
CONTACT	Vítězslav Kala	vitezslav.kala@matfyz.cuni.cz
INFO	Charles University Faculty of Mathematics and Physics Sokolovská 83 18675 Praha Czech Republic	www.karlin.mff.cuni.cz/~kala/web/
PERSONAL	Born August 8, 1985. Married, 2 daughters. Nationality Czech Republic.	
RESEARCH INTERESTS	Broadly interested in number theory (algebraic and analytic), algebra, and logic. Specifically: <ul style="list-style-type: none"> • Universal quadratic forms, arithmetic of number fields, distribution of class numbers, generalized continued fractions • Langlands program, applications of model theory, simple semifields 	
WORK	Charles University , Prague, Czech Republic	
	Faculty of Mathematics and Physics, Department of Algebra	
	Associate Professor (tenured)	01/2022 – present
	• Habilitation ‘ <i>docent</i> ’ awarded 10/2021	
	Assistant Professor	01/2017 – 12/2021
	Postdoc	09/2015 – 06/2016
	University of Göttingen , Germany	
	Postdoc	01/2015 – 08/2017
	• Mentor: Valentin Blomer	
	• Partly supported by V.B.’s ERC Starting Grant	
	Max Planck Institute for Mathematics , Bonn, Germany	
	Postdoc	09/2014 – 12/2014
EDUCATION	Purdue University , West Lafayette, Indiana, USA	
	Ph.D., Mathematics	2009 – 2014
	• Advisor: Freydoon Shahidi	
	• Thesis: <i>Density of self-dual automorphic representations of $GL_n(\mathbb{A}_{\mathbb{Q}})$</i>	
	Charles University , Prague, Czech Republic	
	Ph.D., Mathematics (in absentia)	2009 – 2013
	• Advisor: Tomáš Kepka	
	• Thesis: <i>Algebraic substructures in \mathbb{C}^m</i>	
	Mgr. (Master’s), Mathematics	2007 – 2009
	Bc. (Bachelor’s), Mathematics	2004 – 2007

GRANTS,
AWARDS

Czech Science Foundation GAČR **2021 – 2025**

- PI of *UFOCLAN: Universal quadratic forms and class numbers* grant
- Highly selective Junior Star project (success rate 9%)
- 10 postdocs supported, total budget 900 000 EUR

Primus Research Programme **2020 – 2022**

- PI of research grant *Universal quadratic forms: geometry and analysis*
- 4 postdocs supported

Czech Science Foundation GAČR **2017 – 2019**

- PI of Junior Grant *Quadratic forms and numeration systems over number fields*
- 3 postdocs supported
- Outcomes of the grant evaluated by the grant agency as excellent
- Nominated for GAČR President's award in physical sciences (the best project in mathematics; among top 3 out of approx. 100 projects overall)

Neuron Impulse **2018 – 2019**

- PI of grant *Semifields in number theory and geometry*

Bolzano Award **2019**

- Annual award of the Bernard Bolzano Endowment Fund for the best research in mathematics, for *Universal quadratic forms and families of number fields*

International Fulbright Science and Technology Award **2009 – 2012**

- For international PhD students at prestigious universities in the USA
- Only 40 students worldwide selected each year

Mathematical Competitions

- 1st Prize – International Mathematical Competition 2006, 2008
- 1st Place – Vojtěch Jarník International Mathematical Competition 2009
- Bronze Medal – International Mathematical Olympiad 2004

ARTICLES

Nine of my best papers are highlighted in bold.

