

CURRICULUM VITAE

MICHAEL K. KINYON

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1. EDUCATION

Ph.D.	Mathematics	1991	University of Utah
M.S.	Mathematics	1988	University of Utah
B.S. (Honors)	Mathematics	1986	University of Utah

2. PROFESSIONAL EXPERIENCE

University of Denver, Department of Mathematics

2010– Professor
2007–2010 Associate Professor (with tenure)
2006–2007 Assistant Professor

Center for Mathematics and Applications, Nova University of Lisbon

2020– Member

Universidade Aberta (Lisbon, Portugal), Department of Mathematics

2013– Adjunct Full Professor (Professor Catedrático Convidado)

Center for Computational and Stochastic Mathematics, University of Lisbon

2013–2019 Member

Indiana University South Bend, Department of Mathematical Sciences

2004–2006 Professor
1998–2004 Associate Professor (with tenure)
1992–1998 Assistant Professor

Western Michigan University, Department of Mathematics

2001–2003 Associate Professor

University of Utah, Department of Mathematics

1991–1992 Associate Instructor
1988–1991 Teaching Fellow
1986–1988 Teaching Assistant

3. GRANTS

2015-2020 Simons Foundation Collaboration Grant, \$35000
2017 (with P. Vojtěchovský), NSF Grant: 4th Mile High Conference on Nonassociative Mathematics, \$15000
2013 (with P. Vojtěchovský), NSF Grant: 3rd Mile High Conference on Nonassociative Mathematics, \$18000
2012 (with P. Vojtěchovský), University of Denver PROF Grant, \$25280
2012 University of Denver FRF Grant, \$2750
2009 (with P. Vojtěchovský), NSF Grant: 2nd Mile High Conference on Nonassociative Mathematics, \$24000

2008 (with P. Vojtěchovský), University of Denver PROF Grant, \$15000

2008 (with D. Carney), University of Denver CTL Grant, \$17000

1999 IUSB Faculty Research Grant, \$8000

1993 IUSB Summer Faculty Fellowship, \$5000

4. HONORS AND AWARDS

2013 University of Denver United Methodist Teacher/Scholar Award

1998 IUSB Teaching Excellence Recognition Award.

1988 Univ. of Utah Dept. of Mathematics Outstanding Teaching Assistant Award.

5. PUBLICATIONS

Books.

In Progress.

A. Drápal, M. Kinyon and P. Vojtěchovský, *Loop Theory*.

Edited.

G. Van Brummelen and M. K. Kinyon (eds.), *Mathematics and the Historian's Craft: the Kenneth O. May Lectures*, CMS Books in Mathematics **21**, Springer Verlag, 2005.

Refereed Journal Articles.

Appeared (in reverse chronological order).

- [1] (with D. Fitzgerald) Trace- and pseudo-products: restriction-like semigroups with a band of projections, *Semigroup Forum* (2021), doi:10.1007/s00233-021-10221-x
- [2] (with R.A. Bailey, P.J. Cameron and C. Praeger) Diagonal groups and arcs over groups, *Des. Codes Cryptogr.* (2021), doi:10.1007/s10623-021-00907-2
- [3] (with A. Iorgulescu) Putting bounded involutive lattices, De Morgan algebras, ortholattices and boolean algebras on the “map”, *J. Appl. Logics* **8** (2021), 1169–1213.
- [4] (with N. Galatos, P. Jipsen and A. Přenosil) Lattice-ordered pregroups are semidistributive, *Algebra Universalis* **82** (2021), art. 16, 6pp.
- [5] (with M. Bonatto, D. Stanovský and P. Vojtěchovský) Latin involutive solutions of the Yang-Baxter equation, *J. Algebra* **565** (2021), 128–159.
- [6] (with A. Drápal) Normality, nuclear squares and Osborn identities, *Comment. Math. Univ. Carolin.* **61** (2020), no. 4, 481-500.
- [7] (with M. Barralho) Variants of epigroups and primary conjugacy, *Comm. Algebra* **48** (2020), 5465–5473.
- [8] (with K. Cvetko-Vah, J. Leech and T. Pisanski) Regular antilattices, *Art Discrete Appl. Math.* **2** (2019), #P2.06, 10 pp.
- [9] (with J. Araújo and Y. Robert) Varieties of regular semigroups with uniquely defined inversion, *Portugal. Math. (N.S.)* **76** (2019), 205–228.
- [10] (with P. Jipsen) Nonassociative right hoops, *Algebra Universalis* **80** (2019), art. 47, 14pp.
- [11] (with J. Araújo and J. Konieczny) Conjugacy in inverse semigroups, *J. Algebra* **533** (2019), 142–173.
- [12] Proof simplification and automated theorem proving, *Philos. Trans. Roy. Soc. A* **377**: 20180034. doi:10.1098/rsta.2018.0034
- [13] (with J. Araújo, J. Konieczny and A. Malheiro) Decidability and independence of conjugacy problems in finitely presented monoids, *Theoret. Comput. Sci.* **731** (2018), 88–98.
- [14] (with F. Araújo) Commutativity theorems for groups and semigroups, *Portugal. Math. (N.S.)* **74** (2018), 243–255.
- [15] (with J. Araújo, J. Konieczny and A. Malheiro) Four notions of conjugacy for abstract semigroups, *Proc. Roy. Soc. Edinburgh Sect. A* **147** (2017) 1169–1214.
- [16] (with J.D.H. Smith and P. Vojtěchovský) Sylow theory for quasigroups II, *J. Combinatorial Designs* **25** (2017), 159–184.
- [17] (with G. Nagy and P. Vojtěchovský) Bol loops and Bruck loops of order pq , *J. Algebra* **473** (2017), 481–512.
- [18] (with K. Kunen, J.D. Phillips and P. Vojtěchovský) The structure of automorphic loops, *Trans. Amer. Math. Soc.* **368** (2016), 8901–8927.

