CURRICULUM VITAE OF AARON LAUVE

Postal Address:
Department of Mathematics & Statistics
Loyola University Chicago
1032 W. Sheridan Road
Chicago, IL 60660

Office: BVM Hall, Room 507
Tel: +1 (773) 508-3727
Fax: +1 (773) 508-2123
lauve@math.luc.edu
http://www.math.luc.edu/~lauve

PROFESSIONAL EMPLOYMENT

2010–present *Assistant Professor,* Loyola Univesity Chicago (LUC)
2007–2010 *Visiting Assistant Professor,* Texas A & M Univesity (TAMU)
2005–2007 *Postdoctoral Fellow,* Université du Québec à Montréal (UQÀM)

EDUCATION

Rutgers, The State University of New Jersey *New Brunswick, NJ*
Ph.D. *A quasideterminantal approach to quantized flag varieties*, May 2005
Directed by Vladimir Retakh and Robert L. Wilson

The University of Oklahoma *Norman, OK*
B.S. Mathematics, summa cum laude, May 1999
B.S. Physics, with distinction, May 1999

RESEARCH INTERESTS

Exploiting combinatorial structures in algebra. Specific interests in this direction include: quasideterminants, Hopf algebras (of quantum, pointed, and combinatorial varieties), word combinatorics, noncommutative ring theory, and representation theory.

GRANTS, HONORS & AWARDS

Research
LUC – Research Stipend, Summers 2013 & 2014
LUC – CAS Special Project: *Sage Days 65 Workshop*, Summer 2015
National Security Agency (NSA) – **Principal Investigator,** Young Investigators Grant: *Word combinatorics and combinatorial Hopf algebras,* @TAMU: 2009–2010, @LUC: 2011–2013
BIRS – Collaborator (in group of six), Focused Research Group: *Supercharacters & Hopf Monoids in Species,* awarded a week at Banff, Alberta, Fall 2012
AIM – Participant, Workshop: *Supercharacters & Combin. Hopf Algebras,* Palo Alto, Summer 2010
Rutgers University – Louis Bevier Dissertation Fellowship, 2004–2005
DIMACS – Graduate Student Award, Summers 2003 & 2004
NSF – VIGRE Graduate Student Fellow, 1999–2001

Teaching / Service
LUC – (**nominee**) St. Ignatius of Loyola Award, Spring 2015
LUC – CAS Special Project: *Undergraduate Math. Colloquium,* Academic Years 11/12 – 14/15
MAA – Project NExT Fellow, 2007–2008

PUBLICATIONS

Refereed Journal Articles

[1] (w/ M. Aguiar) *The characteristic polynomial of the Adams operators on graded connected Hopf algebras.* Alg. Number Theory, 9 (2015), no. 3, 547–583.

[2] (w/ T. Hangelbroek) *The polyharmonic Dirichlet problem and path counting.* J. Math. Pures Appl. (9), 102 (2014), no. 3, 449–481.

[3] (w/ M. Konvalinka) *Skew Pieri rules for Hall–Littlewood functions.* Alg. Comb., 17 (2013), no. 3, 499–518.

[4] (w/ S. Forcey, F. Sottile) *Cofree compositions of coalgebras,* Ann. Comb., Special Issue: 10 years of BAD Math, 17 (2013), no. 1, 105–130.

[5] (w/ M. Aguiar) *Lagrange's theorem for Hopf monoids in species,* Canad. J. Math., 65 (2013), no. 2, 241–265.

[6] (w/ 27 coauthors[1]) *Supercharacters, symmetric functions in noncommuting variables, and related Hopf algebra,* Adv. Math., 229 (2012), no. 4, 2310–2337.

[7] (w/ S. Mason) *$QSym_n$ over Sym_n has an n-stable basis,* J. Combin. Theory Ser. A, 118 (2011), 1661–1673.

[8] (w/ M. Mastnak) *The primitives and antipode in the Hopf algebra of symmetric functions in non-commuting variables,* Adv. Appl. Math., 47 (2011), no. 3, 536–544.

[9] (w/ T. Lam, F. Sottile) *Skew Littlewood–Richardson rules from Hopf algebras,* Int. Math. Res. Not. 2011, no. 6, 1205–1219.

[10] (w/ S. Forcey, F. Sottile) *Hopf structures on the multiplihedra,* SIAM J. Discrete Math., 24 (2010), no. 4, 1250–1271.

[11] (w/ F. Bergeron) *Invariant and coinvariant spaces for the algebra of symmetric polynomials in non-commuting variables,* Electron. J. Combin., 17 (2010), no. 1, article R166.

