

# CURRICULUM VITAE

Petr Vojtěchovský

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## CONTACT

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## EDUCATION AND TRAINING

- PhD, *Connections between codes, groups and loops*  
Charles University in Prague, August 2003, advisor Aleš Drápal
- PhD, *Finite simple Moufang loops*  
Iowa State University, December 2001, advisor Jonathan D. H. Smith
- M.S. Summa Cum Laude, *On Hamming distances of groups*  
Charles University in Prague, June 1998, advisor Aleš Drápal

## PROFESSIONAL EXPERIENCE

07/11 –            professor, Dept of Mathematics, University of Denver  
07/18 – 06/22    chair, Dept of Mathematics, University of Denver  
07/13 – 08/15    chair, Dept of Mathematics, University of Denver  
12/12 – 06/13    interim chair, Dept of Mathematics, University of Denver  
09/08 – 06/11    associate professor, Dept of Mathematics, University of Denver  
09/02 – 08/08    assistant professor, Dept of Mathematics, University of Denver  
01/02 – 06/02    temporary assistant professor, Dept of Mathematics, Iowa State University  
08/01 – 12/01    temporary instructor, Dept of Mathematics, Iowa State University  
08/98 – 05/01    teaching assistant, Dept of Mathematics, Iowa State University  
09/97 – 06/98    teaching assistant, Dept of Algebra, Charles University

## MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- American Mathematical Society (since 1999)
- Combinatorial Mathematics Society of Australasia (since 2014, lifetime member)
- Mathematical Association of America (2000–2005)
- $\Sigma \Xi$  Scientific Research Society, full membership (since 2002)

## RESEARCH INTERESTS

Nonassociative mathematics, loops and quasigroups, latin squares, racks and quandles, set-theoretical solutions of the Yang-Baxter equation, computational geometry, automated deduction.

## RESEARCH STAYS

*Long-term research stays (more than 1 month)*

- Iowa State University, Ames, Iowa, collaboration with J.D.H. Smith (2015)
- Charles University, Prague, Czech Republic, collaboration with A. Drápal (Apr–May 2009)
- Monash University, Melbourne, Australia, collaboration with I. Wanless (Feb–Mar 2009)

### Short-term research stays

- Instituto Superior Técnico, University of Lisbon, Portugal, collaboration with P. Lopes (2023)
- Czech Technical University, Czech Republic, collaboration with M. Janota (2022)
- Charles University, Czech Republic, collaboration with D. Stanovský (2018, 2019, 2022)
- University of Szeged, Hungary, collaboration with G.P. Nagy (2016, 2006, 2004)
- University of Auckland, New Zealand, collaboration with E. O'Brien (2015)
- Michigan State University, Michigan, collaboration with J.I. Hall (2015)
- Northern Michigan University, Michigan, collaboration with J.D. Phillips (2015)
- Würzburg University, Germany, collaboration with G.P. Nagy (2015, 2007)
- Chapman University, California, collaboration with P. Jipsen (2012)
- Memorial University, Canada, collaboration with E. Goodaire (2010)
- University of Sao Paulo, Brazil, collaboration with A. Grishkov (2009)
- Penn State Abington, Pennsylvania, collaboration with K.W. Johnson (2004)

## POSTDOCS AND STUDENTS SUPERVISED

### Post-doctoral scholars

- Sujoy Mukherjee, *homology in low-dimensional topology*, 06/2022–
- Seung Yeop Yang, *quandles and homology*, 09/2017–08/2018, now Assistant Professor, Kyungpook National University, Korea
- Izabella Stuhl, *loop theory*, 09/2014–06/2017, now Visiting Assistant Professor, Penn State University

### PhD students

- Jesse Parrish (in progress)
- Mouna Aboras, *Dihedral-like constructions of automorphic loops*, Dept of Mathematics (May 2015)
- Dylene Agda Souza de Barros, *On the classification of commutative A-loops of order  $p^3$  and  $p^4$* , Institute of Mathematics and Statistics, University of Sao Paulo, Brazil (coadvisor with Alexander Grishkov, February 2013), now assistant professor at Federal University of Viçosa, Brazil
- Jenya Kirshtein, *Cayley-Dickson loops*, Dept of Mathematics (July 2012), now programmer at C12Energy
- Kyle Pula, *Approximate transversals of latin squares*, Dept of Mathematics (May 2011), now researcher at the National Security Agency
- Daniel Daly, *Permutation patterns, reduced decompositions with few repetitions and the Bruhat order*, Dept of Mathematics (May 2009), now associate professor at Southeast Missouri State University
- Sadananda Narayanappa, *Geometric routing*, Dept of Mathematics and Dept of Computer Science (July 2006), now chief data scientist at Lockheed Martin

### Masters and honors bachelor students

- Ramiya Chandramohan, *A new pseudo-random interleaver design for turbo coding*, M.S. thesis, Dept of Engineering (coadvisor, November 2004)
- Carlos Lara, B.S. honors thesis, Dept of Computer Science (coadvisor, 2006)

## COAUTHORS

- Mouna Aboras (University of Denver)

- Mohammed Albow (University of Denver)
- Shayma Alkobaisi (United Arab Emirates University, UAE)
- Kye Bae (Digipen)
- Wan D. Bae (Univeristy of Wisconsin-Stout)
- Richard N. Ball (University of Denver)
- Marco Bonatto (Charles University, Czech Republic)
- Dylene Agda Souza de Barros (Federal University of Viçosa, Brazil)
- Orin Chein (Temple University)
- Dan Daly (Southeast Missouri State University)
- Aleš Drápal (Charles University in Prague, Czech Republic)
- Jeffrey Edgington (University of Denver)
- Alexandr Grishkov (University of Sao Paulo, Brazil)
- Alexander Hulpke (Colorado State University)
- Mikoláš Janota (Czech Technical University, Czech Republic)
- Přemysl Jedlička (Czech University of Life Sciences, Czech Republic)
- Ken W. Johnson (Penn State Abington)
- Seon H. Kim (University of Denver)
- Michael Kinyon (University of Denver)
- Kenneth Kunen (University of Wisconsin)
- António Lages (Instituto Superior Técnico, University of Lisbon, Portugal)
- Scott T. Leutenegger (University of Denver)
- Pedro Lopes (Instituto Superior Técnico, University of Lisbon, Portugal)
- Mario Lopez (University of Denver)
- Wade Meyers (University of Wisconsin-Stout)
- António Morgado (University of Lleida, Spain)
- Gábor P. Nagy (University of Szeged, Hungary)
- Sada Narayanappa (Lockheed Martin)
- Eamonn O'Brien (University of Auckland, New Zealand)
- Nicholas Ormes (University of Denver)
- Jon D. Phillips (Northern Michigan University)
- Józef H. Przytycki (George Washington University)
- Kyle Pula (Department of Defense)
- Aleš Pultr (Charles University in Prague, Czech Republic)
- Andrew Rajah (Science University of Malaysia, Malaysia)
- Marina Rasskazova (Omsk Service Institute, Omsk, Russia)
- Jonathan D.H. Smith (Iowa State University)
- David Stanovský (Charles University in Prague, Czech Republic)
- Douglas Stones (Monash University, Australia)
- Izabella Stuhl (University of Debrecen, Hungary)
- Jianjun P. Tian (College of William and Mary)
- Robert Veroff (University of New Mexico)
- Ian Wanless (Monash University, Australia)
- Seung Yeop Yang (Kyungpook National University, Korea)

## PUBLICATIONS

### *In research journals*

1. Petr Vojtěchovský, Generators of nonassociative simple Moufang loops over finite prime fields, *J. Algebra* **241** (2001), 186–192