- [43] V. Kala, S. H. Man, ***Sails for universal quadratic forms***, 21 pp.
- [42] N. Daans, V. Kala, J. Krásenský, P. Yatsyna, *Failures of integral Springer's Theorem*, 8 pp.
- [41] V. Kala, P. Yatsyna, ***Even better sums of squares over quintic and cyclotomic fields***, 19 pp., submitted
- [40] V. Kala, P. Yatsyna, B. Žmija, ***Real quadratic fields with a universal form of given rank have density zero***, 18 pp., submitted
- [39] N. Daans, V. Kala, S. H. Man, ***Universal quadratic forms and Northcott property of infinite number fields***, 18 pp., submitted
- [38] H. Rada, Š. Starosta, V. Kala, *Periodicity of general multidimensional continued fractions using repetend matrix form*, 28 pp., submitted
- [37] V. Kala, E. Sgallová, M. Tinková, *Arithmetic of cubic number fields: Jacobi–Perron, Pythagoras, and indecomposables*, 40 pp. (+21 pp. of appendices), submitted
- [36] V. Kala, L. Šíma, *On minimal semiring generating sets of finitely generated commutative parasemifields*, Algebra Universalis (to appear), 19 pp.
- [35] V. Kala, M. Melistas, *Universal quadratic forms and Dedekind zeta functions*, Int. J. Number Theory (to appear), 12 pp.
- [34] V. Kala, M. Zindulka, *Partitions into powers of an algebraic number*, Ramanujan J. (to appear), 15 pp.
- [33] V. Kala, T. Kepka, M. Korbelař, *Congruence-simple matrix semirings*, Internat. J. Algebra Comput. (to appear), 18 pp.
- [32] V. Kala, P. Miska, *On continued fraction partial quotients of square roots of primes*, J. Number Theory 253 (2023), 215 – 234

- [31] G. Cherubini, A. Fazzari, A. Granville, V. Kala, P. Yatsyna, *Consecutive real quadratic fields with large class numbers*, Int. Math. Res. Not. IMRN (2023), 12052 – 12063
- [30] V. Kala, *Universal quadratic forms and indecomposables in number fields: A survey*, Commun. Math. 31 (2023), Special issue: Euclidean lattices: theory and applications, 81 – 114
- [29] V. Kala, P. Yatsyna, *On Kitaoka’s conjecture and lifting problem for universal quadratic forms*, Bull. Lond. Math. Soc. 55 (2023), 854 – 864
- [28] V. Kala, *Number fields without universal quadratic forms of small rank exist in most degrees*, Math. Proc. Cambridge Philos. Soc. 174 (2023), 225 – 231
- [27] V. Kala, M. Tinková, *Universal quadratic forms, small norms and traces in families of number fields*, Int. Math. Res. Not. IMRN (2023), 7541 – 7577
- [26] T. Hejda, V. Kala, *Ternary quadratic forms representing a given arithmetic progression*, J. Number Theory 234 (2022), 140 – 152
- [25] V. Kala, P. Yatsyna, *Lifting problem for universal quadratic forms*, Adv. Math. 377 (2021), 107497, 24 pp.
- [24] V. Kala, P. Yatsyna, *Sums of squares in S -integers*, New York J. Math. 26 (2020), 1145 – 1154
- [23] T. Hejda, V. Kala, *Additive structure of totally positive quadratic integers*, Manuscripta Math. 163 (2020), 263 – 278
- [22] V. Kala, J. Svoboda, *Universal quadratic forms over multiquadratic fields*, Ramanujan J. 48 (2019), 151 – 157
- [21] V. Kala, T. Vávra, *Periodic representations in algebraic bases*, Monatsh. Math. 188 (2019), 109 – 119
- [20] V. Kala, M. Korbelař, *Idempotence of finitely generated commutative semifields*, Forum Math. 30 (2018), 1461 – 1474
- [19] A. Dahl, V. Kala, *Distribution of class numbers in continued fraction families of real quadratic fields*, Proc. Edinb. Math. Soc. 61 (2018), 1193 – 1212
- [18] V. Blomer, V. Kala, *On the rank of universal quadratic forms over real quadratic fields*, Doc. Math. 23 (2018), 15 – 34
- [17] P. Glivický, V. Kala, *Fermat’s Last Theorem and Catalan Conjecture in weak exponential arithmetics*, Math. Log. Quart. 63 (2017), 162 – 174
- [16] V. Kala, *Semifields and a theorem of Abhyankar*, Comment. Math. Univ. Carolin. 58 (2017), 267 – 273
- [15] V. Kala, *Lattice-ordered abelian groups finitely generated as semirings*, J. Commut. Algebra 9 (2017), 387 – 412
- [14] V. Kala, *Norms of indecomposable integers in real quadratic fields*, J. Number Theory 166 (2016), 193 – 207
- [13] V. Kala, *Universal quadratic forms and elements of small norm in real quadratic fields*, Bull. Aust. Math. Soc. 94 (2016), 7 – 14
- [12] V. Blomer, V. Kala, *Number fields without universal n -ary quadratic forms*, Math. Proc. Cambridge Philos. Soc. 159 (2015), 239 – 252
- [11] J. Berg, A. Castillo, R. Grizzard, V. Kala, R. Moy, C. Wang, *Congruences for Ramanujan’s f and ω functions via generalized Borcherds products*, Ramanujan J. 35 (2014), 327 – 338
- [10] J. Jeřek, V. Kala, T. Kepka, *Finitely generated algebraic structures with various divisibility conditions*, Forum Math. 24 (2012), 379 – 397
- [9] V. Kala, M. Korbelař, *Congruence simple subsemirings of \mathbb{Q}_+* , Semigroup Forum 81 (2010), 286 – 296
- [8] A. Drápal, C. Hämmäläinen, V. Kala, *Latin bitrades, dissections of equilateral triangles, and abelian groups*, J. Comb. Des. 18 (2010), 1 – 24

