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Research Interests

Commutative algebra, Algebraic and discrete geometry, hyperplane arrangements, computational algebra, algebraic coding theory, splines approximation.

Professional Experience

2019-present Associate Professor, University of Idaho.

2013-2019 Assistant Professor, University of Idaho.

2010-2013 Postdoctoral Fellow and Assistant Professor, University of Western Ontario.

2007-2010 Visiting Assistant Professor, University of Cincinnati.

Summer 2007 Adjunct Assistant Professor, Texas A&M University.

2002-2007 Graduate Teaching Assistant, Texas A&M University.

Education

Ph.D. in Mathematics, Texas A&M University (2007). Advisor Dr. Hal Schenck. Thesis Title: Homological Algebra and Problems in Combinatorics and Geometry.

M.S. in Mathematics (Analysis), University of Bucharest (2001).

M.S. in Mathematics (Algebra), University of Bucharest (1999).

B.S. in Mathematics, University of Bucharest (1997).

Publications

Published, Accepted and Submitted

1. Formal arrangements with modular coatoms, Submitted.
2. On the Jacobian ideal of an almost generic hyperplane arrangement (with R. Burity and A. Simis), *Proc. Amer. Math. Soc.* (2022), to appear; a version is available at arXiv: 2101.02735.
3. Logarithmic derivations associated to line arrangements (with R. Burity), *J. of Algebra*, **581** (2021), 327–352.
4. Combinatorial views on the geometric and homological properties of fold products of linear forms (with R. Burity and Y. Xie), Submitted; a version is available at arXiv: 2004.07430.
5. On the Geramita-Harbourne-Migliore conjecture (with Y. Xie), *Trans. Amer. Math. Soc.*, **374** (2021), 4059–4073.
6. On the containment problem for fat points ideals (with Y. Xie), *Proc. Amer. Math. Soc.*, **148** (2020), 2411–2419.
7. GMD functions for scheme-based linear codes and algebraic invariants of Geramita ideals (with S. Cooper, A. Seceleanu, M. Vaz Pinto and R. Villarreal), *Advances Applied Math.*, **112** (2020), 101940.

8. On ideals generated by a -fold products of linear forms, *J. Commutative Algebra*, **13** (2021), 549–570.
9. A blowup algebra for hyperplane arrangements (with M. Garrouasian and A. Simis), *Algebra & Number Theory*, **12** (2018), 1401–1429.
10. Subspace arrangements as generalized star configurations, *Mathematische Nachrichten*, **290** (2017), 3029–3037.
11. Generalized star configurations and the Tutte polynomial (with B. Anzis and M. Garrouasian), *J. Algebraic Combinatorics*, **46** (2017), 165–187.
12. On the geometry of real or complex supersolvable line arrangements (with B. Anzis), *J. Combin. Theory Ser. A*, **140** (2016), 76–96.
13. On a conjecture of Vasconcelos via Sylvester forms (with R. Burity and A. Simis), *J. of Symbolic Computation*, **77** (2016), 39–62.
14. Projective duality of arrangements with quadratic logarithmic vector fields, *Discrete Mathematics*, **339** (2016), 54–61.
15. Minimum distance of linear codes and the α -invariant (with M. Garrouasian), *Advances Applied Math.*, **71** (2015), 190–207.
16. Star Configurations are Set-Theoretic Complete Intersection, *Archiv der Mathematik*, **105** (2015), 343–349.
17. Error-correction of linear codes via colon ideals (with B. Anzis), *J. of Algebra (C.S.)*, **443** (2015), 479–493.
18. The ubiquity of Sylvester forms in almost complete intersections (with A. Simis), *Collectanea Mathematica*, **66** (2015), 1–31.
19. Finding Inverse Systems from Coordinates, *J. of Algebra*, **400** (2014), 72–77.
20. Modular decomposition of the Orlik-Terao algebra of a hyperplane arrangement (with G. Denham and M. Garrouasian), *Annals of Combinatorics*, **18** (2014), 289–312.
21. Homology of homogeneous divisors (with A. Simis), *Israel J. Math.*, **200** (2014), 449–487.
22. A commutative algebraic approach to the fitting problem, *Proc. Amer. Math. Soc.*, **142** (2014), 659–666.
23. A computational criterion for the supersolvability of line arrangements, *Ars Combinatoria*, **117** (2014), 217–223.
24. From Spline Approximation to Roth’s Equation and Schur Functors (with J. Minac), *Manuscripta Math.*, **142** (2013), 101–126.
25. On freeness of divisors on \mathbf{P}^2 , *Communications in Algebra*, **41** (2013), 2916–2932.
26. Growth of the ideal generated by a quadratic multivariate function over $GF(3)$ (with T. Hodges, J. Ding, V. Kruglov and D. Schmidt), *J. of Algebra and Its Applications*, **12** (2013), 1250219-1 to 23.
27. Bounding invariants of fat points using a coding theory construction (with A. Van Tuyl), *J. of Pure and Applied Algebra* **217** (2013), 269–279.
28. The minimum distance of sets of points and the minimum socle degree, *J. of Pure and Applied Algebra* **215** (2011), 2645–2651.
29. On the De Boer-Pellikaan method for computing minimum distance, *J. of Symbolic Computation* **45** (2010), 965–974.
30. Lower bounds on minimal distance of evaluation codes, *Applicable Algebra in Engineering Communications and Computing* **20** (2009), 351–360.
31. The Orlik-Terao algebra and 2-formality (with H. Schenck), *Mathematical Research Letters* **16** (2009), 171–182.