2. Petr Vojtěchovský, The abstract groups  $(3, 3|3, p)$ , their subgroup structure, and their significance for the non-associative finite simple Moufang loops, *Quasigroups Related Systems* **8** (2001), 97–104
3. Petr Vojtěchovský, Reconstruction of group multiplication tables by quadrangle criterion, *European J. Combin.* **22** (2001), No. 8, 1159–1164
4. Gábor P. Nagy and Petr Vojtěchovský, Automorphism groups of simple Moufang loops over perfect fields, *Math. Proc. Cambridge Philos. Soc.* **135** (July 2003), no. 1, 193–197
5. Petr Vojtěchovský, Generators for finite simple Moufang loops, *J. Group Theory* **6** (2003), 169–174
6. Orin Chein, Michael Kinyon, Andrew Rajah and Petr Vojtěchovský, Loops and the Lagrange property, *Results Math.* **43** (2003), 74–78
7. Petr Vojtěchovský, Random generators of given orders and the smallest simple Moufang loop, *Algebra Universalis* **50** (2003), 27–33
8. Petr Vojtěchovský, Investigation of subalgebra lattices by means of Hasse constants, *Algebra Universalis* **50** (2003), 7–26
9. Petr Vojtěchovský, On the uniqueness of loops  $M(G, 2)$ , *Comment. Math. Univ. Carolin.* **44** (2003), no. 4, 629–635
10. Petr Vojtěchovský, The smallest Moufang loop revisited, *Results Math.* **44** (2003), 189–193
11. J.D. Phillips and Petr Vojtěchovský, Linear groupoids and the associated wreath products, *J. Symbolic Comput.* **40** (2005), no. 3, 1106–1125
12. J.D. Phillips and Petr Vojtěchovský, The varieties of loops of Bol-Moufang type, *Algebra Universalis* **54** (2005), no. 3, 259–271
13. Michale Kinyon, J.D. Phillips and Petr Vojtěchovský, Loops of Bol-Moufang type with a subgroup of index two, *Bul. Acad. de Stiinte Republicii Mold. Mat.* (Bulletin of the Academy of Sciences of the Republic of Moldova, Mathematics) **3** (49), 2005, 71–87
14. J.D. Phillips and Petr Vojtěchovský, The varieties of quasigroups of Bol-Moufang type: An equational reasoning approach, *J. Algebra* **293** (2005), 17–33
15. Aleš Drápal and Petr Vojtěchovský, Moufang loops that share associator and three quarters of their multiplication tables *Rocky Mountain J. Math.* **36** (2006), no. 2, 425–455
16. J.D. Phillips and Petr Vojtěchovský, C-loops: An introduction, *Publ. Math. Debrecen* **68** (2006), nos. 1–2, 115–137
17. Petr Vojtěchovský, Toward the classification of Moufang loops of order 64, *European J. Combin.* **27**, issue 3 (April 2006), 444–460
18. Kenneth W. Johnson and Petr Vojtěchovský, Right division in groups, Dedekind-Frobenius group matrices, and Ward quasigroups, *Abh. Math. Semin. Univ. Hambg.* **75** (2006), 121–136
19. Michael Kinyon, J.D. Phillips and Petr Vojtěchovský, C-loops: Extensions and constructions, *J. Algebra Appl.* **6** (2007), no. 1, 1–20
20. Richard N. Ball, Aleš Pultr and Petr Vojtěchovský, Colored graphs without colorful cycles, *Combinatorica* **27** (2007), no. 4, 407–427
21. Nicholas Ormes and Petr Vojtěchovský, Powers and alternative laws, *Comment. Math. Univ. Carolin.* **48** (2007), no. 1, 25–40
22. Gábor P. Nagy and Petr Vojtěchovský, The Moufang loops of order 64 and 81, *J. Symbolic Comput.* **42**(2007), no. 9, 871–883
23. Michael Kinyon, J.D. Phillips and Petr Vojtěchovský, When is the commutant of a Bol loop a subloop?, *Trans. Amer. Math. Soc.* **360** (2008), 2393–2408
24. Aleš Drápal and Petr Vojtěchovský, Explicit constructions of loops with commuting inner mappings, *European J. Combin.* **29** (2008), no. 7, 1662–1681
25. Dan Daly and Petr Vojtěchovský, How permutations displace points and stretch intervals, *Ars Combin.* **90** (2009), 175–191

26. Michael Kinyon, Kyle Pula and Petr Vojtěchovský, Admissible orders of Jordan loops, *J. Combin. Des.* **17** (2009), no. 2, 103–118
27. Michael Kinyon and Petr Vojtěchovský, Primary decompositions in varieties of commutative diassociative loops, *Comm. Algebra* **37** (2009), no. 4, 1428–1444
28. Petr Vojtěchovský, Periods in missing lengths of rainbow cycles, *J. Graph Theory* **61** (2009), no. 2, 98–110
29. Aleš Drápal and Petr Vojtěchovský, Symmetric multilinear forms and polarization of polynomials, *Linear Algebra Appl.* **431** (2009), no. 5–7, 998–1012
30. Gábor P. Nagy and Petr Vojtěchovský, Moufang loops with commuting inner mappings, *J. Pure Appl. Algebra* **213** (2009), no. 11, 2177–2186
31. Dan Daly and Petr Vojtěchovský, Enumeration of nilpotent loops via cohomology, *J. Algebra* **322** (2009), no. 11, 4080–4098
32. Michael Kinyon, Přemysl Jedlička and Petr Vojtěchovský, Constructions of commutative automorphic loops, *Comm. Algebra* **38** (2010), no. 9, 3243–3267
33. Aleš Drápal and Petr Vojtěchovský, Code loops in both parities, *J. Algebraic Combin.* **31** (June 2010), no. 4, 585–611
34. Přemysl Jedlička, Michael Kinyon and Petr Vojtěchovský, The structure of commutative automorphic loops, *Trans. Amer. Math. Soc.* **363** (2011), no. 1, 365–384
35. Aleš Drápal and Petr Vojtěchovský, Small loops of nilpotency class three with commutative inner mapping groups, *J. Group Theory* **14** (Jul 2011), no. 4, 547–573
36. Wan D. Bae, Shayma Alkobaisi, Sada Narayanappa, Kye Y. Bae and Petr Vojtěchovský, Optimizing map labeling of point-features based on an onion peeling approach, *J. Spat. Inf. Sci.*, no. 2 (2011), 3–28
37. Kenneth W. Johnson, Michael Kinyon, Gábor P. Nagy and Petr Vojtěchovský, Searching for small simple automorphic loops, *LMS J. Comput. Math.* **14** (2011), 200–213
38. Shayma Alkobaisi, Wan D. Bae, Sada Narayanappa and Petr Vojtěchovský, An interactive framework for spatial joins: A statistical approach to data analysis in GIS, *Geoinformatica* **16** (2012), no. 2, 329–355
39. Douglas Stones, Petr Vojtěchovský and Ian Wanless, Cycle structure of autotopisms of quasigroups and latin squares, *J. Combin. Des.* **20** (2012), no. 5, 227–263
40. Michael Kinyon, Kyle Pula and Petr Vojtěchovský, Incidence properties of cosets in loops, *J. Combin. Des.* **20** (2012), no. 3, 179–197
41. Přemysl Jedlička, Michael Kinyon and Petr Vojtěchovský, Nilpotency in automorphic loops of prime power order, *J. Algebra* **350** (2012), no. 1, 64–76
42. Dylene Agda Souza de Barros, Alexander Grishkov and Petr Vojtěchovský, Commutative automorphic loops of order  $p^3$ , *J. Algebra Appl.* **11** (2012), 15 pages.
43. Petr Vojtěchovský and Ian Wanless, Closest multiplication tables of groups, *J. Algebra* **353** (2012), no. 1, 261–285
44. David Stanovský and Petr Vojtěchovský, Commutator theory for loops, *J. Algebra* **399** (2014), 290–322
45. David Stanovský and Petr Vojtěchovský, Abelian extensions and solvable loops, *Results Math.* **66** (2014), 367–384
46. Michael Kinyon, Ken Kunen, J.D. Phillips and Petr Vojtěchovský, The structure of automorphic loops, *Trans. Amer. Math. Soc.* **368** (December 2016), no. 12, 8901–8927
47. Mouna Aboras and Petr Vojtěchovský, Automorphisms of dihedral-like automorphic loops, *Comm. Algebra* **44** (2016), no. 2, 613–627
48. Alexander Hulpke, David Stanovský and Petr Vojtěchovský, Connected quandles and transitive groups, *J. Pure Appl. Algebra* **220** (February 2016), no. 2, 735–758
49. Alexander Grishkov, Marina Rasskazova and Petr Vojtěchovský, Automorphic loops arising from module endomorphisms, *Publ. Math. Debrecen* **88** (2016), no. 3–4, 287–303