- [7] V. Kala, T. Kepka, P. Němec, *Norms on semirings I*, Acta Univ. Carolin., Math. Et Phys. 51 (2010), 29 – 48
- [6] V. Kala, T. Kepka, *Commutative parasemifields finitely generated as semirings*, Acta Univ. Carolin., Math. Et Phys. 51 (2010), 49 – 56
- [5] V. Kala, T. Kepka, M. Korbelař, *Notes on commutative parasemifields*, Comment. Math. Univ. Carolin. 50 (2009), 521 – 533
- [4] V. Kala, A. D. Keedwell, *Addendum to The existence of Buchsteiner and conjugacy-closed quasigroups*, Europ. J. Combin. 30 (2009), 1386
- [3] V. Kala, T. Kepka, M. Korbelař, J. D. Phillips, *Various subsemirings of the field \mathbb{Q} of the rational numbers*, Acta Univ. Carolin., Math. Et Phys. 50 (2009), 29 – 59
- [2] V. Kala, T. Kepka, *A note on finitely generated ideal-simple commutative semirings*, Comment. Math. Univ. Carolin. 49 (2008), 1 – 9
- [1] V. Flařka, A. Jančařík, V. Kala, T. Kepka, *Trees in commutative nil-semigroups of index two*, Acta Univ. Carolin., Math. Et Phys. 48 (2007), 81 – 101

TEACHING

Charles University, Czech Republic

♠: *Dean's teaching award for all my courses in a given academic year (total 2 times)*

♡: *Dean's teaching award for an individual course (total 4 times)*

2nd year Bachelor's lectures

- Algebra, Spring 2021, 2024
- Number theory, Spring 2009, 2018, 2019, 2020 ♡, 2022 ♠, 2023 ♠

3rd year Bachelor's lectures

- Introduction to commutative algebra, Fall 2017 ♡, 2018, 2019 ♡, 2022 ♠
- Introduction to group theory, Fall 2021 ♠

Master's lectures

- Algebraic number theory, Spring 2018, 2019, 2021
- Quadratic forms and class fields, Fall 2015, 2018 ♡, Spring 2011, 2016, 2019
- Modular forms and L-functions, Fall 2017, 2019, Spring 2018