32. Freeness of Conic-Line Arrangements in \mathbf{P}^2 (with H. Schenck), *Commentarii Mathematici Helvetici* **84** (2009), 235-258.
33. Mutant Gröbner basis algorithm (with J. Ding, D. Cabarcas, D. Schmidt and J. Buchmann), Proceedings of the 1st international conference on Symbolic Computation and Cryptography, Beijing, LMIB, pp. 16-22 (2008).
34. Topological criteria for k -formal arrangements, *Beitrage zur Algebra und Geometrie* **48** (2007), 27-34.
35. Smooth planar r -splines of degree $2r$, *J. of Approximation Theory* **132** (2005), 72-76.

Work in progress and other publications and preprints

1. On some ideals with linear free resolutions (not published), a version is available at arXiv: 1906.02422.
2. Equivalent matrices up to permutations (with J. Vargas) (not published), a version is available at arXiv: 1805.08343.
3. Practical Course of Linear Algebra with 327 Solved Questions and Exercises (with R.-M. Danet), in romanian, Matrix Rom Publishing, 295 pages, Bucharest 2004.
4. On some locally complete intersection ideals, in romanian, in The Preprints of the Department of Mathematics, Civil Engineering University of Bucharest, pp. 144-145, Bucharest 2001.
5. A note on the UFD of $k[[x_1, x_2, x_3]]/I$, *Bull. Math. Soc. Sc. Math. Roumanie* **43** (2000), 55-59.

Editorial Work

Referee Reports (35 articles): Computers and Mathematics with Applications, Ars Combinatoria, Proceedings of MEGA 2009, Journal of Commutative Algebra (2), Journal of Symbolic Computation (2), Advances of Mathematics in Communications, SIAM Journal on Discrete Mathematics, Applicable Algebra in Engineering Communication and Computing (5), The American Mathematical Monthly, Journal of Algebraic Combinatorics (5), Journal of Pure and Applied Algebra (3), Journal of Combinatorial Theory - Series A, Discrete Mathematics, Computer Aided Geometric Design, Geometriae Dedicata, Journal of Algebra, Graphs & Combinatorics, Journal of Algebra and Its Applications, European Journal of Math, Advances in Mathematics, Advances in Applied Math, Rocky Mountain Journal, Linear Algebra and Its Applications.

Reviewer for Zentralblatt Math and Mathematical Reviews: 47 articles.

Invited Talks and Other Presentations

Invited Conference Talks

1. Combinatorial views on the geometric and homological properties of fold products of linear forms, 60 minutes talk, Escola de Verão 2022 (Virtual), Universidade Federal da Paraíba, **Brazil**, February 2022.
2. On the Jacobian ideal of an almost generic hyperplane arrangement, 20 minutes talk, Special Session on Hyperplane arrangements in connection with Commutative Algebra, AMS Meeting (Virtual), **Albuquerque NM**, October 2021.
3. Free arrangements with low exponents, MiniWorkshop (online): Logarithmic Vector Fields and Freeness of Divisors and Arrangements: New perspectives and applications, Mathematisches Forschungsinstitut Oberwolfach (MFO), **Oberwolfach Germany**, February 2021.
4. Star configurations and symbolic powers, MiniWorkshop: Asymptotic Invariants of Homogeneous Ideals, Mathematisches Forschungsinstitut Oberwolfach (MFO), **Oberwolfach Germany**, October 2018.
5. A blow up algebra for hyperplane arrangements, 20 minutes talk, Special Session on Arrangements, AMS Meeting, **Boston MA**, April 2018.
6. Interpolating with generalized star configurations, 25 minutes talk, Minisymposium on multivariate splines and algebraic geometry, SIAM Conference on Applied Algebra and Geometry, **Atlanta GA**, August 2017.
7. Generalized star configurations, 20 minutes talk, Special Session on Commutative Algebra and Its Interactions with Combinatorics and Algebraic Geometry, AMS Meeting, **Fargo ND**, April 2016.

8. The set-theoretic complete intersection property of some subspace arrangements, 20 minutes talk, Special Session on Combinatorial and Computational Commutative Algebra and Algebraic Geometry, AMS Meeting, **Salt Lake City UT**, April 2016.
9. Ideals generated by products of linear forms, 20 minute talk, Special Session on Hyperplane Arrangements and Applications, AMS National Meeting, **Baltimore MD**, January 2014.
10. Hyperplane arrangements with many (two) Euler vector fields, 20 minute talk, Special Session on Combinatorial Commutative Algebra, AMS Meeting, **Louisville KY**, October 2013.
11. From Spline Approximation to Roth's Equation and Schur Functors, 20 minute talk, Special Session on Approximation Theory, Geometric Modelling, and Algebraic Geometry, AMS Meeting, **New Orleans LA**, October 2012.
12. The variety of codewords of minimum weight, 20 minutes talk, Special Session on Algebraic Geometry and its Applications, AMS Meeting, **Lawrence KS**, March 2012.
13. An interesting property of logarithmic derivations, 60 minutes talk, PIMS-Hyperplane Arrangements and Applications, **Vancouver BC**, August 2011.
14. Points, Regularity, Minimum Distance, 20 minutes talk, Special Session on Hilbert Function in Commutative Algebra and Algebraic Combinatorics, AMS Meeting, **Notre Dame IN**, November 2010.
15. Gorenstein evaluation codes, 20 minutes talk, Special Session on Advances in Algebraic Coding Theory, AMS Meeting, **Lexington KY**, March 2010.
16. The minimal distance of evaluation codes, 20 minutes talk, Special Session on Applicable Algebraic Geometry, AMS Meeting, **Waco TX**, October 2009.
17. Smooth planar r -splines of degree $2r$, 30 minutes talk, 2nd International Workshop on Algebraic Geometry and Approximation Theory, Towson University, **Towson MD**, April 2009.
18. The Orlik-Terao algebra and formal arrangements, 25 minutes talk, Special Session on Arrangements and Related Topics, AMS Meeting, **Baton Rouge LA**, March 2008.
19. Freeness of Line-Conic Arrangements in \mathbf{P}^2 , 20 minutes talk, Special Session on Arrangements and Related Topics, AMS National Meeting, **New Orleans LA**, January 2007.
20. Line-Conic arrangements in \mathbf{P}^2 , 30 minutes talk, MSRI workshop on Arrangements and Configuration Spaces, **Berkeley CA**, August 2006.
21. Topological Criteria for k -Formal Arrangements, 30 minutes talk, Special Session on Arrangements and Configuration Spaces, AMS Meeting, **Durham NH**, April 2006.

Workshops, meetings organization

1. Summer 2018: Co-organizer (with Susan Cooper, Alexandra Seceleanu, Maria Vaz Pinto and Rafael Villarreal) "Interactions between Coding Theory and Commutative Algebra", Research Focus Group, Banff International Research Station (BIRS), Banff Alberta, July 22-28.
2. Spring 2017: Co-organizer (with Hiro Abo and Alex Woo) Special Session on Combinatorial and Computational Commutative Algebra and Algebraic Geometry in AMS Spring Western Sectional Meeting at Washington State University, April 22-23.
3. Spring 2017: Co-organizer (with Somantika Datta) "Showcase of Student Research in Mathematics" at University of Idaho, April 6.
4. Fall 2014: Co-organizer (with Hiro Abo, Zach Teitler, and Alex Woo) Western Algebraic Geometry Symposium at University of Idaho, October 11-12, 2014.
5. Summer 2007: TA/Assistant Organizer, IMA Workshop "Applicable Algebraic Geometry", Texas A&M University.

Seminars, Colloquium and Other Presentations

1. Ideals generated by fold products of linear forms (online), *Algebra Seminar*, University of Idaho, **Moscow ID**, January 2022.
2. Linear codes with prescribed projective codewords of minimum weight (online), *Seminar in Coding Theory and Cryptography*, University of Zürich, **Switzerland**, March 2021.
3. Projective schemes derived from linear codes, *Algebra Seminar*, Boise State University, **Boise ID**, October 2019.
4. Symbolic powers of homogeneous ideals: the containment problem, *Colloquium*, University of Idaho, **Moscow ID**, February 2019.

5. Codes constructed from graphs, *Research Focus Group*, BIRS, **Banff AB**, July 2018.
6. Subspace arrangements as generalized star configurations, *Colloquium*, University of Idaho, **Moscow ID**, September 2017.
7. Interpolating subspace arrangements, *Algebra Seminar*, University of Idaho, **Moscow ID**, December 2016.
8. On some Rees algebras of hyperplane arrangements, *Algebra Seminar*, University of Oregon, **Eugene OR**, October 2016.
9. From linear codes to generalized star configurations and beyond, *Colloquium*, University of Oregon, **Eugene OR**, October 2016.
10. Set-theoretic complete intersection of subspace arrangements, *Algebra Seminar*, University of Idaho, **Moscow ID**, January 2016.
11. The Fitting module of a linear code, *CLaN Seminar*, Washington State University, **Pullman WA**, October 2015.
12. On the geometry of supersolvable line arrangements, *Algebra Seminar*, University of Idaho, **Moscow ID**, March 2015.
13. Brief intro to splines approximation via commutative algebra, *Algebra Seminar*, University of Idaho, **Moscow ID**, April 2014.
14. Hyperplane arrangements with low degree logarithmic vector fields, *Colloquium*, University of Idaho, **Moscow ID**, March 2014.
15. Linear Codes from Commutative Algebraic Perspectives, *Job Colloquium*
 - (a) University of South Florida, **Tampa, FL**, February 2013.
 - (b) Georgia Southern University, **Statesboro, GA**, February 2013.
 - (c) University of Manitoba, **Winnipeg MB**, March 2013.
 - (d) University of Idaho, **Moscow ID**, March 2013.
16. Coding Theory and a Problem in Plane Geometry, *Undergraduate Math Seminar*, University of Western Ontario, **London ON**, January 2012.
17. Splines approximation and homology, *Algebra Seminar*, University of Western Ontario, **London ON**, September 2011.
18. Fitting points in hyperplanes, *Queen's Algebraic Geometry Seminar*, Queen's University, **Kingston ON**, January 2011.
19. Minimum distance of linear codes and geometry of points, *Algebra Seminar*, University of Western Ontario, **London ON**, September 2010.
20. The XL algorithm and the cohomology of algebra of regular functions of the affine space over a finite field, *Algebra Seminar*, SUNY-Buffalo, **Buffalo NY**, April 2010.
21. Ideals generated by products of linear forms and minimum distance of linear codes, *Colloquium*, University of South Florida, **Tampa, FL**, April 2010.
22. Supersolvable line arrangements: a computational approach, *Discrete CATS Seminar*, University of Kentucky, **Lexington KY**, February 2010.
23. Hyperplane Arrangements: Orlik-Terao Algebra and Formality (I,II,III), *Algebra Seminar*, University of Cincinnati, **Cincinnati OH**, October 2008.
24. Gorenstein evaluation codes and their minimum distance (I,II,III), *Algebra Seminar*, University of Cincinnati, **Cincinnati OH**, October 2007.
25. Homological Algebra and Problems in Combinatorics and Geometry, *Defense*, Texas A&M University, **College Station TX**, March 2007.
26. Introduction to Coding Theory: two preparation lectures for Introductory Workshop for Algebraic Coding Theory, Texas A&M, **College Station TX**, May 2006.
27. Basics of cohomology with a specific example: Hyperplane Arrangements, *Graduate Student Seminar*, Texas A&M, **College Station TX**, December 2005.
28. Cominuscule Algorithm, *Working Seminar on Geometry and Lie Theory*, Texas A&M, **College Station TX**, November 2005.
29. Geometric Plethysm and Representations, *Working Seminar on Representation Theory*, Texas A&M, **College Station TX**, August 2005.

Teaching Experience as Instructor

- Spring 2022: **University of Idaho** - Groups and Fields II (MATH 556: graduate level course in Algebra. Galois Theory, Representation of groups).
- Spring 2022: **University of Idaho** - Linear Algebra (MATH 330: Linear systems, matrices, determinants, vector spaces, bases, linear transformations).
- Fall 2021: **University of Idaho** - Groups and Fields I (MATH 555: graduate level course in Algebra. Groups, Sylow theorems, Fields).
- Fall 2021: **University of Idaho** - Cryptography (MATH 415: crypto systems, RSA, basic number theory).
- Spring 2021: **University of Idaho** - Abstract Algebra II (MATH 462: rings, ideals, rings of polynomials, fields, field extensions).
- Spring 2021: **University of Idaho** - Linear Algebra (MATH 330: Linear systems, matrices, determinants, vector spaces, bases, linear transformations).
- Fall 2020: **University of Idaho** - Abstract Algebra I (MATH 461: groups and subgroups, homomorphisms of groups, fundamental theorem of finite Abelian groups).
- Fall 2020: **University of Idaho** - Advanced Linear Algebra (MATH 430).
- Spring 2020: **University of Idaho** - Discrete Math II (MATH 376: combinatorics, graph theory, modeling, optimization).
- Spring 2020: **University of Idaho** - Linear Algebra (MATH 330: Linear systems, matrices, determinants, vector spaces, bases, linear transformations).
- Fall 2019: **University of Idaho** - Cryptography (MATH 415: crypto systems, RSA, basic number theory).
- Fall 2019: **University of Idaho** - Discrete Math I (MATH 176: logic, counting techniques, graph theory).
- Spring 2019: **University of Idaho** - Calculus III (MATH 275: vector calculus, multivariate differentiation and integration).
- Spring 2019: **University of Idaho** - course coordinator for Calculus II (MATH 175: applications of integration, sequences, series).
- Fall 2018: **University of Idaho** - Cryptography (MATH 415: crypto systems, RSA, basic number theory).
- Fall 2018: **University of Idaho** - Discrete Math I (MATH 176: logic, counting techniques, graph theory).
- Spring 2018: **University of Idaho** - Complex Variables (MATH 420: complex numbers, analytic functions, complex integration, residues).
- Spring 2018: **University of Idaho** - Discrete Math I (MATH 176: logic, counting techniques, graph theory).
- Spring 2018: **University of Idaho** - Discrete Math I (MATH 176: logic, counting techniques, graph theory) - Engineering Outreach (online).
- Fall 2017: **University of Idaho** - Cryptography (MATH 415: crypto systems, RSA, basic number theory).
- Fall 2017: **University of Idaho** - Abstract Algebra I (MATH 461: groups and subgroups, homomorphisms of groups, fundamental theorem of finite Abelian groups).
- Spring 2017: **University of Idaho** - Intro to Algebraic Geometry (MATH 558: graduate level course. Dimension theory, Varieties, Algebraic Curves).
- Spring 2017: **University of Idaho** - Discrete Math I (MATH 176: logic, counting techniques, graph theory).
- Fall 2016: **University of Idaho** - Ring Theory (MATH 557: graduate level course in Algebra. Commutative rings, Localization, Chain conditions on modules).
- Fall 2016: **University of Idaho** - Linear Algebra (MATH 330: Linear systems, matrices, determinants, vector spaces, bases, linear transformations).
- Spring 2016: **University of Idaho** - Groups and Fields II (MATH 556: graduate level course in Algebra. Galois Theory, Representation of groups).