- [19] (with I. Stuhl and P. Vojtěchovský) Half-isomorphisms of Moufang loops, *J. Algebra* **450** (2016), 152–161.
- [20] (with I. Wanless) Loops with exponent 3 in all isotopes, *Internat. J. Algebra Comput.* **25** (2015), 1159–1177.
- [21] (with J. Leech and J. Pita Costa) Distributivity in skew lattices, *Semigroup Forum* **91** (2015), 378–400.
- [22] (with J. P. Araújo) A natural characterization of semilattices of rectangular bands and groups of exponent two, *Semigroup Forum* **91** (2015), 295–298.
- [23] (with A. Drápal) Buchsteiner loops: associators and constructions, *J. Algebra & its Applications* **14** 1550050 (2015), 25 pp.
- [24] (with J. Araújo) Inverse semigroups with idempotent-fixing automorphisms, *Semigroup Forum* **89** (2014), no. 2, 469–474.
- [25] (with A. Grishkov and G. Nagy) Solvability of commutative automorphic loops, *Proc. Amer. Math. Soc.* **142** (2014), no. 9, 3029–3037.
- [26] (with R. Felipe-Sosa, R. Felipe, J. Sanchez-Ortega and M. R. Bremner) The Cayley-Dickson process for dialgebras, *Linear and Multilinear Algebra* **62** (2014), no. 6, 811–830.
- [27] (with J. Araújo and A. Malheiro) A characterization of adequate semigroups by forbidden subsemigroups, *Proc. Roy. Soc. Edinburgh Sect. A* **143** (2013), 1115–1122.
- [28] (with J. Leech) Categorical skew lattices, *Order* **30** (2013), no. 3, 763–777.
- [29] (with J. Araújo) On a problem of M. Kambites regarding abundant semigroups, *Comm. Algebra* **40** (2012), no. 12, 4439–4447
- [30] (with M. Greer) Pseudoautomorphisms of Bruck loops and their generalizations, *Comment. Math. Univ. Carolin.* **53** (2012), no. 3, 383–389.
- [31] (with O. Chein and E. Goodaire) When is a Bol loop Moufang?, *Algebra Colloq.* **19** (2012), 927–936.
- [32] (with J. Araújo) Axioms for unary semigroups via division operations, *Comm. Algebra* **40** (2012), 719–737.
- [33] (with K. Pula and P. Vojtěchovský) Incidence properties of cosets in loops, *J. Combinatorial Designs* **20** (2012), 161–197.
- [34] (with P. Jedlička and P. Vojtěchovský) Nilpotency in automorphic loops of prime power order, *J. Algebra* **350** (2012), 64–76.
- [35] Ken Kunen: Algebraist, *Topology and its Applications* **158** (2011), 2468–2472.
- [36] (with A. Krapež and J. D. Phillips) Right product quasigroups and loops, *Quasigroups and Related Systems* **19** (2011), 239–264.
- [37] (with J. Araújo) Independent axiom systems for nearlattices, *Czechoslovak Math. J.* **61** (2011), 975–992.
- [38] (with K. Johnson, G. Nagy and P. Vojtěchovský) Searching for small simple automorphic loops, *LMS J. Comput. Math.* **14** (2011), 200–213.
- [39] (with J. Araújo) An elegant 3-basis for inverse semigroups, *Semigroup Forum* **82** (2011), no. 2, 319–323.
- [40] (with K. Cvetko-Vah, J. Leech and M. Spinks) Cancellation in skew lattices, *Order* **28** (2011), no. 1, 9–32.
- [41] (with J. Araújo and J. Konieczny) Minimal paths in the commuting graph of semigroups, *Europ. J. Combinatorics* **32** (2011), no. 2, 178–197.
- [42] (with P. Jedlička and P. Vojtěchovský) The structure of commutative automorphic loops, *Trans. Amer. Math. Soc.* **363** (2011), no. 1, 365–384.
- [43] (with P. Jedlička and P. Vojtěchovský) Constructions of commutative automorphic loops, *Comm. Algebra* **38** (2010), no. 9, 3243–3267.
- [44] (with T. Foguel) Uniquely 2-divisible Bol loops, *J. Algebra Appl.* **9** (2010), no. 4, 591–601.
- [45] (with T. Kepka and J. D. Phillips) F-quasigroups isotopic to groups, *Comment. Math. Univ. Carolin.* **51** (2010), no. 2, 267–277.
- [46] (with W. Bertram) Associative geometries II: Involutions, the classical torsors, and their homotopes, *J. Lie Theory* **20** (2010), no. 2, 253–282.
- [47] (with W. Bertram) Associative geometries I. Torsors, linear relations and Grassmannians, *J. Lie Theory* **20** (2010), no. 2, 215–252.
- [48] (with P. Csörgő and A. Drápal) Buchsteiner loops, *Internat. J. Algebra Comput.* **19** (2009), no. 8, 1049–1088.
- [49] (with P. Vojtěchovský) Primary decompositions in varieties of commutative diassociative loops, *Comm. Algebra* **37** (2009), no. 4, 1428–1444.
- [50] (with K. Pula and P. Vojtěchovský) Admissible orders of Jordan loops, *J. Combinatorial Designs* **17** (2009), no. 2, 103–118.
- [51] (with T. Kepka and J. D. Phillips) F-quasigroups and generalized modules, *Comment. Math. Univ. Carolin.* **49** (2008), no. 2, 249–257.