8 recitation classes (on number theory and algebra), 2006 – 2009

University of Göttingen, Germany

- Analytic Number Theory I (assistant), Winter 2016

Purdue University, USA

- Introductory Analysis I (business calculus course), Spring 2013, 2014

SERVICE

- Chair of the evaluation panel *Mathematics and Computer Science*, Czech Science Foundation, 2023 – 2025 (previously vice chair 2021 – 2023)
- Member of the *Committee of programs for the support of science at Charles University* (evaluating grant proposals), from 2023
- Member of the *Cooperatio* advisory board for mathematics, Charles University, from 2022
- Member of the *Academic Senate* of the Faculty of Mathematics and Physics, Charles University, 2020 – 2023
- Editorial board member of *Comment. Math. Univ. Carolin.*, from 2021
- Founder and Organizer of the *Number Theory Seminar* (from 2015), *Algebra Colloquium* (2021 – 2022), and *Colloquium of the School of Mathematics* (from 2023) at Charles University
- Referee of > 30 articles, e.g., for *Adv. Math.*, *Bull. Lond. Math. Soc.*, *Comment. Math. Helvet.*, *Intern. Math. Res. Not. IMRN*, *Math. Z.*, *Trans. Amer. Math. Soc.*
- External Ph.D. thesis referee for *University of Salerno* (Italy) and *Harish-Chandra Research Institute* (India)

- External grant reviewer for *National Science Centre Poland*
- Reviewer for *Mathematical Reviews*
- Editorial board member of *Pokroky matematiky, fyziky a astronomie* (Advances in mathematics, physics, and astronomy), Czech popularization journal, from 2019
- *Graduate Representative* in the Department of Mathematics at Purdue University, 2012 – 2013
- Founder and Organizer of the *Student Colloquium* in the Department of Mathematics at Purdue University, 2011 – 2012
- Vice president and Mentor of the *Purdue Fulbright Association*, 2011, 2012
- Organizer of math competitions (correspondence seminars) and camps for middle- and high-school students, 2001 – 2009

POSTDOCS

- Stevan Gajović, 03/2023 – 12/2025
- Siu Hang Man, 09/2022 – 08/2025
- Dayoon Park, 03/2024 – 12/2025
- Matteo Bordignon, 01/2022 – 01/2023
next job: postdoc at KTH Stockholm
- Giacomo Cherubini, 09/2020 – 10/2022
next job: permanent position at Sapienza University of Rome
- Nicolas Daans, 01/2023 – 12/2023
next job: continues as postdoc in Prague, funded by other projects
- Alessandro Fazzari, 09/2021 – 12/2021
next job: postdoc at American Institute of Mathematics
- Daniel Gil Muñoz, 08/2021 – 06/2023
next job: postdoc at University of Barcelona
- Tomáš Hejda, 01/2017 – 12/2019
next job: work for Overleaf
- Mentzelos Melistas, 01/2023 – 08/2023
next job: tenure track lecturer at University of Twente
- Eric Stucky, 08/2021 – 08/2022
next job: adjunct faculty member at Champlain College
- Tomáš Vávra, 01/2017 – 12/2019, 05/2020 – 08/2020
next job: postdoc at University of Waterloo
- Pavlo Yatsyna, 01/2020 – 08/2022
next job: postdoc at Aalto University
- Ezra Waxman, 08/2018 – 07/2019
next job: postdoc at Dresden University with Minerva Fellowship
- Błażej Żmija, 10/2021 – 06/2023
next job: postdoc at Polish Academy of Sciences

STUDENTS

Ph.D.

- Om Prakash, *Representations of algebraic integers by higher degree forms* (from 2023)
- Ester Sgallová, *n-universal quadratic forms over number fields* (from 2021)
- Mikuláš Zindulka, *Arithmetics of number fields: partitions, norms, and quadratic forms* (from 2021)
- Jakub Krásenský, *Universal quadratic forms over orders in number fields* (2018 – 2023)
Elected member of European Mathematical Young Academy
next job: tenure-track faculty at Czech Technical University, Prague
- Magdaléna Tinková, *Arithmetics of number fields and generalized continued fractions* (2017 – 2021)
Josef Hlávka Award
next jobs: tenure-track faculty at Czech Technical University, Prague; and