[12] *Quasideterminants and q-commuting minors,* Glasg. Math. J. 52 (2010), no. 3, 663–675.

[13] (w/ C. Cibils, S. Witherspoon) *Hopf quivers and Nichols algebras in positive characteristic,* Proc. Amer. Math. Soc. 137 (2009), no. 12, 4029–4041.

[14] (w/ A. Glen, F. V. Saliola) *A note on the Markoff condition and central words,* Inform. Proc. Letters, 105 (2008), no. 6, 241–244.

[15] (w/ E. J. Taft) *A class of left quantum groups modeled after* $\mathrm{SL}_q(n)$*,* J. Pure and Appl. Algebra, 208 (2007), no. 3, 797–803.

[16] *Quantum- and quasi-Plücker coordinates,* J. Algebra, 296 (2006), no. 2, 440–461.

Books

[14] (w/ J. Berstel, C. Reutenauer, F. V. Saliola) *Combinatorics on Words: Christoffel Words and Repetitions in Words.* CRM Monograph Series, 27. American Mathematical Society, Providence, RI, 2009. xii+147 pp. ISBN: 978-0-8218-4480-9

[1] A paper resulting from a successful 2010 AIM Workshop with roughly the same name. **Attendees/Coauthors:** M. Aguiar, C. Andr, C. Benedetti, N. Bergeron, Z. Chen, P. Diaconis, A. Hendrickson, S. Hsiao, I. M. Isaacs, A. Jedwab, K. Johnson, G. Karaali, A. Lauve, T. Le, S. Lewis, H. Li, K. Magaard, E. Marberg, J.-C. Novelli, A. Pang, F. Saliola, L. Tevlin, J.-Y. Thibon, N. Thiem , V. Venkateswaran, C.. R. Vinroot, N. Yan, M. Zabrocki.

Refereed Collections & Proceedings

[15] (w/ C. Reutenauer) *Rational series in the free group and the Connes operator.* In: Noncommutative Birational Geometry, Representations and Combinatorics. Edited by Arkady Berenstein and Vladimir Retakh. Contemporary Mathematics, 592. *American Mathematical Society, Providence, RI*, 2013 (pp. 177–197).

[16] (w/ M. Aguiar) *Antipode and convolution powers of the identity in graded connected Hopf algebras.* **25**th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Paris, France, 2013, DMTCS Proceedings.

[17] (w/ M. Konvalinka) *Skew Pieri rules for Hall–Littlewood functions.* **24**th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Nagoya, Japan, 2012, DMTCS Proceedings.

[18] (w/ M. Aguiar) *Lagrange's theorem for Hopf monoids in species.* **23**rd FPSAC Conference (Reykjavik, Iceland, 2011), DMTCS Proceedings.

[19] (w/ S. Forcey, F. Sottile) *Cofree compositions of coalgebras.* **23**rd FPSAC Conference (Reykjavik, Iceland, 2011), DMTCS Proceedings.

[20] (w/ S. Mason) *$QSym_n$ over Sym_n has a stable basis.* **22**nd FPSAC Conference (San Francisco, 2010), DMTCS Proceedings.

[21] (w/ T. Lam, F. Sottile) *Skew Littlewood–Richardson rules from Hopf algebras.* **22**nd FPSAC Conference (San Francisco, 2010), DMTCS Proceedings.

[22] (w/ S. Forcey, F. Sottile) *New Hopf structures on binary trees.* **21**st FPSAC Conference (Hagenberg, Austria, 2009), DMTCS Proceedings.

[23] (w/ F. Bergeron) *Invariant and coinvariant spaces for the algebra of symmetric polynomials in noncommuting variables.* **20**th FPSAC Conference (Valparaiso, Chile, 2008), DMTCS Proceedings.

[24] (w/ D. F. Anderson, A. Frazier, P. Livingston) *The zero-divisor graph of a commutative ring II.* Ideal theoretic methods in commutative algebra (Columbia, MO, 1999), 61–72, Lecture Notes in Pure and Appl. Math., 220, Dekker, New York, 2001.

Manuscripts

In Preparation

- (w/ Z. Daugherty) *The Hopf algebra of trapezoidal partition diagrams.*
- (w/ M. Mastnak) *Classifying combinatorial Hopf algebras up to equivalance.*
- (w/ S. Doty, G.H. Seelinger) *Young and permutation modules for the Brauer algebra.*
- (w/ F. Saliola) *Self-duality of the Hopf algebra of k-Schur functions.*
- *Flag varieties for the Yangian $Y(\mathfrak{gl}_n)$.*

SELECTED PRESENTATIONS

Conferences & Workshops

Convolution powers of the identity in combinatorial Hopf algebras.