- [52] (with J. D. Phillips and P. Vojtěchovský) When is the commutant of a Bol loop a subloop? *Trans. Amer. Math. Soc.* **360** (2008), no. 5, 2393–2408.
- [53] (with T. Kepka and J. D. Phillips) The structure of F -quasigroups, *J. Algebra* **317** (2007), no. 2, 435–461.
- [54] (with J. D. Phillips and P. Vojtěchovský) C-loops: extensions and constructions, *J. Algebra Appl.* **6** (2007), no. 1, 1–20.
- [55] Leibniz algebras, Lie racks, and digroups, *J. Lie Theory* **17** (2007), no. 1, 99–114.
- [56] (with K. Kunen) Power-associative, conjugacy closed loops, *J. Algebra* **304** (2006), no. 2, 679–711.
- [57] (with T. Foguel and J. D. Phillips) On twisted subgroups and Bol loops of odd order, *Rocky Mountain J. Math.* **36** (2006), no. 1, 183–212.
- [58] (with M. Aschbacher and J. D. Phillips) Finite Bruck loops, *Trans. Amer. Math. Soc.* **358** (2006), no. 7, 3061–3075
- [59] (with J. D. Phillips and P. Vojtěchovský) Loops of Bol-Moufang type with a subgroup of index two, *Bul. Acad. Ştiinţe Repub. Mold. Mat.* (2005), no. 3, 71–87.
- [60] (with J. D. Phillips) Rectangular quasigroups and rectangular loops, *Comput. Math. Appl.* **49** (2005), no. 11-12, 1679–1685.
- [61] (with K. Kunen) The structure of extra loops, *Quasigroups Related Systems* **12** (2004), 39–60.
- [62] (with K. Kunen and J. D. Phillips) Diassociativity in conjugacy closed loops, *Comm. Algebra* **32** (2004), no. 2, 767–786.
- [63] (with J. D. Phillips) Axioms for trimedial quasigroups, *Comment. Math. Univ. Carolin.* **45** (2004), no. 2, 287–294.
- [64] (with H. Kiechle) Infinite simple Bol loops, *Comment. Math. Univ. Carolin.* **45** (2004), no. 2, 275–278.
- [65] (with J. D. Phillips) Commutants of Bol loops of odd order, *Proc. Amer. Math. Soc.* **132** (2004), no. 3, 617–619
- [66] (with O. Chein, A. Rajah and P. Vojtěchovský) Loops and the Lagrange property, *Results Math.* **43** (2003), no. 1-2, 74–78.
- [67] (with J. D. Phillips) A note on trimedial quasigroups, *Quasigroups Related Systems* **9** (2002), 65–66.
- [68] (with K. Kunen and J. D. Phillips) A generalization of Moufang and Steiner loops, *Algebra Universalis* **48** (2002), no. 1, 81–101.
- [69] (with A. A. Sagle) Nahm algebras, *J. Algebra* **247** (2002), no. 2, 269–294.
- [70] (with K. Kunen and J. D. Phillips) Every diassociative A -loop is Moufang, *Proc. Amer. Math. Soc.* **130** (2002), no. 3, 619–624
- [71] (with D. Alvis) Birkhoff’s theorem for panstochastic matrices, *Amer. Math. Monthly* **108** (2001), no. 1, 28–37.
- [72] (with A. Weinstein) Leibniz algebras, Courant algebroids, and multiplications on reductive homogeneous spaces, *Amer. J. Math.* **123** (2001), no. 3, 525–550.
- [73] (with A. A. Ungar) The gyro-structure of the complex unit disk, *Math. Mag.* **73** (2000), no. 4, 273–284.
- [74] Global left loop structures on spheres, *Comment. Math. Univ. Carolin.* **41** (2000), no. 2, 325–346.
- [75] (with O. Jones) Loops and semidirect products, *Comm. Algebra* **28** (2000), no. 9, 4137–4164.
- [76] (with A. M. Bloch and S. V. Drakunov) Stabilization of nonholonomic systems using isospectral flows, *SIAM J. Control Optim.* **38** (2000), no. 3, 855–874
- [77] (with N. C. Hopkins) Quadratic differential equations in \mathbb{Z}_2 -graded algebras, *Trans. Amer. Math. Soc.* **351** (1999), no. 11, 4545–4559.
- [78] (with N. C. Hopkins) Automorphism eigenspaces of quadratic differential equations and qualitative theory, *Differential Equations Dynam. Systems* **5** (1997), no. 2, 121–138.
- [79] (with S. Walcher) On ordinary differential equations admitting a finite linear group of symmetries, *J. Math. Anal. Appl.* **216** (1997), no. 1, 180–196.
- [80] (with A. A. Sagle) Quadratic dynamical systems and algebras, *J. Differential Equations* **117** (1995), no. 1, 67–126.
- [81] (with A. A. Sagle) Automorphisms and derivations of differential equations and algebras, *Rocky Mountain J. Math.* **24** (1994), no. 1, 135–154.
- [82] (with W. J. Coles) Summability methods for oscillation of linear second-order matrix differential equations, *Rocky Mountain J. Math.* **24** (1994), no. 1, 19–36.
- [83] The adjoint problem for coupled linear operators, *Results Math.* **18** (1990), no. 1-2, 60–73.
- [84] (with R. N. Bryan and D. H. Tucker) Coupled linear operators, *Results Math.* **15** (1989), no. 1-2, 1–14.