Master's

- Matěj Doležálek (from 2023)
- Simona Hlavinková (from 2024)
- Veronika Jarrahová (from 2024)
- Martin Raška (from 2021)
- Martin Kuděj, *Semilattices and indecomposable elements* (2024)
- Bára Tížková, *Adeles and class fields* (2023)
- Sára Vyhnalová, *Ideal lattices in cryptography* (co-advised by P. Yatsyna, 2021)
- Kristína Mišlanová, *Quaternion algebras and units* (2021)
- Lucien Šíma, *Finitely generated semirings and semifields* (2021)
- Ester Sgallová, *Periodicity of Jacobi-Perron algorithm* (co-advised by M. Tinková, 2021)
 - 2nd place in SVOČ research competition
- Pavel Surý, *Local-global principle for quadratic forms* (2020)
- Martin Čech, *Pretentious approaches in analytic number theory* (2018)
- Kristýna Zemková, *Composition of quadratic forms over number fields* (2018)
 - Dean's prize for best thesis; 3rd place in SVOČ research competition
- Dominik Lachman, *Bruhat-Tits buildings* (2017)
 - Dean's prize for best thesis; 1st place in SVOČ research competition
- Jakub Hlavnička, *Products of primes in arithmetic sequences and prime number theorem*, Czech Technical University, Master's project (2015) and thesis (2016)
- Maroš Hrnčiar, *Solving diophantine equations by factorization in number fields* (2015)

Bachelor's

- Natália Bátorová, *Arithmetic-geometric mean sequences and elliptic curves over finite fields* (co-advised by S. Gajović, from 2023)
- Jan Kotyk, *Congruent numbers, elliptic curves, and L-functions* (co-advised by S. Gajović, from 2023)
- Žaneta Lipertová, *Non-unique factorization in number fields* (from 2023)
- Emma Pěchoučková, *Conway's topograph* (from 2023)
- Anna Růžičková, *Two-dimensional integer trigonometry* (co-advised by M. Raška, from 2023)
- Tomáš Sklenář, *Proving combinatorial identities via formal power series* (co-advised by S. H. Man, from 2022)
- František Couf, *Fourier transform on polytopes and tiling with rectangles* (co-advised by M. Zindulka, 2023)
- Simona Hlavinková, *The structure of generalized Pythagorean triples* (2023)
- Veronika Jarrahová, *Cyclotomic extensions and the Kronecker–Weber theorem* (2023)
- Filip Kucka, *RSA in number fields and on lattices* (2023)
- David Stern, *Partitions of totally positive elements in real quadratic fields* (co-advised by M. Zindulka, 2023)
- Matěj Doležálek, *Subfields of number field extensions and quadratic forms* (2022)
 - 3rd place in SVOČ research competition
- Daniela Lněničková, *Geometric solution of quadratic diophantine equations* (2022)
- Martin Raška, *Sums of squares in number fields* (2021)
 - Dean's prize for best thesis; Honor. mention in SVOČ research compet.
- Bára Tížková, *Universal quadratic forms and estimates of traces of algebraic integers* (2021)
- Ondrej Bínovský, *Imaginary quadratic fields with class number 1* (2021)
- Matěj Doležálek, *Quaternions and universal quadratic forms over number fields* (2021, unofficial research project)
 - Award of The Learned Society of the Czech Republic
 - 1st place in SVOČ research competition

- Alexandr Beneš, *Counting extensions of imaginary quadratic fields* (2020)
Dean's prize for best thesis
- Veronika Hájková, *Pythagoras numbers of orders in number fields* (2020)
- Martin Kuděj, *Continued fractions with prescribed period* (2020)
- Kateřina Bžatková, *Visibly irreducible polynomials* (2019)
- Kristína Mišlanová, *Matrix of Legendre symbols* (2019)
- Sára Vyhňalová, *Solovay-Strassen primality test* (2019)
- Anh Dung Le, *Bernoulli numbers and ideal class groups* (2017)
- Martin Čech, *Algebraic proofs of Dirichlet's theorem on arithmetic progressions* (2016)
- Josef Svoboda, *Universal quadratic forms over number fields* (2016)

High School

- Matěj Doležálek, *Quaternions and generalizations of 4-square theorem* (2019)
České hlavičky award; 1st place in SOČ research competition
- Matěj Doležálek, *The congruent number problem* (2018)