Spring 2016: **University of Idaho** - Linear Algebra (MATH 330: Linear systems, matrices, determinants, vector spaces, bases, linear transformations).

Fall 2015: **University of Idaho** - Calculus I (MATH 170, 2 sections: limits, continuity, differentiation, integration, applications).

Fall 2015: **University of Idaho** - Groups and Fields I (MATH 555: graduate level course in Algebra. Groups, Sylow theorems, Fields).

Summer 2015: **University of Idaho** - Ordinary Differential Equations (MATH 310, both Summer terms).

Spring 2015: **University of Idaho** - Ordinary Differential Equations (MATH 310: first-order differential equations, systems of differential equations).

Fall 2014: **University of Idaho** - Calculus III (MATH 275: vector calculus, multivariate differentiation and integration).

Fall 2014: **University of Idaho** - Discrete Math I (MATH 176: logic, counting techniques, graph theory).

Spring 2014: **University of Idaho** - Discrete Math II (MATH 376: combinatorics, graph theory, modeling, optimization).

Fall 2013: **University of Idaho** - Linear Algebra (MATH 330: Linear systems, matrices, determinants, vector spaces, bases, linear transformations).

Summer 2013: **University of Western Ontario** - Calculus I (CALC 1000: Limits, continuity, derivatives, integration).

Winter 2013: **University of Western Ontario** - Methods of Calculus (MATH 1225: Techniques and applications of integration).

Fall 2012: **University of Western Ontario** - Advanced Calculus I (MATH 2502: Multivariate Calculus, Limits, Continuity, Differentiation).

Fall 2011: **University of Western Ontario** - Methods of Matrix Algebra (MATH 1229: Linear Systems, Matrices, Determinants).

Winter 2011: **University of Western Ontario** - General Topology (MATH 9021/3132: graduate/undergraduate course on topology).

Fall 2010: **University of Western Ontario** - Intro to Calculus (MATH 0110: Limits, Derivatives).

Spring 2010: **University of Cincinnati** - Calculus 3 (MATH 253: Series, Vectors).

Winter 2010: **University of Cincinnati** - Calculus 2 (MATH 252: Integration).

Fall 2009: **University of Cincinnati** - Calculus 1 (MATH 251: Limits, Derivatives).

Summer 2009: **University of Cincinnati** - Linear Algebra II (MATH 352).

Spring 2009: **University of Cincinnati** - Differential Equations (MATH 273).

Winter 2009: **University of Cincinnati** - Calculus 4 (MATH 264: Partial Differentiation, Multiple Integrals, Vector Calculus).

Fall 2008: **University of Cincinnati** - Calculus 3 (MATH 253: Series, Vectors).

Spring 2008: **University of Cincinnati** - Calculus 2 (MATH 252: Integration).

Winter 2008: **University of Cincinnati** - Calculus 1 (MATH 251: Limits, Derivatives).

Fall 2007: **University of Cincinnati** - Calculus 0 (MATH 150: Precalculus).

Fall 2006: **Texas A&M University** - Precalculus: Trigonometric Functions (MATH 103).