Groups and Invariant Theory", Moscow, January-February 2011

Talk: "Affine suspensions and infinite transitivity"

Workshop "Real and complex affine algebraic geometry", Angers, France, March 2011

Talk: "Infinitely transitive actions on real affine suspensions"

Workshop "Journées de Géométrie Algébrique Affine", Grenoble, France, May 2011

Talk-thesis defence: "Actions des groupes algébriques sur les variétés affines et normalité d'adhérences d'orbites"

Universität Tübingen, Germany, July 2011

Talk: "Infinite transitivity and flexibility for affine toric varieties"

The international conference on algebra and geometry, Ekaterinburg, August 2011

Talk: "Infinite transitivity of automorphisms groups actions on varieties"

Higher School of Economics, Bogomolov laboratory, Moscow, October 2011

Talk: "Varieties with infinite-transitive action of the group of special automorphisms"

Christmas meetings with Pierre Deligne, Moscow, January 2012

Talk: "Varieties with infinitely transitive action of the group of Special Automorphisms"

Swiss-French workshop on algebraic geometry, Enney, Switzerland, February 2012

Talk: "Varieties with infinitely transitive action of the group of Special Automorphisms"

"Algebra and Geometry", International Conference dedicated to the 65-th anniversary of Askold G. Khovanskii, HSE & IUM, Moscow, Russia, June 2012

Talk: "Simple G -modules with normal closures of maximal torus orbits"

School-conference "Lie Algebras, Algebraic Groups and Invariant Theory", Tolyatti, Russia, June 2012

Talk: "Normality of torus orbits closures in irreducible representations of simple algebraic groups"

MSJ-SI 2012 Schubert calculus, school & conference, Osaka, Japan, July 2012

Poster: "Simple G -modules with normal closures of maximal torus orbits"

LAREMA, Angers, France, October 2012,

Talk: "Unirationalité et existence de modèles birationnels infiniment transitifs"

Conference "Birational and Affine Geometry", CIRM, Italy, October 29 - November 3, 2012,

Poster: "Unirationality and existence of infinitely transitive models"

Christmas meetings with Pierre Deligne, Moscow, January 2013

Talk: "Unirationality and existence of infinitely transitive birational models"

School-conference "Combinatorial Algebraic Geometry", Levico Terme (Italy), June 9-15, 2013,

Talk: "Normality of maximal torus orbits closures in simple modules of algebraic groups"

Second International Conference "Mathematics in Armenia: Advances and Perspectives", Tsaghkadzor, Armenia, August 25-31, 2013,

Talk: "Normality of maximal torus orbits closures in simple modules of algebraic groups "

The International Conference/Short-School on Affine Algebraic Geometry and the Jacobian Conjecture, Nankai University, Tianjin, China, July 14-25, 2014,

Talk: "Infinite transitivity of Special Automorphism Group action and stabilizations"

Other activities

2012 - 9th grade supervisor at LXXVth Moscow Mathematical Olympiad (together with Elena Bunkova)

Languages

Russian – native, French – fluent, English – fluent, Armenian – with dictionary