TALKS

Invited conference and seminar talks

- *Universal quadratic forms and Northcott property of infinite number fields*; Seminar on Arithmetic Geometry and Algebraic Groups; online; October 26, 2023
- *Universal quadratic forms and Northcott property of infinite number fields*; ANTA Seminar; Aalto University, Finland; September 28, 2023
- *Consecutive real quadratic fields with large class number*; International Conference on Class Groups of Number Fields and Related Topics, KSoM, India; November 22, 2022
- *Lifting problem for universal quadratic forms*; Number Theory Seminar; Krakow, Poland (online talk); November 3, 2022
- *Universal quadratic forms and indecomposables in number fields* (6 hours of lectures); XXIII International Workshop for Young Mathematicians, Krakow, Poland; September 11 – 17, 2022
- *Universal quadratic forms over number fields*; International Conference on Class Groups of Number Fields and Related Topics, KSoM, India (online talk); October 24, 2021
- *Universal quadratic forms over number fields*; Number Theory Lunch Seminar, MPIM Bonn, Germany; March 3, 2020
- *Introduction to L-functions and Langlands program* (two plenary lectures); 57th SSAOS, Czechia; September 5 and 6, 2019
- *Universal quadratic forms over number fields*; Prague–Dresden Number Theory Meeting, Dresden, Germany; March 8, 2019
- *The rank of universal quadratic forms over number fields*; Conference on the Arithmetic Theory of Quadratic Forms, Seoul National U., Korea; January 7, 2019
- *Universal quadratic forms and class numbers of real quadratic fields*; Mathematical Colloquium, Göttingen, Germany; October 26, 2016
- *Universal quadratic forms over number fields*; Rényi Institute, Hungary; May 24, 2016
- *Universal quadratic forms and indecomposable integers in $\mathbb{Q}(\sqrt{D})$* ; Oberseminar Analytic Number Theory, Göttingen, Germany; April 11, 2016
- *Universal quadratic forms and continued fractions*; Mathematical Colloquium, Masaryk University, Brno, Czechia; November 6, 2015
- *Number fields without universal n-ary quadratic forms*; Göttingen–Hannover Number Theory Workshop, Germany; April 24, 2015
- *Provability of Fermat's Last Theorem in arithmetics with weak exponential*; Automorphic Forms and Representation Theory Seminar, Purdue University, USA; December 9, 2014

- *Number of self-dual automorphic representations of $GL(N)$ and depth preservation*; Families of Automorphic Forms and the Trace Formula; BIRS, Canada; December 3, 2014
- *Number of self-dual automorphic representations of $GL(N)$ and depth preservation*; Oberseminar Analytic Number Theory, Göttingen, Germany; November 10, 2014
- *Counting (self-dual) automorphic representations*; Texas–Oklahoma Representations and Automorphic Forms VI; March 8, 2014

Contributed conference talks (selected)

- *Universal quadratic forms and Northcott property of infinite number fields*; 8th Mini Symposium RNTA, Rome, Italy; April 17 – 19, 2024
- *A density result for universal quadratic forms over number fields*; Leuca 2022, Italy; May 16, 2022
- *Lifting problem for universal quadratic forms*; 31st Journées Arithmétiques, Turkey; July 4, 2019
- *Classifications of finitely generated semifields and lattice-ordered groups*; 98th AAA, Dresden, Germany; June 21, 2019
- *Classifications of finitely generated semifields and lattice-ordered groups*; 56th SSAOS, Czechia; September 6, 2018
- *Universal quadratic forms over number fields*; Quadratic forms in Chile, Talca; January 12, 2018
- *Universal quadratic forms over number fields*; 30th Journées Arithmétiques, France; July 7, 2017
- *Additively indecomposable integers in number fields*; ALaNT 4, Czech Republic; June 16, 2016
- *Universal quadratic forms over number fields*; 22nd Czech and Slovak International Conference on Number Theory; August 31, 2015
- *Langlands program: an area of pure mathematics* (poster); International Fulbright Science and Technology Conference, Washington, DC; June 12, 2012

Frequent local seminar talks are not listed.