50. Michael Kinyon, Izabella Stuhl and Petr Vojtěchovský, Half-isomorphisms of Moufang loops, *J. Algebra* **450** (2016), 152–161
51. Michael Kinyon, Jonathan D.H. Smith and Petr Vojtěchovský, Sylow theory for quasigroups II: Sectional action, *J. Combin. Des.* **25**, no. **4** (April 2017), 159–184
52. Přemysl Jedlička, David Stanovský and Petr Vojtěchovský, Distributive and trimedial quasigroups of order 243, *Discrete Math.* **340**, no. **3** (March 2017), 404–415
53. Michael Kinyon, Gábor P. Nagy and Petr Vojtěchovský, Bol loops and Bruck loops of order  $pq$ , *J. Algebra* **473** (2017), 481–512
54. Eamonn A. O'Brien and Petr Vojtěchovský, Code loops in dimension at most 8, *J. Algebra* **473** (2017), 607–626
55. Petr Vojtěchovský, Bol loops and Bruck loops of order  $pq$  up to isotopism, *Finite Fields Appl.* **52** (July 2018), 1–9
56. Seung Yeop Yang and Petr Vojtěchovský, Enumeration of racks and quandles up to isomorphism, *Math. Comp.* **88** (September 2019), no. **319**, 2523–2540
57. Mohammed Albow, Jeffrey Edgington, Mario Lopez and Petr Vojtěchovský, Permutations in two dimensions that maximally separate neighbors, *Electron. J. Combin.* **26** (2019), no. **2**, article P2.1, 20 pages
58. Aleš Drápal and Petr Vojtěchovský, Division sudokus: Invariants, enumeration and multiple partitions, *Glasg. Math. J.* **62** (September 2020), no. **3**, 600–630
59. Aleš Drápal and Petr Vojtěchovský, A variety of Steiner loops satisfying Moufang's theorem: A solution to Rajah's problem, *Aequationes Math.* **94** (2020), no. **1**, 97–101
60. Marco Bonatto, Michael Kinyon, David Stanovský and Petr Vojtěchovský, Involution latin solutions of the Yang-Baxter equation, *J. Algebra* **565** (2021), 128–159
61. David Stanovský and Petr Vojtěchovský, Idempotent solutions of the Yang-Baxter equation and twisted group division, *Fund. Math.* **255** (2021), no. **1**, 51–68
62. Józef Przytycki, Seung Yeop Yang and Petr Vojtěchovský, Set-theoretic Yang-Baxter (co)homology theory of involutive non-degenerate solutions, accepted to *J. Knot Theory Ramifications*, October 2021
63. António Lages, Pedro Lopes and Petr Vojtěchovský, A sufficient condition for a quandle to be latin, *J. Combin. Des.* **30** (April 2022), no. **4**, 251–259
64. Jonathan D.H. Smith and Petr Vojtěchovský, Okubo quasigroups, *Doc. Math.* **27** (2022), 535–580
65. Mikoláš Janota, António Morgado and Petr Vojtěchovský, Computing generating sets of minimal size in finite algebras, to appear in *J. Symbolic Comput.*, January 2023
66. David Stanovský and Petr Vojtěchovský, Supernilpotent groups and 3-supernilpotent loops, to appear in *J. Algebra Appl.*, March 2023
67. Aleš Drápal and Petr Vojtěchovský, Abelian congruences and solvability in Moufang loops, to appear in *J. Algebra*, March 2023

#### *In conference proceedings and special volumes*

1. Petr Vojtěchovský, Distances of groups of prime order, proceedings of the Workshop on general algebra '98, Olomouc, Czech Republic, published in *Contributions to General Algebra* **11**, 225–231, Verlag Johannes Heyn, Klagenfurt, 1999
2. Petr Vojtěchovský, Combinatorial aspects of code loops, proceedings of Loops '99, published in *Comment. Math. Univ. Carolin.* **41** (April 2000), No. 2, 429–435
3. Petr Vojtěchovský, Chevalley groups of type  $G_2$  as automorphism groups of loops, proceedings of Groups St Andrews 2001 in Oxford, Volume II, published in *London Mathematical Society Lecture Note Series* **305**, 586–598, Cambridge University Press, 2003
4. Gábor P. Nagy and Petr Vojtěchovský, Octonions, simple Moufang loops and triality, proceedings of Workshops Loops '03, Prague, published in *Quasigroups Related Systems* **10** (2003), 65–93

5. Petr Vojtěchovský, Combinatorial polarization, code loops, and codes of high level, proceedings of CombinaTexas 2003, published in *Int. J. Math. Math. Sci.* **29** (2004), 1533–1541
6. Petr Vojtěchovský, A class of Bol loops with a subgroup of index two, proceedings of Loops '03, Prague, published in *Comment. Math. Univ. Carolin.* **45**, no. 2 (2004), 371–381
7. Jianjun P. Tian and Petr Vojtěchovský, Mathematical aspects of evolution algebras in non-Mendelian genetics, proceedings of the Mile High Conference on Quasigroups, Loops, and Nonassociative Systems, Denver, 2005, published in *Quasigroups Related Systems* **14** (2006), no. **3**, 111–122
8. Sadananda Narayanappa and Petr Vojtěchovský, An improved approximation factor for the unit disk covering problem, *Proceedings of the 18th Canadian Conference on Computational Geometry*, Kingston, Ontario, Canada, 2006, 15–18
9. Gábor P. Nagy and Petr Vojtěchovský, Computing with small quasigroups and loops, proceedings of the Workshops Loops '07, Prague, published in *Quasigroups Related Systems* **15** (2007), no. **1**, 77–94
10. Shayma Alkobaisi, Wad D. Bae, Seon H. Kim, Scott T. Leutenegger and Petr Vojtěchovský, An interactive framework for raster data spatial joins, *Proceedings of the 15th ACM International Symposium on Advances in Geographic Information Systems*, 2007, Seattle, Washington, USA, 19–26
11. J.D. Phillips and Petr Vojtěchovský, A scoop from groups: Equational foundations for loops, proceedings of Loops '07, Prague, published in *Comment. Math. Univ. Carolin.* **49** (2008), no. **2**, 279–290
12. Shayma Alkobaisi, Wan D. Bae, Seon H. Kim, Scott T. Leutenegger and Petr Vojtěchovský, The truncated tornado in TMBB: Spatiotemporal uncertainty model for moving objects, *DEXA* (2008), Turin, Italy, 33–40
13. Wan D. Bae, Shayma Alkobaisi, Sadananda Narayanappa, Kye Bae and Petr Vojtěchovský, Convex Onion Peeling Genetic Algorithm: An Efficient Solution to Map Labeling of Point-Feature, SAC '10, proceedings of the *2010 ACM Symposium on Applied Computing*, 892–899
14. Joshua Browning, Ian Wanless and Petr Vojtěchovský, Overlapping latin subsquares and full products, proceedings of the 2nd Mile High Conference on Nonassociative Mathematics, University of Denver, June 2009, published in *Comment. Math. Univ. Carolin.* **51** (2010), no. **2**, 175–184
15. Dylene Agda Souza de Barros, Alexander Grishkov and Petr Vojtěchovský, The free commutative automorphic 2-generated loop of nilpotency class 3, proceedings of the Loops '11 conference, Třešť', June 2011, published in *Comment. Math. Univ. Carolin.* **53** (2012), no. **3**, 321–336
16. Michael Kinyon, Robert Veroff and Petr Vojtěchovský, Loops with abelian inner mapping groups: an application of automated deduction, in *Automated Reasoning and Mathematics, Essays in Memory of William McCune, Lecture Notes in Artificial Intelligence* **7788** (editors Maria Paola Bonacina and Mark E. Stickel), Springer 2013, pp. 151–164
17. Petr Vojtěchovský, Three lectures on automorphic loops, proceedings of Workshops Loops '15 (Ohrid, Macedonia), published in *Quasigroups Related Systems* **23** (2015), no. **1**, 129–163
18. Wan D. Bae, Shayma Alkobaisi, Wade Meyers, Sadananda Narayanappa and Petr Vojtěchovský, Voronoi cells: An approach to individual-based environmental exposure estimation, SAC '16, proceedings of the *31st Annual ACM Symposium on Applied Computing*, April 2016, 596–603
19. David Stanovský and Petr Vojtěchovský, Central and medial quasigroups of small orders, *Bulletin of the Academy of Sciences of Moldova* (Belousov's 90th anniversary volume) **1** (80), 2016, 24–40.
20. Marco Bonatto and Petr Vojtěchovský, Simply connected latin quandles, proceedings of Self-distributive systems and quandle (co)homology theory in algebra and low-dimensional topology, Korea Institute for Advanced Study, Busan, published in *J. Knot Theory Ramifications* **27** (2018), no. **11**, 1843006, 32 pages.

21. Izabella Stuhl and Petr Vojtěchovský, Enumeration of involutory latin quandles, Bruck loops and commutative automorphic loops of odd prime power order, *Nonassociative Mathematics and its Applications*, proceedings of the 4th Mile High Conference on Nonassociative Mathematics, Denver, Colorado, published in *Contemporary Mathematics* **721** (2019), 261–276

### Submitted

- Aleš Drápal and Petr Vojtěchovský, Subdirect products and propagating equations with an application to Moufang theorem, submitted, April 2020
- Frédéric Latrémolière, Sadananda Narayanappa and Petr Vojtěchovský, Estimating the Jacobian matrix of an unknown multivariate function from sample values by means of a neural network, submitted April 2022
- Aleš Drápal and Petr Vojtěchovský, Congruence solvability in finite Moufang loops of order coprime to three, submitted November 2022
- Aleš Drápal and Petr Vojtěchovský, On abelian-by-cyclic Moufang loops, December 2022
- Sujoy Mukherjee and Petr Vojtěchovský, Minimal representatives of endofunctions, submitted March 2023

### In preparation

- Loop theory, with A. Drápal and M. Kinyon, textbook
- `RightQuasigroups`, package for `GAP`, with Gábor P. Nagy
- Loops with commuting inner mappings, with Michale Kinyon, J.D. Phillips and Robert Veroff
- Enumeration of right distributive groupoids, with Sujoy Mukherjee
- Moufang permutations on small groups, with Dylene Agda Souza de Barros
- Solvability in Moufang loops, with Aleš Drápal
- Falconer varieties, with Aleš Drápal