(fully funded), Midwest Combinatorics Conference, Minnesota, 05/15;
AMS Sectional Meeting, 03/15;
(poster), 25th FPSAC Conference, Paris, 06/13;
CMS Summer Meeting, Halifax, 06/13

Hopf algebra structure of the ring of k-Schur functions.
(partially funded), XX Coloquio Latinoamericano de Álgebra, Lima, Peru, 12/14;
AMS Sectional Meeting, 09/14

Permutation modules for Brauer algebras. AMS Sectional Meeting, 04/13

Spectra of principal elements in Frobenius seaweed Lie algebras. AMS Sectional Meeting, 03/12

Lagrange's theorem for Hopf monoids in species. AMS Sectional Meeting, 09/11;
(poster) 23rd FPSAC Conference, Reykjavik, Iceland, 06/11;
SIAM Conference on Discrete Mathematics, Austin, 06/10

QSym over Sym has a stable basis. LaCIM 2010: celebrating LaCIM's 10th anniversary (Graciously delivered by Christophe Reutenauer in my absence), Montreal, 08/10;
AMS Sectional Meeting, 03/10

Skew Littlewood–Richardson rules from Hopf algebras. 22nd FPSAC Conference, San Francisco, 08/10

New Hopf structures on binary trees. (poster), Joint Meetings, 01/10;
21st FPSAC Conference, Hagenberg, Austria, 07/09;
AMS Sectional Meeting, 04/09;
CMS Winter Meeting, Ottawa, 12/08

Nichols algebras in positive characteristic. Groups and Hopf Algebras Workshop, St. John's, Newfoundland, 06/09

Rational and irrational series over the free group. Joint Meetings, 01/09

The Markoff condition and central words. (poster), Joint Meetings, 01/09

Commutative and noncommutative invariants of the symmetric group.
20th FPSAC Conference, Valparaiso, Chile, 09/07;
CMS Winter Meeting, Toronto, 12/06;
AMS Sectional Meeting, 11/06

Noncommutative flag varieties and Yangians.
(**partially funded**) Advanced Course on Quasideterminants, CRM, Barcelona, 02/07;
AMS Sectional Meeting, 11/05

On novel ways to invert a matrix. Joint Meetings, 01/07;
XVIIIth Meeting on Representation Theory of Algebras, Sherbrooke, Quebec, 09/06

Generalized Grassmannians constructed via quasideterminants. Joint Meetings, 01/05

Quantum and quasi-Plücker coordinates. AMS Sectional Meeting, 10/04

Research Seminars

Convolution powers of the identity in combinatorial Hopf algebras.
Algebra & Combinatorics Seminar, Cornell University, 02/14;
Algebra Seminar, DePaul University, 03/13;
Algebra and Representation Theory Seminar, Oklahoma University, 02/13

Introduction to supercharacter theory. Algebra Seminar, DePaul University, 05/11

Primitive and antipode formulas in the Hopf algebra of symmetric functions in noncommuting variables.
Algebra and Combinatorics Seminar (ACS), TAMU, 01/11;
Algebra Seminar, DePaul University, 09/10;
Algebra Seminar, LUC, 08/10

Skew Littlewood–Richardson rules from Hopf algebras. Discr. Geom. & Comb. Seminar, Cornell, 10/09;
Combinatorics Seminar, MIT, 10/09;
Algebra, Geometry & Combinatorics Seminar, UI–Urbana-Champaign, 10/09;
ACS, TAMU, 10/09

Another look at Markoff's work on quadratic forms. AGANT Seminar, UT-Arlington, 09/09;
Number Theory Seminar, University of Texas, 10/08;
Discrete Math Seminar, Texas State University, 10/08;

Nichols algebras in positive characteristic. Joint Algebra Seminar, University of Ottawa, 12/08

Rational and irrational series over the free group. Groups and Dynamics Seminar, TAMU, 11/08;
Postdoc Lunch Series, TAMU, 10/08

The MacMahon Master Theorem and its modern extensions: expository talk on Konvalinka–Pak (2007).
Séminaire du LaCIM, UQÀM, 11/06

Poset paths and q-commuting minors. Séminaire du LaCIM, UQÀM, 04/06

Capture the flag: the quantum flag of Taft & Towber revisited. Algebra Seminar, Rutgers, 04/04

Colloquia & Broader Audiences

The Markoff condition and central words. Applied Mathematics Colloquium, IIT 10/14;
(poster) Young Mathematicians Network Poster Session, Joint Meetings, 01/08