Accepted.

- [85] (with M.L. Araújo and M.T. Araújo) The solution of an open problem on semigroup inclusion classes, to appear in *Semigroup Forum*, arXiv:2006.03180

Refereed Articles in Proceedings Volumes.Appeared.

- [86] (with P. Jipsen) Nonassociative right hoops (extended abstract), in *Algebras and Lattices in Hawai'i: honoring Ralph Freese, Bill Lampe, and J.B. Nation*, K. Adaricheva et al (eds.), lulu.com.
- [87] (with W. Bertram) Torsors and ternary Moufang loops arising in projective geometry, in *Algebra, Geometry and Mathematical Physics*, A. Makhlouf et al (eds.), Springer Proceedings in Mathematics & Statistics **85** (2014), pp. 343–360. (Proceedings of the Conference AGMP-7 Mulhouse '11)
- [88] (with R. Veroff and P. Vojtěchovský) Loops with abelian inner mapping groups: an application of automated deduction, in *Automated Reasoning and Mathematics: Essays in Memory of William McCune*, M. P. Bonacina and M. Stickel (eds.), Lecture Notes in Artificial Intelligence **7788**, Springer-Verlag, 2013, 151–164.
- [89] (with A. M. Bloch and S. V. Drakunov) Nonholonomic stabilization and isospectral flows, in *Proceedings of the 37th IEEE Conference on Decision and Control*, 1998, 3581–3586.
- [90] (with A. M. Bloch and S. V. Drakunov) Stabilization of Brockett's generalized canonical driftless system, in *Proceedings of the 36th IEEE Conference on Decision and Control*, 1997, 4260–4265.
- [91] (with A. A. Sagle) Differential systems and algebras, in *Differential equations, dynamical systems, and control science*, 115–141, Lecture Notes in Pure and Appl. Math. **152**, Dekker, New York, 1994.
- [92] Quadratic differential equations on graded structures, in *Nonassociative Algebra and Its Applications*, 215–218, S. Gonzalez (ed.), Math. Appl. **303**, Kluwer, 1994.
- [93] (with A. A. Sagle) Quadratic systems, blow-up, and algebras, in *Nonassociative Algebra and Its Applications*, 367–371, S. Gonzalez (ed.), Math. Appl. **303**, Kluwer, 1994.

Unrefereed Articles.Appeared.

- [94] (with H. C. Myung and A. A. Sagle) Quadratic differential equations, in *Hadronic mechanics and nonpotential interactions, Part 1* (Cedar Falls, IA, 1990), 197–204, Nova Sci. Publ., Commack, NY, 1992.
- [95] (with A. A. Sagle) Quadratic dynamical systems, in K. Yamaguti and N. Kawamoto (eds.), *Nonassociative algebras and related topics* (Hiroshima, 1990), 101–114, World Sci. Publ., River Edge, NJ, 1991.

Pedagogical Articles and Problem Solutions.

- [96] A note on an “unnatural” isomorphism, *Pi Mu Epsilon J.* **10** (Fall 1997), 525–527.
- [97] Solution to Problem 641, *College Math J.* **31** (2000), 63–64.
- [98] Solution to Problem 1626, *Math. Mag.* **75** (2002), 231.

Unpublished Articles.

- [99] Density invariance of certain operational quantities associated to bounded linear operators on normed vector spaces, arXiv:math/0108124v1.

6. TALKS AND PRESENTATIONS

Talks at Professional Meetings. (* indicates an invited talk)

- (*) July 14, 2021: “Semi-quasigroups”, Special Session on Nonclassical Algebra, ENSPM 2021, Lisbon, PT (via Zoom).
- (*) July 12, 2021: “Proof simplification in automated theorem proving”, Special Session on Automated Proofs in Mathematics, ENSPM 2021, Lisbon, PT (via Zoom).
- (*) June 22, 2021: “Quasibands and noncommutative, nonassociative lattices”, Mini-symposium on Noncommutative Structures, 8th European Congress of Mathematics, Pirán, SI (via Zoom).
- (*) Sept. 13, 2019: “Semi-quasigroups”, Special Session on Quasigroups and Loops, Fall Central Sectional AMS Meeting, University of Wisconsin, Madison, WI.
- (*) August 1, 2019: “Latin set-theoretic solutions of the Yang-Baxter equation”, British Combinatorial Conference 2019, University of Birmingham, UK