### Theses

- Finite simple Moufang loops, PhD thesis, Iowa State University (2001)
- Connections between codes, groups and loops, PhD thesis, Charles University, Prague (2003)
- On Hamming distances of groups, M.S. thesis, in Czech (*O Hammingově vzdálenosti grup*), Charles University, Prague (June 1998)
- Mechanical analogs of viscous-elastic materials, undergraduate thesis, in Czech (*Mechanické analogy visko-elastických materiálů*), Charles University, Prague (1995)

### Other

- Mé studium na matfyzu a v zahraničí (My study at matfyz and abroad), *Jubilejní almanach, Univerzita Karlova v Praze, Matematicko-fyzikální fakulta (Anniversary Almanac, Charles University, Prague, Faculty of Mathematics and Physics)*, edited by I. Netuka and M. Stiborová, Matfyzpress, 2002, in Czech, 168–169

### Software

- Library of small racks and quandles, `GAP` code, with Seung Yeop Yang, available at author's homepage
- Enumeration of small connected quandles, `GAP` code, with Alexander Hulpke and David Stanovský, available at author's homepage
- Cryptographer's toolkit, educational software for breaking ciphers, version 0.75, available at authors homepage (2006-2017)
- `LOOPS`: Computing with quasigroups and loops in `GAP`, with G.P. Nagy, a package for `GAP (Groups, Algorithms and Programming)`, download at <http://www.math.du.edu/loops> (2005-2017)



- GAP 4.1 libraries related to the algebraic and geometrical theory of loops (1999, 2000)
- WinGroup 1.0, with A. Drápal, 32-bit application for Windows 95 (September 1997)

## PROFESSIONAL PRESENTATIONS AND MEETINGS

### *Main talks, plenary talks and lecture series*

- RightQuasigroups: computing with one-sided quasigroups in GAP, with Gábor P. Nagy, Workshops Loops '23, Mathematical Institute of the Polish Academy of Sciences, Bedlewo, Poland (June 2023, lecture series)
- Solvability in loop theory, III Brazilian Meeting on Loops and Nonassociative Systems, Federal University of Uberlandia, Uberlandia, Brazil (November 2022, plenary talk, remotely)
- Idempotent solutions of the Yang-Baxter equation, Knots in Washington XLIX, George Washington University, Washington, D.C. (February 2020, plenary talk)
- Okubo quasigroups and new consequences of Moufang identities, 2nd Brazilian Meeting on Loops and Nonassociative Systems, Federal University of Ouro Preto, Ouro Preto, Brazil (August 2019, plenary talk)
- Enumeration of racks, quandles and Bruck loops, Loops '19, Budapest University of Technology and Economics, Budapest, Hungary (July 2019, main talk)
- Three lectures on automorphic loops, Workshops Loops '15, Ohrid, Macedonia (June 2015, lecture series)
- The term  $x^{1/2}yx^{1/2}$ , Algebras and Clones Fest, Charles University, Prague, Czech Republic (July 2014, main talk)
- Computational aspects of loop theory, 35th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Melbourne, Australia (December 2011, main talk)
- Automorphic loops, Loops '11, Třešť, Czech Republic (July 2011, main talk)
- GAP and loops, with G.P. Nagy, Workshops Loops '07, Czech Agricultural University, Prague, Czech Republic (August 2007, lecture series)
- Moufang loops and 3-nets, with G.P. Nagy, Workshops Loops '03, Prague, Czech Republic (August 2003, lecture series)

### *Invited conference talks*

- Classical solvability and congruence solvability in Moufang loops, Loops '23, Mathematical Institute of the Polish Academy of Sciences, Bedlewo, Poland, June 25-July 2, 2023
- Nilpotence just beyond groups, Groups, Nilpotence and Tensors 2023, Colorado State University, Ft. Collins (April 2023)
- Enumeration of groupoids, particularly right distributive groupoids, Spring 2023 AMS Sectional Meeting, University of Cincinnati, Cincinnati (April 2023)
- Cycles in translations of quandles, The algebra of the Yang-Baxter equation, Institute of Mathematics, Polish Academy of Sciences, Bedlewo, Poland (July 2022, remotely)
- RightQuasigroups: A package for GAP with support for racks and quandles, The 12th TAPU-KOOK Joint Seminar on Knots and Related Topics, Kyungpook National University (July 2021, remotely)
- A large scale automated deduction project in nonassociative algebra, Joint Mathematics Meeting, Denver, Colorado (January 2020)
- Varieties of loops satisfying Moufang's theorem, 1150th meeting of AMS, Special session on quasigroups and loops – in honor of J.D.H. Smith's 70th birthday, University of Wisconsin, Madison, Wisconsin (September 2019)
- Highlights from the research of Jonathan D.H. Smith, Loops '19, Budapest University of Technology and Economics, Budapest, Hungary (July 2019)
- A class of latin set-theoretical solutions to the Yang-Baxter equation, AMS Southeastern Sectional Meeting, University of Arkansas, Fayetteville, Arkansas (November 2018)

- Involutory latin quandles of odd prime power order, 1134th meeting of the American Mathematical Society, University of California Riverside, Riverside, California (November 2017)
- Enumeration of quandles and distributive quasigroups, Self-distributive systems and quandle (co)homology theory in algebra and low-dimensional topology, Korea Institute for Advanced Study, Busan, Korea (June 2017)
- Code loops in dimension up to 8, 1122nd meeting of the American Mathematical Society, University of Denver, Colorado (October 2016)
- Cohomology in connected quandles, ADAM 2016, University of New Mexico, Albuquerque, New Mexico (August 2016)
- A computational model for exposure estimates and optimal intervention, Workshop on Smart and Connected Health: Modeling and Analysis of the Effect of Environmental Exposure on Public Health, United Arab Emirates University, Al Ain, UAE (February 2016)
- Bol loops and Bruck loops of order  $pq$  AMS Central Sectional Meeting, Loyola University, Chicago, Illinois (October 2015)
- Automorphic loops constructed from field extensions, Loops '15, Ohrid, Macedonia (July 2015)
- Two problems on solvability in loops suitable for automated deduction, ADAM 2014, University of North Alabama, Florence, Alabama (August 2014)
- Abelian extensions and solvable loops, 2nd Joint Meeting of the Israeli Mathematical Union and the American Mathematical Society, Bar Ilan University and Tel Aviv University, Tel Aviv, Israel (June 2014)
- Examples of models for spatial-temporal uncertainty, Workshop on Smart and Connected Health: Modeling and Analysis of the Effect of Environmental Exposure on Public Health, United Arab Emirates University, Al Ain, UAE (January 2014)
- Connected quandles, ADAM 2013, University of New Mexico, Albuquerque, New Mexico (June 2013)
- A case for new associators AMS central sectional meeting, Iowa State University, Ames, Iowa (April 2013)
- Commutator theory for loops, ADAM 2012, Northern Michigan University, Marquette, Michigan (June 2012)
- Model builders, automated deduction and automorphic loops, ADAM 2011, Banff International Research Station, Banff, Canada (June 2011)
- Searching for simple automorphic loops, 1064th AMS sectional meeting, University of Notre Dame, Notre Dame, Indiana (November 2010)
- Combinatorial designs based on coset decompositions, ADAM 2009, Denver, Colorado (July 2009)
- Nilpotency in loops and their inner mapping groups, Southwestern Group Theory Day, Tucson, Arizona (November 2008)
- The structure of commutative A-loops, Part 1, ADAM 2008, University of New Mexico, Albuquerque, New Mexico (June 2008)
- Commutative A-loops, Binary systems and other stories, Czech University of Life Sciences, Prague, Czech Republic (June 2008)
- Moufang loops with commuting inner mappings, Binary systems and other stories, Czech University of Life Sciences, Prague, Czech Republic (June 2008)
- Loops with commuting inner mappings and of nilpotency class three, Loops '07, Czech Agricultural University, Prague, Czech Republic (August 2007)
- Code loops and Prover9, ADAM 2007, University of New Mexico, Albuquerque, New Mexico (June 2007)
- Semi-boolean algebras and implication algebras, ADAM 2006, University of New Mexico, Albuquerque, New Mexico (June 2006)

- Linear identities and the associated wreath products, AWARD-2005, Argonne National Laboratories, Argonne, Illinois (August 2005)
- Commutativity and Associativity, Workshop on Nonassociative Binary Systems of Non-Lie Type, Charles University, Prague (May 2005)
- Small Moufang 2-loops, Nearrings and Nearfields, Hamburg, Germany (July 2003)
- Octonions, exceptional groups, and finite simple Moufang loops, Arbeitstagung Allgemeine Algebra, Linz, Austria (June 2001)
- Octonions, exceptional groups, and finite simple Moufang loops, V Joint meeting of AMS and SMM, Morelia, Mexico (May 2001)
- Generators for finite simple Moufang loops, Arbeitstagung Allgemeine Algebra, Dresden, Germany (June 2000)
- On Moufang loops, Workshop on multiplication groups of loops, Prague, Czech Republic (June 2000)
- Generators of non-associative simple Moufang loops, AMS Meeting No. 953, Notre Dame (April 2000)