Spectra of Principal Elements in Frobenius Seaweed Lie Algebras. Mathematics Colloquium, Wake Forest University 09/12;
Math. & Computer Science Colloquium, St. Mary's University (Halifax) 06/12

A menagerie of "coinvariant" spaces (modern takes on Chevalley-Shephard-Todd). Mathematics Colloquium, Northern Illinois University, 12/11;
Topology Seminar, University of Chicago, 11/11

Pointed Hopf algebras. Kempner Colloquium Series, University of Colorado, 11/09

Middle binomial matrices and Chebyshev polynomials. Postdoc Lunch Series, TAMU, 10/09

Up with quasideterminants! (w/ apologies to S. Axler) Postdoc Lunch Series, TAMU, 10/07

Questions concerning sums and products of matrices (w/ answers!) Mathematics Colloquium, Dalhousie University, Halifax, 04/07

Graduate Student "Pizza" Seminar, Rutgers University. Introduction to Schur polynomials, 09/04; Horned Hermitian Honeybees and their Quasi-Friends, 10/03; Down with Determinants?, 11/02; And at the root of it all ... finite reflection groups, 09/01; $\Gamma(R)$: graph theory meets ring theory, 10/00; Who was Tableaux, and how young was he?, 10/99

Outreach

Arithmetic with fractional bases. Brazos Valley Math Teachers' Circle, 10/09

Fun with Polynomials, Rutgers Undergraduate Seminar, 04/02

Zero-divisor graphs, Math Club Student Lecture Series, University of Oklahoma, 10/98

Tangling with topology, Mu Alpha Theta National Convention, 08/96
(MAΘ is a high school mathematics honor society holding state and national competitions.)

TEACHING

University Courses

Instructor at Loyola University Chicago

MATH 108 – *Real-World Modeling.* Sp. '13
MATH 118 – *Precalc., II.* Fa. '10, Fa. '15
MATH 131 – *Applied Calc., I.* Fa. '12, Fa. '13
MATH 132 – *Applied Calc., II.* Sp. '11, Fa. '11
MATH 161 – *Calc., I.* Fa. '10, Sp. '12, Fa. '14
MATH 162 – *Calc., II.* Sp. '11, Sp. '15
MATH 313 – *Abstract. Alg., I* Fa. '11, Fa. '15
MATH 314 – *Abstract Alg., II* Sp. '12
MATH 315/488 – *Adv. Linear Alg.* Fa. '12
MATH 318/418 – *Combin.* Sp. '13, Sp. '15

Instructor Elsewhere

Applied Calculus I, TAMU, Spring 2010
- Differential calculus for business and biology majors.

Mathematics of Contingent Claims, TAMU, Spring 2010
- Gentle, proof-based introduction to options pricing models: Black-Scholes, implied volatility trees, binomial trees and the like. Basic probability and differential equations are prerequisites.

Structure of Mathematics I, TAMU, Fall 2009
- A "content" and "methods" for pre-service elementary and middle school teachers.

Applied Abstract Algebra, TAMU, Spring 2009
- Taken primarily by pre-service high school teachers. Covers group theory and cryptography.

Topics in Applied Math I, TAMU, Spring 2009, Fall 2008, Spring 2008
- An abstract linear algebra course for engineering majors, with applications to ODEs and PDEs.

Topics in Contemporary Math II, TAMU, Spring 2008
- A finite mathematics course for life science majors. Large lecture format.

Introduction to Linear Algebra, TAMU, Fall 2007
- A proof-based first course in linear algebra. For mathematics majors.

Calculus II, for engineering majors, McGill University, Fall 2006

Linear Algebra and its Applications, Rutgers University, Summer 2005
- For engineering graduate students. Matrix factorizations, numerical & iterative methods, etc.

Introduction to Linear Algebra, Rutgers University, Summer 2002

Co-Instructor

(w/ F. Bergeron, F. Saliola) Algebra and Combinatorics, UQÀM, Fall 2006
- Second year graduate topics course on quasisymmetric and noncommutative symmetric functions.