- (*) April 9, 2019: “Hint selection and prioritization”, AITP’19, Obergurgl, Austria.
- July 13, 2018: “ F -inverse semigroups as $\langle 2, 1, 1 \rangle$ -algebras”, International Conference on Semigroups, University of Lisbon, Portugal
- (*) May 25, 2018: “Nonassociative right hoops”, Workshop on Non-commutative Structures, University of Portoroz, Slovenia
- (*) March 20, 2018: “Loops, automated deduction, and the AIM Conjecture,” Kemper Colloquium, University of Colorado, Boulder, CO.
- August 31, 2017: “Inverse semiquandles”, 4th Mile High Conference on Nonassociative Mathematics, University of Denver, CO
- (*) July 26, 2017: “Loops and their multiplication groups”, All Kinds of Mathematics Reminds Me of You (Peter Cameron Fest), University of Lisbon, Portugal
- (*) July 6, 2017: “Simplicity of Proofs in Automated Reasoning”, Workshop on Proof Simplification and Prover9, Nova University of Lisbon, Portugal
- (*) August 6, 2016: “Loops and the AIM Conjecture: history and progress”, ADAM 2016, University of New Mexico, Albuquerque, NM
- July 13, 2016: “Loops and the AIM Conjecture”, Algebraic Combinatorics and Group Actions, Herstmonceux Castle, UK
- (*) April 4, 2016, “Loops and the AIM Conjecture: history and progress”, AITP 2016: 1st Conference on Artificial Intelligence and Theorem Proving, Obergurgl, AT
- (*) August 8, 2016: “Current status of the AIM Conjecture”, ADAM 2015, University of New Mexico, Albuquerque, NM
- (*) July 21, 2015, “Automorphic loops and their associated permutation groups”, LMS/EPSRC Durham Symposium: Permutation groups and transformation semigroups, University of Durham, Durham, UK.
- (*) July 1, 2015, “Loops with commuting inner mappings: the state of the art”, LOOPS’15, Ohrid, MK
- (*) July 23, 2014, “Forbidden subalgebra theorems in semigroup theory”, Conference on Computational Algebra, Center for Algebra at the University of Lisbon, Lisbon, PT
- (*) July 21, 2014, “Loops and automated deduction”, Conference on Computational Algebra, Center for Algebra at the University of Lisbon, Lisbon, PT
- (*) July 15, 2014, “Loops with commuting inner maps and automated deduction”, Thematic Session on Algebra and Combinatorics, 2014 National Meeting of the Portuguese Mathematical Society, Lisbon, PT
- (*) July 8, 2014, “Loops and automated deduction”, Workshop on The Notion of Proof, Conference on Intelligent Computer Mathematics, Coimbra, PT
- (*) July 2, 2014, “Forbidden subalgebra theorems in semigroup theory”, Algebras & Clones Fest, Prague, CZ.
- (*) June 9, 2014, “Loops and automated deduction”, Scientific Session on Grobner Bases and Computer Algebra, 2014 Canadian Mathematical Society Summer Meeting, Winnipeg, MB, CA.
- August 13, 2013, “Totally automorphic loops”, 3rd Mile High Conference on Nonassociative Mathematics, Denver, CO.
- May 25, 2013, “Automorphic loops”, 2013 Zassenhaus Group Theory Conference, Western Carolina University, Asheville, NC.
- (*) April 28, 2013, “Loops presented by finite automata”, Special Session on Loops, Quasigroups, and Non-associative Division Algebras, Central Sectional Meeting of the AMS, Iowa State University, Ames, IA.
- (*) June 13, 2012 “Loops with abelian inner mapping groups”, ADAM 2012, Northern Michigan University, Marquette, MI.
- (*) July 4, 2012 “Adventures in automated deduction and algebra”, 6th Workshop on Statistics, Mathematics and Computation, Universidade da Beira Interior, Covilhã, PT
- Oct. 22, 2011, “Loops with exponent 3 in all isotopes and latin squares”, Rocky Mountain Discrete Math Days, University of Wyoming, Laramie, WY.
- (*) July 25, 2011, “Inverse Moufang semiloops and their transformation semigroups”, Groups and Semigroups: Interactions and Computations, University of Lisbon, Lisbon, PT
- (*) Nov. 7, 2010: “Loops with abelian inner mapping groups: recent progress”, AMS Special Session on Loops, Quasigroups and Nonassociative Division Algebras, Notre Dame, IN.
- (*) July 1, 2010, “Searching for simple automorphic loops”, Workshop on Algebra 2010, CAUL, University of Lisbon, Lisbon, PT
- (*) Jan. 15, 2010: “Associative Geometry”, AMS Special Session on Representation Theory and Nonassociative Algebras, Joint Mathematics Meetings, San Francisco, CA.

- July 13, 2009, “Several Open Problems”, ADAM Workshop, University of Denver, Denver, CO.
- June 22, 2009, “The Structure of commutative, automorphic loops”, 2nd Milehigh Conference on Nonassociative Mathematics, University of Denver, Denver, CO.
- (*) June 19, 2009, “Cancellativity, modularity and distributivity in skew lattices”, Workshop on Algebra and Logic, Faculty of Science, University of Lisbon, Lisbon, PT
- (*) Apr. 4, 2009, “Loops, quasigroups and automated reasoning”, Kunen Fest, University of Wisconsin, Madison, WI.
- (*) Nov. 8, 2008, “Commutative, automorphic loops”, Southwestern Group Theory Days, Arizona State University, Tempe, AZ.
- Aug. 10, 2008, “Cancellation in skew lattices”, BLAST, University of Denver, Denver, CO.
- July 17, 2008, “Commutative A-loops, Part 2”, ADAM Workshop, University of New Mexico, Albuquerque, NM.
- (*) June 26, 2008, “Leibniz algebra, quasi-Jordan algebras, and their associated Lie grouplike and symmetric spacelike objects”, International Conference on Hermitian Symmetric Spaces, Jordan Algebras and Related Topics, CIRM, Luminy, FR
- (*) Jan. 8, 2008, “Leibniz algebras and their coquecigrues”, Special Session on Representation Theory and Nonassociative Algebras, Joint AMS-MAA Meeting, San Diego, CA.
- Aug. 23, 2007, “Buchsteiner loops”, *Loops07*, Czech Agricultural University, Prague, CZ
- June 22, 2007, “A variety containing quasi-Hilbert algebras”, ADAM Workshop, Albuquerque, NM.
- June 23, 2006, “Loop theory problems for which automated deduction might be useful”, ADAM Workshop, Albuquerque, NM.
- (*) July 9, 2005, “A Survey of Osborn Loops”, Plenary Address, Mile High Conference on Loops, Quasigroups, and Nonassociative Systems, Denver, CO.
- (*) May 23, 2005, “Generalizations of F-quasigroups and semimedial quasigroups,” Workshop on Nonassociative Binary Systems of nonLie Type, Charles University, Prague, CZ
- Jan. 7, 2004, “The Cocquecigrue of a Leibniz Algebra”, Joint Mathematics Meetings, Phoenix, AZ.
- Aug. 14, 2003, “Loop Isotopes of F-quasigroups and their Paramedial-like Analogs”, *Loops03*, Czech Agricultural University, Prague, CZ
- Aug. 8-10, 2003, “Introduction to Smooth Loops I, II, III”, *Loops03* Workshop, Czech Agricultural University, Prague, CZ
- (*) Aug. 4, 2003, “The Cocquecigrue of a Leibniz Algebra”, AlanFest (conference in honor of the 60th birthday of Alan Weinstein), Erwin Schrödinger Institute, Vienna, AT
- (*) Jan. 2003, “Symplectic Geometry of Prüfer Transformations”, Special Session on Discrete Dynamics and Difference Equations, Joint Mathematics Meetings, Baltimore, MD.
- (*) Jan. 8, 2002, “Oscillation of 2nd Order, Linear, Matrix Differential Equations on Measure Chains”, Special Session on Dynamic Equations on Time Scales, Joint Mathematics Meetings, San Diego, CA.
- May 25, 2001, “The Early History of Quasigroup/Loop Theory”, Annual Meeting of the CSHPM, University of Laval, Quebec City, Quebec, CA.
- Jan. 11, 2001, “Euler and Some Paradoxes of Integral Calculus”, MAA Session on The Mathematics of Euler and His Times, Joint Mathematics Meetings, New Orleans, LA.
- April 8, 2000, “From Bol to Bruck”, Special Session on Quasigroups, Loops, and their Applications, Central Section AMS Meeting, University of Notre Dame, Notre Dame, IN.
- (*) Jan. 15, 2000, “A Loop Structure on the Complex Hyperbolic Plane”, Special Session on Complex Hyperbolic Geometry and the Heisenberg Group, Joint Mathematical Meetings, Washington, D.C.
- Oct. 16, 1999, “How To Add Vectors”, Fall Meeting of the Indiana Section of the MAA, Valparaiso University, Valparaiso, IN.
- July 29, 1999, “Global Left Loop Structures on Spheres”, *Loops99* Conference, Czech Agricultural University, Prague, CZ
- May 6-8, 1999, “Stabilization of Nonholonomic Systems Using Isospectral Flows” (Poster), Michigan Interdisciplinary Mathematics Meeting II, University of Michigan, Ann Arbor, MI.
- Jan. 16, 1999, “Stabilization of Nonholonomic Systems Using Isospectral Flows”, AMS Session on Differential Equations & Dynamical Systems, Joint Mathematics Meeting, San Antonio, TX.
- Nov. 7, 1997, “Stabilization of Brockett’s Generalized Canonical Driftless System”, Third Midwest-Southeastern Atlantic Joint Regional Conference on Differential Equations, Vanderbilt University, Nashville, TN.
- (*) Sept. 27, 1997, “Gyrogroups and Non-Euclidean Geometry”, Special Session on Non-Euclidean and Spacetime Geometry, Meeting of the American Mathematical Society, Montreal, Quebec, CA

May 31, 1996, “Ordinary Differential Equations Admitting Finite Linear Symmetry Groups”, First International Conference on Differential Equations and Dynamical Systems, Southwest Missouri State University, Springfield, MO.

Oct. 22, 1995, “Algebraic Structures Arising from the ER Decomposition”, Third Matrix Symposium, Western Michigan University, Kalamazoo, MI.

(*) Nov. 12, 1994, “Gyrogroups, Symmetric Spaces, and Lie Triple Systems”, Special Session on Nonassociative Algebras, 896th Meeting of the American Mathematical Society, University of Richmond, Richmond, VA.

May 1994, “Difference Equations and Algebras”, First International Conference on Difference Equations, Trinity University, San Antonio, TX.

July 17, 1993, “Quadratic Differential Equations and Graded Structures”, Third International Conference on Nonassociative Algebra and Its Applications, Oviedo, ES

Nov. 13, 1992, “Quadratic Differential Equations with Automorphisms of Finite Order”, Midwest-Southeastern Atlantic Second Joint Regional Conference on Differential Equations, University of Kentucky, Louisville, KY.

Invited Colloquia and Seminars.

August 10, 2020: “Loops with abelian inner mapping groups and automated deduction”, La Trobe University General Algebra Seminar (via Zoom).

October 14, 2019: “Latin set-theoretic solutions of the Yang-Baxter equation”, Algebra Seminar, Nova University of Lisbon, PT.

March 18, 2018: “Loops, Automated Deduction and the AIM Conjecture”, University of Colorado, Boulder, CO.

Sept. 7, 2012: “Quasigroups, loops and automated deduction”, University of Saskatchewan, Saskatoon, SK, CA.

Feb. 25, 2011: “Applications of automated reasoning to loop and quasigroup theory”, University of South Florida, Tampa, FL, USA.

Dec. 2, 2010: “Automorphic loops”, University of Oulu, Oulu, Finland.

June 8, 9, 15, 2009, “Automated Deduction and Algebra I, II and III”, Invited Lecture Series, Center of Algebra, University of Lisbon, Lisbon, Portugal.

June 5, 2009, “Applications of Automated Deduction to Loop and Quasigroup Theory (or: How I Learned to Stop Worrying and Start Letting Computers Prove Theorems)”, Colóquio de Álgebra e Combinatória, Center of Algebra, University of Lisbon, Lisbon, Portugal

April 13, 2009, “Applications of Automated Deduction to Loop and Quasigroup Theory (or: How I Learned to Stop Worrying and Start Letting Computers Prove Theorems)”, CU Kempner Colloquium, University of Colorado, Boulder, CO.

April 11, 2008, “Cancellation and distributivity in skew lattices”, Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, Ft. Collins, CO.

June 5, 2008, “Leibniz algebras and their coquecigrues: recent progress”, IECN Mathematics Colloquium, Nancy, France

March 28, 2008, “How to Add Vectors”, Mathematics Colloquium, Western States College, Gunnison, CO.

Oct. 26, 2007, “Applications in Automated Reasoning in Quasigroup Theory and Loop Theory”, Graduate Seminar, University of Denver, Denver, CO.

Oct. 19, 2007, “Applications in Automated Reasoning in Quasigroup Theory and Loop Theory”, Mathematics Colloquium, Auburn University, Montgomery, AL.

Dec. 1, 2006, “A classical correspondence and some generalizations”, Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, Ft. Collins, CO.

Feb. 3, 2006, “Leibniz Algebras and their Coquecigrues: Recent Progress”, Graduate Seminar, University of Denver, Denver, CO.

June 20, 2005, “Quasigroups, Loops, and Automated Reasoning”, Institute of Mathematics Colloquium, University of Santiago de Compostela, Spain.

July 6, 2004, “The Coquecigrue of a Leibniz Algebra: Recent Progress”, Institute of Mathematics Colloquium, University of Santiago de Compostela, Spain.

Oct. 31, 2003, “Adventures in Automated Reasoning”, Pi Mu Epsilon Colloquium, Western Michigan University, Kalamazoo, MI.

Nov. 22, 2002, “Loops, Quasigroups, and Automated Reasoning”, Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, Ft. Collins, CO.

Nov. 21, 2002, “Difference Equations and Algebras”, Mathematics Colloquium, University of Wyoming, Laramie, WY. Laramie, WY.

Nov. 5, 2002, “How To Add Vectors”, Mathematics Colloquium, Wabash College, Crawfordsville, IN.

- Nov. 2, 2001, “How To Add Vectors”, Pi Mu Epsilon Colloquium, Western Michigan University, Kalamazoo, MI.
- March 17, 2001, “How To Add Vectors”, Mathematics Colloquium, Coker College, Hartsville, SC.
- March 9, 2001, “Differential Equations and Algebras”, Mathematics Colloquium, Western Michigan University, Kalamazoo, MI.
- Feb. 23, 2001, “How To Add Vectors”, Mathematics Colloquium, Southeastern Louisiana University, Hammond, LA.
- Feb. 9, 2001, “How To Add Vectors”, Mathematics Colloquium, Union College, Schenectady, NY.
- Oct. 19, 2000, “Leibniz algebras, Courant algebroids, and multiplications on homogeneous spaces”, Mathematics Colloquium, Western Michigan University, Kalamazoo, MI.
- May 31, 2000, “Smooth Loops, Differential Geometry, and Spheres”, Differential Geometry Seminar, University of California, Berkeley, CA.
- March 10, 2000, “Differential Equations and Algebras”, Mathematics Colloquium, Northeastern Illinois University, Chicago, IL.
- March 12, 1998, “Chaos: The Hying of an Old Science”, Deans’ Seminar, Indiana University South Bend, South Bend, IN.
- June 12, 1997, “Gyrogroups: A Generalization of Groups”, Mathematics Colloquium, Indiana State University, Terre Haute, IN.
- Mar. 11, 1994, “The Complex Unit Disk”, Mathematics Colloquium, Indiana University South Bend, South Bend, IN.
- Oct. 2, 1992, “From Magic Squares to Symmetric Spaces”, Mathematics Colloquium, Indiana State University, Terre Haute, IN.

7. PROFESSIONAL SERVICE

Editing.

Editorial Boards.

- 2005-2010 *Journal of Generalized Lie Theory*
- 2004- *Quasigroups and Related Systems*
- 2003-2005 *College Mathematics Journal* (editor of “Classroom Capsules”)

Special Issues and Proceedings Volumes.

- Co-editor, Special Issue of *The Art of Discrete and Applied Mathematics*, the Proceedings of the Workshop on Non-commutative Structures, to appear in 2020.
- Co-editor, *Nonassociative Mathematics and its Applications*, AMS Contemporary Mathematics **721** (2019), 297 pp.
- Co-editor, *Comment. Math. Univ. Carolin.* **56** (2016), no. 2: the Proceedings of *Loops15*.
- Co-editor, *Comment. Math. Univ. Carolin.* **51** (2010): the Proceedings of the *2nd Milehigh Conference on Nonassociative Mathematics*.
- Co-editor, *Comment. Math. Univ. Carolin.* **49** (2008), no. 2: the Proceedings of *Loops07*.
- Co-editor, *Comment. Math. Univ. Carolin.* **45** (2004), no. 2: the Proceedings of *Loops03*.
- Co-editor, *Comment. Math. Univ. Carolin.* **41** (2000), no. 2: the Proceedings of *Loops99*.
- 2000-2002 Editor of the *Proceedings of the Canadian Society for History and Philosophy of Mathematics*, published annually. (Also served on the Society’s Executive Council.)

Refereeing and Reviewing.

Referee for about 10 to 12 papers per year. I no longer keep track of the journals.

Reviewer for *Mathematical Reviews*, 1992–2005

Organization of Conferences, Workshops, Etc.

- Co-organizer (with Karin Cvetko-Vah, Tomaž Pisanski, Joao Costa), Mini-Symposium on Noncommutative Structures, 8th European Congress of Mathematics, Portorož, Slovenia, June 20–26 2021.
- Co-organizer (with Ben Steinberg), Special Session on Recent Trends in Semigroup Theory, Joint Math Meetings, Denver, CO, January 15–18 2020.
- Co-chair (with P. Vojtěchovský), Organizing Committee, *4th Milehigh Conference on Nonassociative Mathematics*, University of Denver, Denver, CO, July 29–August 5, 2017.

Co-organizer (with Ben Steinberg), Special Session on Recent Trends in Semigroup Theory, Western Sectional AMS Meeting, University of Denver, Denver, CO, October 8–9, 2016.

Co-chair (with P. Vojtěchovský), Organizing Committee, *3rd Milehigh Conference on Nonassociative Mathematics*, University of Denver, Denver, CO, August 11–17, 2013.

Co-chair (with P. Vojtěchovský), Organizing Committee, *2nd Milehigh Conference on Nonassociative Mathematics*, University of Denver, Denver, CO, June 21–27, 2009.

Local Co-organizer (with Petr Vojtěchovský), *ADAM 2009*, University of Denver, Denver, CO, July 12–14, 2009.

Program Committee, *Loops07*, Czech Agricultural University, Prague, Czech Republic, Aug. 10–17, 2003.

Program Committee, *Loops03*, Czech Agricultural University, Prague, Czech Republic, Aug. 10–17, 2003.

Co-organizer (with J. D. Phillips) of the Special Session on Quasigroups and Loops and their Applications, Central Section Meeting of the AMS, Notre Dame, IN, April 7–9, 2000.

Program Committee, *Loops99*, Czech Agricultural University, Prague, Czech Republic, July 27–30, 1999.

Other Professional Service.

2000– Owner of email list *LoopForum*.

Affiliations.

Member of the American Mathematical Society.

8. UNIVERSITY SERVICE

University of Denver.

2015–2018 Department Chair

2014–2015 Graduate Council

2013–2015 NSM Promotion & Tenure Committee

2013–2015 Graduate Coordinator, Department of Mathematics

2006–2011 NSM Faculty Committee (chair: Fall 2008, 2009–2011)

2007–2012 Graduate Coordinator, Department of Mathematics

2009–2011 Faculty Advisor for IIME Honors Society, Department of Mathematics

Departmental committees too numerous to mention, sometimes as chair

Indiana University South Bend.

2003–2005 Graduate Director, M.S. Program in Applied Math. and Computer Science

1997–2003 Faculty Advisor for the Student Chapter of the MAA.

1998–2001 MAA Liaison

1995–2001 Webmaster for Department of Mathematical Sciences,

Departmental and College committees, too numerous to list or even count.

9. TEACHING

Dissertations and Theses Supervised.

University of Denver.

2022 (expected), PhD Dissertation, Nicholas Britten

2021 (expected), PhD Dissertation, Mariah Barnes

2013 PhD Dissertation, Mark Greer, *Loops and their associated groups*.

2010 Undergraduate Honors Thesis, Mimi Bau, *The Golden Ratio*.

Indiana University South Bend.

1998 Honors Thesis, Amanda K. Schermer, *Dynamics of quadratic maps on 2×2 matrices*.

1998 Honors Thesis, Dean L. Johnson, *Generalizations of Cavalieri's Principle*.

PhD Dissertation Committees.

University of Denver.

Gavin St John (2019), Wesley Fussner (2018), Masoumah Al-Ali (2017), Mouna Aboras (2015), Jenya Kirshtein (2012), Daniel Daly (2009), Aditya Nagrath (2008)

University of Nantes, France (External reviewer).

Simon Covez (2010)

University of Oulu, Finland (External examiner).

Miikka Rytty (2010), Emma Leppala (2017)

Courses Taught.University of Denver.

Graduate: Lie Groups and Lie Algebras, Rings and Modules, Group Theory, Category Theory, Semigroup Theory, Loop Theory, Permutation Groups

Undergraduate: Calculus I, II, II (regular and honors), Linear Algebra, Discrete Mathematics, Introduction to Abstract Algebra, Partial Differential Equations, History of Mathematics, Mathematical Reasoning and Proofs, various First Year Seminars, various Foundations Seminars

Countless independent studies

Indiana University South Bend.

Graduate: Control Theory

Undergraduate: Precalculus, Trigonometry, Finite Mathematics, Brief Survey of Calculus, Calculus I, II (regular, honors), Linear Algebra, Discrete Mathematics, Ordinary Differential Equations, Partial Differential Equations, History of Mathematics, Introduction to Analysis I, II, Complex Variables, Reading Courses: Difference Equations, Fractal Geometry

Western Michigan University.

Graduate: Partial Differential Equations

Undergraduate: Calculus; Differential Equations and Linear Algebra, Reading Course: Integral Equations

University of Utah.

Undergraduate: Intermediate Algebra, College Algebra, Calculus I, II, III (regular and honors), Ordinary Differential Equations (engineers), Partial Differential Equations (engineers), Linear Algebra and Multivariable Calculus (engineers), Introduction to Analysis (secondary education majors)