#### *Contributed conference talks*

- Propagating equations with an application to Moufang theorem, Arbeitstagung Allgemeine Algebra 100, Jagellonian University, Krakow, Poland, online (February 2021)
- Left nondegenerate idempotent solutions of the Yang-Baxter equation, Joint Mathematics Meeting, Denver, Colorado, satellite session on Self-Distributive Systems, Knot Theory and the Yang-Baxter Equation, University of Denver (January 2020)
- Enumerating racks and quandles up to isomorphism, Knots in Washington XLVI, George Washington University, Washington D.C. (May 2018)
- Simply connected latin quandles, Noncommutative and nonassociative structures, braces and applications, Gzira, Malta (March 2018)
- Okubo algebras and Okubo quasigroups, Fourth Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado (August 2017)
- Code loops in dimension up to 8, Arbeitstagung Allgemeine Algebra 92, Czech University of Life Sciences, Prague, Czech Republic (May 2016)
- Solvability and boolean completeness for loops, Algebra and Algorithms, University of Colorado, Boulder, Colorado (May 2016)
- Classifying linear quasigroups, 39th ACCMCC, University of Queensland, Brisbane, Australia (December 2015)
- Connected quandles and transitive groups, CanaDAM 2015, University of Saskatchewan, Saskatoon, Saskatchewan, Canada (June 2015)
- Automated deduction in research mathematics, MAA Rocky Mountain sectional meeting, Colorado College (April 2015)
- Connected quandles and transitive groups, AMS Western Sectional Meeting, University of California-Riverside, California (November 2013)
- Commutator theory for loops II, 3rd Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado (August 2013)
- Commutator theory in varieties close to groups, Zassenhaus Group Theory Conference, Asheville, North Carolina (May 2013)
- How permutations displace points and stretch intervals, 2012 Rocky Mountain Discrete Mathematics Days, Colorado State University, Fort Collins, Colorado (May 2012)
- Cycle structure of autotopisms of latin squares, WilsonFest, California Institute of Technology, Pasadena, California (March 2012)
- Inner mappings of latin squares, Algebraic Combinatorics: In Memory of Bob Liebler, Colorado State University, Ft Collins, Colorado (November 2011)
- Incidence properties of cosets, Rocky Mountain Discrete Mathematics Days 2011, University of Wyoming, Laramie, Wyoming (October 2011)

- All pairs of closest groups, Harlaxton Group Theory Conference, Harlaxton Manor, UK (August 2011)
- Group theory in loop theory, 30th Ohio State Denison conference, Ohio State University, Columbus, Ohio (May 2010)
- Small loops of Csörgő type, 2nd Mile High Conference on Nonassociative Mathematics, Denver, Colorado (June 2009)
- Implication algebras as hypergraphs, BLAST 2008, University of Denver, Denver, Colorado (August 2008)
- Nilpotent loops, inner mapping groups, and multiplication groups, MAA 2008 Rocky Mountain Sectional Meeting, Black Hills State University, Spearfish, South Dakota (April 2008)
- Code loops of both parities, AMS Sectional Meeting 1038, Indiana University, Bloomington, Indiana (April 2008)
- Missing lengths of rainbow cycles, 11th Rocky Mountain Discrete Mathematics Days, Colorado State University, Fort Collins, Colorado (August 2007)
- High nilpotency class and abelian  $\text{Inn}(G)$ ?, Zassenhaus 2007, Saint Louis University, St. Louis, Missouri (March 2007)
- Absence of colorful cycles in edge-colored graphs, Horizon of Combinatorics, Balatonalmadi, Hungary (July 2006)
- Code loops of both parities, Mile High Conference on Quasigroups, Loops, and Nonassociative Systems, University of Denver, Denver, Colorado (July 2005)
- Graphs without colorful cycles, Graph Theory with Altitude, University of Colorado at Denver, Denver, Colorado (May 2005)
- Transitive transformations on binary trees, 8th Rocky Mountain Discrete Mathematics Days, Colorado College, Colorado Springs, Colorado (August 2004)
- The variety of Moufang loops: recent progress and open problems, AMS Sectional Meeting No. 989, Boulder, Colorado (October 2003)
- Combinatorial polarization over finite fields, Combina Texas 2003, Southwest Texas State University (April 2003)
- Hasse constants and generalized hexagons, Universal algebra and lattice theory, Szeged, Hungary (July 2002)
- Lie groups of type  $G_2$  as automorphism groups of loops, Groups St Andrews, Oxford, England (August 2001)
- Combinatorial aspects of code loops, Loops '99, Prague, Czech Republic (June 1999)
- Distances of groups as a research project, Regional Workshop in Mathematics, University of Nebraska, Lincoln (February 1999)
- Distances of groups of prime order, Arbeitstagung Allgemeine Algebra, Olomouc, Czech Republic (June 1998)
- Distances of groups, Groups and Group Rings, Wisła, Poland (June 1998)
- Building transatlantic ships, 2nd Academic Student Meeting, Center for Theoretical Study, The Institute for Advanced Studies at Charles University and the Academy of Sciences of the Czech Republic, Nová Rábyně, Czech Republic (1998)
- Computer proofs in mathematics, 1st Academic Student Meeting, Center for Theoretical Study, The Institute for Advanced Studies at Charles University and the Academy of Sciences of the Czech Republic, Poddubí u Chocerad, Czech Republic (1997)
- Graphs on surfaces of genus 2, Spring School on Combinatorics, Borová Lada, Czech Republic (1996)

### *Seminar and colloquia talks*

- Solvability and supernilpotence in varieties close to groups, Panglobal algebra and logic seminar, University of Colorado, Boulder (October 2023)

- Quandles: Introduction and recent developments, Instituto Superior Técnico, Lisbon, Portugal (June 2023)
- Commutator theory, nilpotence and solvability beyond groups, Algebra seminar, Nova University of Lisbon, Portugal (June 2023)
- Quandles and other classes of set-theoretic solutions of the Yang-Baxter equation, LieJor Online Seminar: Algebras, Representations, and Applications, University of Sao Paulo, Brazil (September 2021)
- Enumeration in nonassociative algebra, Kempner Colloquium, University of Colorado, Boulder (April 2018)
- The isomorphism problem for nilpotent algebras, Algebra seminar, University of Colorado, Boulder (April 2018)
- On the classification of involutory latin quandles, Algebraic combinatorics seminar, Colorado State University, Fort Collins (November 2017)
- Bol loops of order  $pq$ , Algebra and combinatorics seminar, Iowa State University, Ames, Iowa (November 2015)
- How permutations displace points and separate neighbors, Algebra and combinatorics seminar, Iowa State University, Ames, Iowa (November 2015)
- Automated deduction in research mathematics, Mathematics colloquium, Iowa State University, Ames, Iowa (October 2015)
- Oriented knots, quandles and transitive groups, Algebra seminar, Michigan State University, East Lansing, Michigan (September 2015)
- Expanding number systems beyond complex numbers, Mathematics colloquium, Northern Michigan University, Marquette, Michigan (September 2015)
- Connected quandles and ..., Algebraic combinatorics seminar, Colorado State University, Fort Collins (September 2014)
- Tessellations with and without symmetry, closing of the exhibit of Clark Richert, Gildar Gallery, Denver, Colorado (January 2014)
- Computational methods in abstract algebra, Colloquium, University of Wyoming, Laramie, Wyoming (September 2012)
- Computational aspects of loop theory, MathCS seminar, Chapman University, Orange, California (August 2012)
- Computational aspects of loop theory, algebra seminar, Charles University in Prague, Czech Republic (May 2012)
- A GAP tutorial, Algebra seminar, Memorial University, St John's, Canada (August 2010)
- Transversals in Latin squares, Seminar, Federal University of ABC, Santo André, Brazil (August 2009)
- Enumeration of nilpotent loops by means of cohomology, Algebra seminar, University of Sao Paulo, Sao Paulo, Brazil (August 2009)
- Combinatorial designs based on coset decompositions, Algebra seminar, Charles University in Prague, Czech Republic (April 2009)
- Enumeration of nilpotent loops by means of cohomology, Algebra seminar, Charles University in Prague, Czech Republic (April 2009)
- Lengths of rainbow cycles in complete graphs, Combinatorics seminar, Monash University, Melbourne, Australia (March 2009)
- Automated deduction and research mathematics Mathematics and Computer Science colloquium, Monash University, Melbourne, Australia (February 2009)
- Enumeration of nilpotent loops by means of cohomology, Combinatorics seminar, Monash University, Melbourne, Australia (February 2009)
- Enlarging the mathematical world by the Cayley-Dickson process, Pi Mu Epsilon, Western Michigan University, Kalamazoo, Michigan (September 2008)

- Enumeration of nilpotent loops via cohomology, Algebra seminar, Western Michigan University, Kalamazoo, Michigan (September 2008)
- Code loops of both parities and sporadic groups, Mathematics Colloquium, Western Michigan University, Kalamazoo, Michigan (September 2008)
- Combinatorial polarization and multilinear forms, Kempner Colloquium, University of Colorado, Boulder (March 2008)
- Codes associated with code loops, Algebraic combinatorics seminar, Colorado State University, Fort Collins (February 2008)
- Code loops, Algebra seminar, Erlangen University, Erlangen, Germany (July 2007)
- Map labeling with an introduction to computational complexity, Jeppesen, Centennial, Colorado (August 2007)
- Combinatorial problems as dynamical systems, Algebraic combinatorics seminar, Colorado State University, Fort Collins, Colorado (February 2007)
- Exponential forms and combinatorial polarization, Algebraic combinatorics seminar, Colorado State University, Fort Collins, Colorado (March 2006)
- Permutations that most displace points and stretch intervals, and their possible usage in turbo coding, Cryptography seminar, Charles University, Prague, Czech Republic (December 2005)
- Unit disk covering problems, Algebraic combinatorics seminar, Colorado State University, Fort Collins (March 2005)
- Extensions based on Steiner triple systems, Algebraic seminar, Charles University, Prague, Czech Republic (December 2004)
- Extensions based on Steiner triple systems, Algebraic combinatorics seminar, Colorado State University, Fort Collins, Colorado (November 2004)
- Wreath products, dynamical systems, and the interplay between commutativity and associativity, Algebraic combinatorics seminar, Colorado State University, Fort Collins, Colorado (April 2004)
- Some combinatorial problems in communication, Algebraic combinatorics seminar, Colorado State University, Fort Collins, Colorado (December 2003)
- Combinatorial polarization and codes of high level, Algebraic combinatorics seminar, Colorado State University (April 2003)
- Distances of groups and loops, Kempner Colloquium, University of Colorado, Boulder, Colorado (October 2002)
- Distances of groups and loops, Algebraic combinatorics seminar, Colorado State University, Fort Collins, Colorado (October 2002)
- Chevalley groups arising from octonions and finite simple Moufang loops, University of Denver, Denver, Colorado (March 2002)
- Introduction to counting: infinity and beyond, University of Illinois, Springfield, Illinois (February 2002)
- Reconstruction of group multiplication tables by quadrangle criterion, Combinatorial seminar, Iowa State University, Ames, Iowa (February 2002)
- Automorphism groups of Paige loops, Combinatorial seminar, Iowa State University, Ames, Iowa (October 2001)
- 3-webs, groups with triality, and finite simple Bol loops, 3 talks, Combinatorial seminar, Iowa State University, Ames, Iowa (2000)
- Polarization and trilinear alternating forms, Combinatorial seminar, Iowa State University, Ames, Iowa (April 2000)
- Generators of non-associative finite simple Moufang loops, 2 talks, Combinatorial seminar, Iowa State University, Ames, Iowa (April 2000)
- $\mathbb{R}$ ,  $\mathbb{C}$ ,  $\mathbb{H}$ ,  $\mathbb{O}$ , Graduate student colloquium, Iowa State University, Ames, Iowa (December 1999)

- Turbo codes, convolutional codes, iterative decoding, Combinatorial seminar, Iowa State University, Ames, Iowa (October 1999)
- Polarized mappings and binary linear codes, Combinatorial seminar, Iowa State University, Ames, Iowa (April 1999)
- On distances of groups, Combinatorial seminar, Iowa State University, Ames, Iowa (September 1998)
- On Hamming distances of groups, Algebraic seminar, Charles University, Prague, Czech Republic (1998)
- numerous talks at Student Algebraic Seminar, Charles University, Prague, Czech Republic (1996–1998)

### *Local talks*

- Estimating the Jacobian of an unknown multivariate function by neural network, Machine learning seminar, University of Denver (November 2022)
- Idempotent solutions of the Yang-Baxter equation, Graduate Colloquium, University of Denver (September 2019)
- Division sudokus, Graduate Colloquium, University of Denver (January 2019)
- Enumeration of racks and quandles, Algebra and Logic Seminar, University of Denver (May 2018)
- Classification of Bol loops and Bruck loops of order  $pq$ , Algebra and Logic Seminar, 2 talks, University of Denver (January and February 2016)
- Shannon's noiseless theorem, Math Club, University of Denver (March 2014)
- Transitive groups with a view toward quandles I, II Algebra and logic seminar, University of Denver (October 2013)
- Commutator theory for loops I, II, algebra/logic seminar, University of Denver (October 2012)
- Computational aspects of loop theory, Graduate colloquium, University of Denver (January 2012)
- A mathematical result is born!, Graduate colloquium, University of Denver (January 2011)
- Searching for simple automorphic loops, Algebra and logic seminar, University of Denver (April 2010)
- Graphs with large girth and chromatic number, Graduate colloquium, University of Denver (February 2010)
- Enumeration of nilpotent loops via cohomology, Algebra and logic seminar, University of Denver (September 2008)
- Codes over  $\text{GF}(p)$  with prescribed intersections I–III, Algebra and logic seminar, University of Denver (February 2008)
- On simple Bol loops, Algebra and logic seminar, University of Denver (April 2007)
- Loops and quasigroups, series of talks, Algebra seminar University of Denver (Winter 2007)
- Combinatorial problems as dynamical systems, Graduate colloquium, University of Denver (February 2007)
- Exponential forms and combinatorial polarization I, II, Faculty seminar, University of Denver (April 2006)
- Sphere packings and lattices, Graduate student colloquium, Dept of Mathematics, University of Denver (January 2006)
- Coloring complete graphs so as to avoid colorful polygons, Faculty seminar, University of Denver (January 2005)
- Combinatorics behind extensions of loops I, II, Faculty seminar, University of Denver (October 2004)
- Matrix games, Graduate student seminar, University of Denver (October 2004)

- Magic squares, Graduate student colloquium, Dept of Mathematics, University of Denver (January 2004)
- Substitution groups of identities I, II, Faculty seminar, University of Denver, (January 2004)
- Designing an interleaver for a turbo code, Faculty seminar, University of Denver (May 2003)

#### *Additional meetings attended (with no presentation)*

- AITP 2021: 6th Conference on Artificial Intelligence and Theorem Proving, Aussois, France, attended remotely (September 2021)
- Combinatorial Mathematics Society of Australasia, online (December 2020)
- AITP 2020: 5th Conference on Artificial Intelligence and Theorem Proving, Aussois, France, attended remotely (September 2020)
- CICM-13: 13th Conference on Intelligent Computer Mathematics, Bertinoro, Forli, Italy, attended remotely (July 2020)
- AITP 2019: 4th Conference on Artificial Intelligence and Theorem Proving, Obergurgl, Austria (April 2019)
- ADAM 2015, University of New Mexico, Albuquerque, New Mexico (August 2015)
- AMS/MAA Joint Mathematics Meeting, San Antonio, Texas (January 2015)
- VII Spanish Workshop on Geometric Optimization, El Rocio, Spain (June 2014)
- AMS Western Sectional Meeting, University of Colorado, Boulder, Colorado (April 2013)
- AMS Joint Mathematics Meeting, San Francisco, California (2010)
- International Congress of Mathematicians, Madrid, Spain (2006)
- Summer school on combinatorics, Renyi Institute, Budapest, Hungary (2006)
- Quantum Structures 2004, University of Denver, Denver, Colorado (2004)
- National Meeting of the American Mathematical Society, San Diego, California (2002)
- Mathematical Challenges of the 21st Century, Los Angeles, California (2000)
- Groups and Group Rings, Wisła, Poland (2000)
- Codes, Systems and Graphical Models, Institute for Mathematics and its Applications, Minneapolis, Minnesota (1999)
- Groupoids in Physics, Analysis and Geometry, University of Colorado, Boulder, Colorado (1999)
- Joint Meeting of the Iowa MAA, ASA, and IMATYC, University of Iowa, Iowa City, Iowa (1999)
- Geometry of Banach Spaces, spring school, Paseky, Czech Republic (1997)

## PROFESSIONAL CONTRIBUTIONS

### *Editor*

- Quasigroups and Related Systems (since 2006, managing editor since 2016)
- Journal of Computational Algebra (since 2022, associate editor)
- Proceedings of the 4th Mile High Conference on Nonassociative Mathematics, University of Denver, July 29–August 5, 2017, published as Nonassociative Mathematics and its Applications, *Contemporary Mathematics* **721**, American Mathematical Society, 2019.
- Proceedings of the 3rd Mile High Conference on Nonassociative Mathematics, University of Denver, Denver (2013)
- Proceedings of the 2nd Mile High Conference on Nonassociative Mathematics, University of Denver, Denver (2009)
- Proceedings of the Mile High Conference on Quasigroups, Loops, and Nonassociative Systems, University of Denver, Denver (2005)

### *Referee for book series*

- CRC Press, Taylor and Francis Group



- Memoirs of the American Mathematical Society

*Referee for professional journals*

- Abhandlungen des Mathematischen Seminars der Universität Hamburg
- Acta Mathematicae (Szeged)
- Acta Mathematica Universitatis Comenianae
- Afrika Matematika
- Alabama Journal of Mathematics
- Algebra and Discrete Mathematics
- Analele Universitatii de Vest din Timisoara: Seria Matematica-Informatica
- Archiv der Mathematik
- Archivum Mathematicum (Brno)
- Ars Mathematica Contemporanea
- Asian Bulletin of Mathematics
- Australasian Journal of Combinatorics
- Bulletin of the European Mathematical Society
- Bulletin of the Korean Mathematical Society
- Bulletin of the Malaysian Mathematical Sciences Society
- Buletinul Academiei de Stiinte a Republicii Moldova, Matematica
- Canadian Mathematical Bulletin
- Carpathian Journal of Mathematics
- Central European Journal of Mathematics
- Commentationes Mathematicae Universitatis Carolinae
- Communications in Algebra
- Computers and Mathematics with Applications
- Contributions to Algebra
- Creative Mathematics and Informatics
- Discrete Applied Mathematics
- Discrete Mathematics
- Discussiones Mathematicae, General Algebra and Applications
- Discussiones Mathematicae Graph Theory
- Electronic Journal of Combinatorics
- Electronic Journal of Linear Algebra
- European Journal of Combinatorics
- Expositiones Mathematicae
- Finite Fields and Their Applications
- Forum Mathematicum
- Glasgow Mathematical Journal
- Graphs and Combinatorics
- Involve
- International Journal of Algebra and Computation
- International Journal of Computational Geometry and Applications
- International Journal of Mathematics and Computer Science
- Italian Journal of Pure and Applied Mathematics
- Journal of Algebra
- Journal of Algebra and its Applications
- Journal of Applied Logic
- Journal of Automated Reasoning
- Journal of Combinatorial Designs
- Journal of Combinatorial Theory, Series A
- Journal of Group Theory

- Journal of Pure and Applied Mathematics
- Journal of Symbolic Computation
- Kragujevac Journal of Mathematics
- Le Matematiche
- Linear Algebra and its Applications
- Matematicki Vesnik
- Mathematica Bohemica
- Mathematical Proceedings of the Cambridge Philosophical Society
- Mathematical Reviews (AMS)
- Mathematics of Computation
- Proceedings of the American Mathematical Society
- Publicationes Mathematicae Debrecen
- Results in Mathematics
- Quasigroups and Related Systems
- SIGMA
- Southeast Asian Bulletin of Mathematics
- Transactions of the American Mathematical Society
- Transformation Groups
- Zentralblatt

#### *Referee for proceedings*

- MED 2019: Mediterranean Conference on Control and Automation, Akko, Izrael, July 2019
- 28th Annual Symposium on Combinatorial Pattern Matching, Warsaw, Poland, July 2017
- Loops '15, Ohrid, Macedonia, June 2015
- 3rd Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado, August 2013
- Category Theory, Algebra and Geometry, Louvain la Neuve, Belgium
- Loops '11, Třešť, Czech Republic, June 2011
- 2nd Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado, June 2009
- Loops '07, Czech Agricultural University, Prague, Czech Republic
- Workshops Loops '07, Czech Agricultural University, Prague, Czech Republic
- 2nd IMT-GT Conference on Mathematics, Statistics and Their Applications, Universiti Sains Malaysia, Penang, Malaysia
- Mile High Conference on Quasigroups, Loops, and Nonassociative Systems, University of Denver, Denver, USA
- Loops '03, Czech Agricultural University, Prague, Czech Republic

#### *Referee for grant agencies*

- National Research and Development Agency (ANID), Chile
- Grant Agency of the Czech Republic (GAČR), Czech Republic
- National Science Foundation, USA
- National Security Agency, USA
- National Research, Development and Innovation Office, Hungary

#### *Conference organizer/committee member*

- Loops 2023, Mathematical Institute of Polish Academy of Sciences (chair of the scientific committee)
- Special session on self-distributive structures, knot theory, and the Yang-Baxter equation, Joint Mathematics Meeting of AMS and MAA, Denver, Colorado, January 15–18, 2020 (coorganizer)

- Special session of quasigroups and loops - in honor of J.D.H. Smith's 70th birthday, Fall 2019 Central Sectional Meeting of the American Mathematical Society, University of Wisconsin-Madison, Wisconsin, September 14–15, 2019 (coorganizer)
- 2nd Brazilian Meeting on Loops and Nonassociative Systems, Federal University of Ouro Preto, Ouro Preto, Brazil, August 28–30, 2019 (member of scientific committee)
- Loops 2019, Budapest University of Technology and Economics, Hungary, July 7–13, 2019 (member of scientific board)
- Fall 2018 Southeastern Sectional Meeting of the AMS, special session on Non-associative Algebraic Structures and their (Co)homology Theories, University of Arkansas, Fayetteville, Arkansas, November 3–4, 2018 (coorganizer)
- 4th Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado, July 29–August 5, 2016 (chair)
- Fall 2016 Western Sectional Meeting of the American Mathematical Society, University of Denver, Denver, Colorado, October 8–9, 2016 (initiated the meeting and organized a special session)
- 39th ACCMCC, University of Queensland, Australia, December 6-11, 2015 (student prize committee member)
- Third Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado, August 11–17, 2013 (co-chair of the program and organizing committee)
- Special session on quasigroups, loops, and nonassociative division algebras, AMS Central Sectional Meeting, Iowa State University, Ames, Iowa, April 27–28, 2013 (coorganizer)
- 14th Rocky Mountain Discrete Math Days, University of Denver, Denver, Colorado, October 27, 2012 (local organizer)
- Special session on quasigroups, loops, and nonassociative division algebras, AMS Central Sectional Meeting, Notre Dame, Indiana, November 5–7, 2010 (coorganizer)
- ADAM 2009, University of Denver, Denver, Colorado, July 12–14, 2009 (local organizer)
- 2nd Mile High Conference on Nonassociative Mathematics, University of Denver, Denver, Colorado, June 21–27, 2009 (co-chair of the program and organizing committee)
- Special session on quasigroups and loops, AMS Central Section Meeting, Kalamazoo, Michigan, October 17–19, 2008 (coorganizer)
- Loops '07 and Workshops Loops '07, Czech Agricultural University, Prague, Czech Republic, August 2007 (member of the local organizing committee)
- Mile High Conference on Quasigroups, Loops and Nonassociative Systems, University of Denver, Denver, Colorado, July 2–9, 2005 (chair of the program and organizing committee)
- Loops '03 and Workshops Loops '03, Czech Agricultural University, Prague, Czech Republic, August 10–17, 2004 (member of the program and organizing committee)

#### *Committee member/external reviewer for a PhD thesis*

- Mariah Barnes, *On loop commutators, quaternionic automorphic loops, and related topics*, Dept of Mathematics (May 2022)
- Riley Britten, *Topics in Moufang loops*, Dept of Mathematics (May 2022)
- Adam Purcilly, *Discrepancy inequalities in graph theory and their applications*, Dept of Mathematics (May 2020)
- Gavin St. John, *Decidability for residuated lattices and substructural logics*, Dept of Mathematics (May 2019)
- Kirk Boyer, *Barrier graphs and extremal questions on line, ray, segment and hyperplane sensor networks*, Dept of Mathematics (May 2019)
- Nawal Alznad, *T-de Vries algebra*, Dept of Mathematics (July 2018)
- Masoumah Al Ali,  *$\mathbb{Z}_2$  orbifolds of affine vertex algebras and  $W$ -algebras*, Dept of Mathematics (May 2017)

- Riquelmi Cardona, *The Finite Embeddability Property for some noncommutative knotted varieties of RL and DRL*, Dept of Mathematics (May 2015)
- Mark Greer, *Loops and their permutation groups*, Dept of Mathematics (May 2013)
- Benjamin Phillips, *Boolean and profinite loops*, Dept of Mathematics, Western Michigan University (December 2012)
- Chee Wing Loon, *Classification of Moufang loops of odd order*, School of Mathematical Sciences, Universiti Sains Malaysia, Penang, Malaysia (2010)
- Hugh Denoncourt, *Some combinatorial models for reduced expressions in Coxeter groups*, Dept of Mathematics, University of Colorado, Boulder, Colorado (2009)
- Shayma Alkobaisi, *Managing uncertainty in spatiotemporal databases*, Dept of Computer Science (June 2008)
- Aditya Nagrath, *Scattered lattices, free complete extensions and the introduction of a duality for meet semilattice*, Dept of Mathematics (June 2008)
- Wan D. Bae, *Online query processing in GIS*, Dept of Computer Science (November 2007)

#### *Committee member/external reviewer for a MS thesis*

- Ondřej Liška, *Linear codes and projective planes of order 10* (in Czech), Dept of Algebra, Charles University in Prague, Czech Republic (August 2013)
- Muatazz A. Bashir, *On the projective plane of order 12*, School of Mathematical Sciences, Universiti Sains Malaysia, Penang, Malaysia (2011, 2013)

## GRANTS

### *Research grants*

- Time series analysis, Lockheed Martin Space, co-PI (PI Sadananda Narayanappa), \$20,000 (2021–2022)
- Computational methods for nonassociative and self-distributive structures, Collaboration grants for mathematicians, Simons Foundation, PI, \$42,000 (2021–2026)
- Commutators, quasigroups and Yang-Baxter equation, Czech-American Scientific Cooperation, Ministry of Education, Youth and Sports of the Czech Republic, LTAUSA19070, one of 3 U.S. participants (PI Aleš Drápal), CZK 4,777,000 = \$207,000 (2020–2022)
- Automated deduction in algebra and knot theory, PROF research grant of the University of Denver, PI, \$10,000 (2019–2021)
- Classification of nonassociative binary algebras, PROF research grant of the University of Denver, PI, \$17,320 (2016–2017)
- Health monitoring system, ICT Fund, UAE, consultant (PI Shayma Al Kobaisi), AED 2,728,948 = \$742,915 (2014–2016)
- Loop theory: A textbook, PROF research grant of the University of Denver, PI (jointly with Michael Kinyon), \$25,280 (2012–2013)
- Computational loop theory, Collaborative grants for mathematicians, Simons Foundation, PI, \$35,000 (2011–2016)
- Incidence relations based on coset decompositions, PROF research grant of the University of Denver, PI (jointly with Michael Kinyon), \$15,000 (2008–2009)
- LOOPS 2.0: A computational package for nonassociative algebra, PROF research grant of the University of Denver, PI, \$6,000 (2006)
- Sums of partial 2-dimensional dynamical systems, PROF research grant of the University of Denver, PI (jointly with Nicholas Ormes), \$10,000 (2004–2005)
- Combinatorics of groups and multilinear forms, Grant Agency of Charles University, grant number 269/2001/B-MAT/MFF, co-investigator, CZK 641,000 = \$25,000 (2001–2003)
- Research assistantship, Iowa State University (Fall 2000, Spring 2001)

- Professional Advancement Grant, Graduate College and Dept of Mathematics, Iowa State University (1999, 2000, 2001)
- Summer research support, Iowa State University (1999, 2000, 2001)
- University Development Grant of the Czech Republic, grant number 1379/1998 (1998)

#### Conference grants

- 4th Mile High Conference on Nonassociative Mathematics, NSF grant, PI, \$15,000 (2017)
- 3rd Mile High Conference on Nonassociative Mathematics, NSF grant, co-PI (PI Michael Kinyon), \$18,000 (2013)
- 2nd Mile High Conference on Nonassociative Mathematics, NSF grant, PI, \$24,000 (2009)

#### Travel grants

- Enhanced sabbatical, University of Denver, PI, \$3,000 (2022–2023)
- CNIC: US-UAE Planning Visit: Development of Research Collaborations on Spatio-temporal Modeling and Analysis of Mobile Sensor Data in Evaluating Environmental Exposures, NSF grant 1338378, consultant (PI Wan Bae), \$34,598 (8/13–10/13)
- Enhanced sabbatical, University of Denver, PI, \$2,500 (2008–2009)
- EMS grant to attend Horizon of Combinatorics, Budapest and Lake Balaton, Hungary (July 2006)
- AMS/NSF grant to attend the International Congress of Mathematicians, Madrid, Spain, \$2,150 (2006)
- Hlávka Foundation (Hlávková Nadace) grant to travel to the U.S. (1998)

#### Teaching grants

- First Year Seminar, grant to develop and teach a course *Ciphers from ancient to modern times*, University of Denver (2020, 2021, 2023)
- Marsico First Year Seminar, grant to develop and teach a course *Ciphers and Codes*, University of Denver (2006, 2007, 2011, 2012, 2017, 2019)
- Marsico First Year Seminar, grant to develop and teach a course *Game Theory and Strategy*, University of Denver (2004, 2005)

## TEACHING

#### Courses taught

All courses taught at the University of Denver, with level (F = freshmen seminar, U = undergraduate course, G = graduate course) and term indicated.

course	level	term
Calculus I	U	Fall 22, 13 (2x), 11, 10, 09, 06, 04
Calculus II	U	Fall 02, Winter 03, Spring 02
Calculus III	U	Fall 10, 09, 07, 05, Spring 15(2x), 03
Ciphers and Codes	F	Fall 19, 17, 14, 12, 11, 07, 06
Ciphers from Ancient to Modern Times	F	Fall 21, 20
Coding Theory	G	Fall 22, 20, 17, 07, Winter 03, 14
Combinatorics	G	Fall 12, Winter 06, Spring 19
Cryptography	F	Fall 09, Winter 11, 08, Spring 18
Cryptography	G	Spring 22
Differential Equations and Transformations	U	Spring 02, Fall 01
Discrete Math for Business Majors	U	Summer 02, Fall 01
Elements of Linear Algebra	U	Fall 06
Group Representations	G	Winter 16
Game Theory and Strategy	F	Fall 05, 04
Graph Theory	G	Fall 03, Winter 10, Spring 20
Group Theory	G	Fall 04, Winter 23, 19, 17, 15, 12
Honors Calculus I	U	Fall 03
Honors Calculus II	U	Winter 04
Honors Calculus III	U	Spring 04
Introduction to Abstract Algebra	U/G	Fall 17, 03, Spring 10, 08, 07, 06, 05
Introduction to Discrete Structures	U	Winter 11, 12
Introduction to Knots and Quandles	G	Spring 18
Introduction to Theory of Numbers	U/G	Fall 11, Winter 15
Linear Algebra	U	Fall 97, Spring 98
Linear Programming	U/G	Spring 21, 17
Loop Theory	G	Spring 11
Math and Music	F	Winter 22
Mathematical Reasoning and Proof	U	Fall 21, 18, Winter 16
Mathematical Structures II	G	Winter 05
Nonassociative Algebra	G	Winter 20
Rings and Fields	G	Spring 13
Rings and Modules	G	Fall 05
Set Theory	G	Winter 06

### *Courses developed*

- Ciphers and codes
- Ciphers from ancient to modern times
- Coding theory
- Combinatorics
- Cryptography
- Game theory and strategy
- Graph theory
- Group representations
- Knot theory and quandles
- Linear programming
- Loop theory
- Nonassociative algebra

## SERVICE ACTIVITIES

### *Committees and governing bodies*

All at University of Denver, unless otherwise stated.

- senator, Faculty Senate (9/2023–)
- chair, Dept of Mathematics (7/2013–9/2015, 7/2018–6/2022)
- member, Tenure and promotion committee, Division of Natural Sciences and Mathematics (2015–2018, 2022)
- interim department chair, Dept of Mathematics (12/2012–6/2013)
- member, Tenure and promotion procedural appeal committee, School of Engineering and Computer Science (2012)
- member, Teaching load committee, Dept of Mathematics (2012)
- member, Penrose [Library] collection storage analysis group (2011)
- chair, Building committee, Dept of Mathematics (2009-2010)
- member, Graduate committee, Dept of Mathematics (2009-2012)
- chair, Scientific Methods section of the PROF committee (2010)
- member, Committee for integration of research at University of Denver website, Division of Natural Sciences and Mathematics (2008)
- member, First year seminar committee (2007–2009)
- member, Faculty search committee, Dept of Mathematics, (2005, 2006, 2009, 2012 – –2017, 2020, 2022)
- member, Faculty search committee, Dept of Physics and Astronomy (2006)
- member, Molecular Life Sciences Institute committee, Division of Natural Sciences and Mathematics (2006)
- co-chair, Lecturer search committee, Dept of Mathematics (2005)
- graduate student representative, Dept Chair Search Committee, Dept of Mathematics, Iowa State University (2000)
- member, Mathematics Graduate Student Council, Dept of Mathematics, Iowa State University (1999–2001)
- senator for mathematics, Graduate Student Senate, Iowa State University (1999–2000)

### *Other*

- coordinator of the Math Center (1/2016–6/2017)
- webmaster, Dept of Mathematics, University of Denver (2003–2007, 2009–2018, 2023 – –)
- interviewer at the Amni Hyde Interviews, Los Angeles-Santa Monica (2006)
- library liaison, Dept of Mathematics, University of Denver (2003–2008)

## STUDENT AWARDS

- Zaffarano Prize for outstanding graduate student research, Iowa State University, \$1000 (April 2002)
- J. J. L. Hinrichsen Award for outstanding research in Pure Mathematics, Iowa State University (December 2000)
- Graduate Teaching Excellence Award, Iowa State University (May 2000)
- $\Phi$  K  $\Phi$  Honors Society (since 1999)
- scholarship, Charles University (1994–1998)

(updated October 5, 2023)