Teaching Assistant (Rutgers University, 2001–2004)

Calculus I, II, & III, for math and physical science majors, 6 semesters
Calculus I, for life science and business majors, 1 semester

Student Supervision

Supervisor (LUC)

Multiplicity of the alternating representation among bi-variate Vandermonde determinants, Summer 2015
Novel ways to invert a square matrix, Summer 2015

Billiard words as generalized Christoffel words, Summer 2015
When is a matrix invertible?, **REAP Program** (High School Student), Summer 2014

Co-Supervisor (LUC)
(w/ S. Doty) *Specht and permutation modules for Brauer algebras,* **LUROP,** Summer 2012–Spring 2015
(w/ A. Giaquinto) *Spectra of Frobenius maximal parabolics,* **LUROP,** Summer 2013–Spring 2014
(w/ P. Tingley) *Reading seminar on semisimple Lie theory* (5 students), Summer 2013
(w/ A. Giaquinto) *Spectra of Frobenius seaweed Lie algebras,* **LUROP,** Summer 2011–Summer 2012

Postdoctoral Supervisor (CRM-ISM Summer Scholarships Program, UQÀM)
(w/ B. Larose) *Schützenberger's conjectures on Young tableaux evacuation,* Summer 2006

Graduate Mentor (REU Program, Rutgers)
(w/ S. Sahi) *Tabulation of spherical functions using a formula of S. Sahi,* Summer 2003
(w/ A. Taylor) *Computing maximal minors of "A-matrices" using graphs,* Summer 2001
(w/ C. Woodward) *Multiplicity-free products and quantum cohomology,* Summer 2000

PROFESSIONAL DEVELOPMENT

(Conferences & Workshops attended, sans lecturer/organizer responsibilities)

Research

Combinatorial Representation Theory, New Directions in Lie Theory, Thematic Semester, CRM, Montreal, April 2014
Combin. on Words + Combin. Hopf Algebras and Macdonald Polynomials + Combin. Alg. Geometry, Recent Advances in Combinatorics, Thematic Semester, CRM, Montreal, Spring 2007
Quasisymmetric Functions, Banff Workshop, Alberta, November 2010
Alg. Combin. meets Combin. Inverse Systems, Mini-Workshop, Fields Institute, Toronto, January 2006
Words, 5th International Conference on Word Combin., Montreal, Canada, September 2005
Combinatorial Hopf Algebras, Banff Workshop, Alberta, September 2004

Teaching

(Assorted Breakout Sessions) Focus on Teaching and Learning, LUC, August 2014
Flipped Classroom + Active Learn. + Social Justice MAA MathFest, Portland, August 2014
Service Learn. + Math. Bio. + Res. Math. Ed. AMS/MAA Joint Meetings, New Orleans, January 2011
(Assorted Project NExT Sessions) AMS/MAA Joint Meetings, Boston, January 2009
(Assorted Project NExT Sessions) MAA MathFest, Wisconsin, August 2008

SERVICE

Professional

Co-chair, MAA Panel, "Innovative Teaching Methods," MAA Mathfest , August 2008
Co-chair, AMS Contributed Papers Session, Joint Meetings, January 2005
Mentor, MAA Project NExT Fellows Program, Fall 2014 to present
Member, Organizing Committee, AMS Central Section Fall Meeting, LUC, October 2015
Member, Dissertation Committee, Doctoral Defense, UQÀM, May 2015
Member, Organizing Committee, 26th International FPSAC Conference, DePaul, July 2014

Co-organizer, Special Sessions in AMS Sectional Meetings
"Hopf algebraic combinatorics," LUC, October 2015
"Symmetric functions and their generalizations," Wake Forest, September 2011
Co-organizer, Sage Days 65, LUC, June 2015
Co-organizer, CRM Mini-workshop, "Alg. Comb. meets Inverse Systems," January 2007
Referee, Journal and Conference Manuscripts (34)

Adv. Math. (1),	Internat. J. Alg. Comput. (1),	J. Pure and Appl. Alg. (2),
Canad. J. Math. (1),	J. Algebra Appl. (1),	Selecta Math. (2),
Comm. Algebra (1),	J. Algebraic Combin. (4),	Sém. Lothar. Combin. (2),
DMTCS, Proc./FPSAC (9),	J. Combin. Theory Ser. A (4),	SIAM J. Discrete Math. (1),
Electron. J. Combin. (1),	J. Discrete Math. (1),	SIGMA (1),
Exp. Math. (1),	J. London Math. Soc. (1),	Trans. Amer. Math. Soc. (1)

Reviewer, MathSciNet, Math Reviews (12)
Reviewer, Young Investigator Grants Program, NSA, Spring 2015

Departmental

(Loyola University Chicago)
Admin., Math. & Stat. Online Presence: Web, Blogs, & Social Media, Summer 2012 to present
Head, Ad Hoc Committee on Assessment of Major Programs (for FCIP), Fall 2015 to present
Head, Math Lecturer Hiring Committee, 2014–2015
Head, One-Year Lecturer Hiring Committee, Summer 2014
Head, Ad Hoc Exploratory Committee: Course Coordination, Spring 2011
Member, