

SERGIO DA SILVA

Curriculum Vitae

Department of Mathematics & Statistics
McMaster University
Hamilton Hall, Room 218
1280 Main Street West, Hamilton

Email: dasils19@mcmaster.ca
Webpage: <https://ms.mcmaster.ca/~dasils19>

ACADEMIC POSITIONS

2020 – 2023 McMaster University, NSERC Postdoctoral Fellow
2018 – 2020 University of Manitoba, PIMS Postdoctoral Fellow

EDUCATION

2018 Cornell University, Ph.D. in Mathematics,
Advisor: Allen Knutson
Thesis: On the Gorensteinization of Schubert Varieties via
Boundary Divisors
2012 University of Toronto, M.S. in Pure Mathematics,
Advisor: Edward Bierstone
Thesis: Desingularization by Blowings-up Avoiding
Simple Normal Crossings
2011 University of Toronto, B.Sc.H. with high distinction; double specialist in
Pure & Applied Mathematics

ACADEMIC AWARDS

2021 – 2023 NSERC Postdoctoral Fellowship, \$90,000 CAD total
2018 – 2020 PIMS Postdoctoral Fellowship, \$70,000 CAD total
2013 – 2015 NSERC Postgraduate Scholarship PGS-D, \$63,000 CAD total
2012 – 2013 Cornell University Graduate Fellowship, \$30,000 USD total
2011 – 2012 NSERC Postgraduate Scholarship PGS-M, \$17,500 CAD total
2010 NSERC USRA award with Edward Bierstone at U of T, \$5,000 CAD total
2009 NSERC USRA award with Kalle Karu at UBC, \$5,000 CAD total

RESEARCH INTERESTS

Interaction between algebraic geometry, commutative algebra, and combinatorics.

PEER-REVIEWED ARTICLES

1. YG Liang, Sergio Da Silva and Yang Zhang, *The Tensor Rank Problem over the Quaternions*, Linear Algebra and its Applications, Vol. 620, 2021, 37-60.
2. Sergio Da Silva, *Strict Bott-Samelson Resolutions of Schubert Varieties*, Experimental Mathematics, Vol. 28 (3), 2019, 313-321.
3. Edward Bierstone, Sergio Da Silva, Pierre Milman and Franklin Vera Pacheco, *Desingularization by Blowings-up Avoiding Simple Normal Crossings*, Proceedings of the AMS, Vol. 142, 2014, 4099-4111.
4. Sergio Da Silva and Kalle Karu, *On Oda's Strong Factorization Conjecture*, Tohoku Mathematical Journal, Vol. 63 Number 2, 2011, 163-182.

PREPRINTS

5. Susan Cooper, Sergio Da Silva, Max Gutkin, and Tessa Reimer, *Splittings For Symbolic Powers of Edge Ideals of Complete Graphs*, 2020, (submitted to Proceedings of the AMS).
6. Jaydeep Chipalkatti and Sergio Da Silva, *Pascal Morphisms and the Ulyanov Configuration Space*, 2020, (most recent version available upon request).
7. Sergio Da Silva, *On the Gorensteinization of Schubert Varieties via Boundary Divisors*, 2018, Arxiv submission 1807.05416. (submitted to J. Algebraic Combinatorics).
8. D. Barbasch, S. Da Silva, B. Elek and G. Krishnan, *Finite Type Multiple Flag Varieties for the Exceptional Group F_4* , 2017. Arxiv submission 1708.06341 (most recent version available upon request).

ARTICLES IN PREPARATION

9. Sergio Da Silva and Megumi Harada, *Regular Nilpotent Hessenberg Varieties, Gröbner Bases, and Toric Degenerations*. (See Research Statement for details.)
10. Michael Cummings, Sergio Da Silva, Jenna Rajchgot and Adam Van Tuyl, *Toric Ideals of Graphs and Geometric Vertex Decomposition*. (See Research Statement for details.)
11. Sergio Da Silva and Jenna Rajchgot, *Frobenius Splittings and K -Orbit Closures*. (See Research Statement for details.)
12. Dominic Austria, Sergio Da Silva and Megumi Harada, *Cryptography via Resolution of Singularities*.
13. Sergio Da Silva, *Frobenius Splittings and the Desingularization of Hypersurfaces in Positive Characteristic*.

STUDENT SUPERVISION

2021 – 2022		Senior thesis project (Math 4P03), Mike Cummings. Co-supervised with Megumi Harada and Jenna Rajchgot.
2021	Summer	Undergraduate Stewart Award project, Dominic Austria. Co-supervised with Megumi Harada.
2021	Summer	Undergraduate USRA project, Michael Cummings. Co-supervised with Jenna Rajchgot and Adam Van Tuyl.
2021	Summer	Undergraduate USRA project, Ryan Edwards. Co-supervised with Jenna Rajchgot.
2019	Summer	Undergraduate Research Award project, Max Gutkin and Tessa Reimer. Co-supervised with Susan Cooper.

TEACHING EXPERIENCE*McMaster University, NSERC Postdoctoral Fellow*

2022	Spring	Instructor, Engineering Mathematics IV (MATH 2ZZ3), enrollment: 129
2021	Fall	Instructor, Graph Theory (MATH 3V03), enrollment: 100
2021	Spring	Instructor, Engineering Mathematics IV (MATH 2ZZ3), enrollment: 163
2021	Spring	Instructor, Engineering Mathematics II-B (MATH 1ZC3), enrollment: 353
2020	Fall	Instructor, Introduction to Calculus and Analytic Geometry (MATH 1F03), enrollment: 369

University of Manitoba, PIMS Postdoctoral Fellow

2020	Spring	Instructor, Engineering Mathematical Analysis III (MATH 3132), enrollment: 80
2019	Fall	Instructor, Engineering Mathematical Analysis (MATH 2130), enrollment: 92
2019	Spring	Instructor, Engineering Mathematical Analysis (MATH 2130), enrollment: 81
2018	Fall	Instructor, Calculus 2 (MATH 1700), enrollment: 51

Cornell University

2018		Teaching Assistant, Graduate Algebra II (MATH 6320)
2018		Teaching Assistant, History of Mathematics (MATH 4030)
2017		Teaching Assistant, Intro to Computing using Python (CS 1110)
2017		Instructor, Calculus I (MATH 1110), enrollment: 25
2016 – 2017		Teaching Assistant, Graduate Algebra (MATH 6310)
2013 – 2017		Summer Tutoring Manager
2013 – 2016		Lecturer/Supervisor, Ithaca High School Senior Seminar
2016		Teaching Assistant, Search and Optimization with Metaheuristics (SYSEN 5240)
2016		Teaching Assistant, Linear Algebra for Engineers (MATH 2940)

2015	Teaching Assistant, Math and Politics (MATH 1340)
2015	Teaching Assistant, Computation & Culture in the Digital Age (CS/INFO 1305)
2014	Teaching Assistant, Applied Functional Analysis (MATH 6220)
2013	Teaching Assistant, Measure Theory (MATH 6210)

University of Toronto

2011 – 2012	Teaching Assistant, Calculus! (MAT 137)
2011 – 2012	Teaching Assistant, Calculus for Life Sciences (MAT 134)
2010 – 2011	Tutor, Analysis I (MAT 157)
2009 – 2011	Teaching Assistant, Calculus Sci. I (MAT 135)

REFEREEING AND REVIEWS

1. Reviewer for Mathematical Reviews (since 2015) [13 reviews]
2. Referee for Discrete Mathematics (since 2021) [1 review]

CONFERENCES AND INVITED TALKS

2022	February	To present a “flash talk” at the Representation Theory and Geometry Conference, hosted by Queen’s University and the Royal Military College of Canada, <i>Frobenius Splittings of K-Orbit Closures</i>
2022	January	Presented for the Postdoc Threads Colloquium, McMaster University, <i>A Brief Introduction to Geometric Vertex Decomposition</i>
2021	December	Presented at the Combinatorial Methods in Algebraic Geometry and Commutative Algebra session at the CMS Winter Meeting, Vancouver, <i>Two Approaches to Geometric Vertex Decomposition</i>
2020	March	Canadian Western Algebraic Geometry Symposium
2019	December	Presented at the Commutative Algebra session at the CMS Winter Meeting, Toronto, <i>Frobenius Splittings and the Desingularization of Hypersurfaces in Positive Characteristic</i>
2019	December	Presented at the Algebraic Combinatorics session at the CMS Winter Meeting, Toronto, <i>Understanding the Blow-up of a Subword Complex Along its Boundary</i>
2019	March	Presented at the Combinatorial and Commutative Algebra session at the AMS Spring Meeting, Auburn, <i>Understanding the Blow-up of a Subword Complex Along its Boundary</i>
2018	December	Presented at the Algebraic Geometry session at the CMS Winter Meeting, Vancouver, <i>On the Gorensteinization of Schubert Varieties via Boundary Divisors</i>
2018	October	Presented at the Algebra Seminar, McMaster University, <i>On the Gorensteinization of Schubert Varieties via Boundary Divisors</i>
2018	February	Presented at the Arithmetic Seminar, Binghamton University,

		<i>Frobenius Splittings and the Desingularization of Hypersurfaces in Positive Characteristic</i>
2017	October	Presented at the Algebraic Geometry Seminar, University of Illinois at Urbana-Champaign, <i>On the Gorensteinization of Schubert Varieties via Boundary Divisors</i>
2015	November	AMS Sectional Meeting Program, Rutgers University
2014	September	Route 81 Conference, Cornell University
2013	November	ALGECOM-09, University of Chicago
2012	June	Clay Mathematics Summer School on Resolution of Singularities, Obergrugl
2010	August	Presented at the Rising Stars of Research Poster Competition (1 st place winner), University of British Columbia, <i>Oda's Strong Factorization Conjecture and its Implications in Toric Geometry</i>
2010	July	Presented at the Canadian Undergraduate Math Conference, University of Waterloo, <i>Oda's Strong Factorization Conjecture</i>

CONFERENCE ORGANIZATION AND OUTREACH

2021	June	Co-organizer with Megumi Harada and Jenna Rajchgot, "Recent Developments in Grobner Geometry" special session at the CMS Summer Meeting, Ottawa
2019	December	Co-organizer with Kiumars Kaveh, "Convexity in Algebraic Geometry and Symplectic Geometry" special session at the CMS Winter Meeting, Toronto
2013 – 2016		Participated in Ithaca Senior Seminar, local outreach program involving lectures and advising projects
2010 – 2011		Co-organizer of the Fields Undergraduate Network, program at the Fields Institute providing workshops for undergraduates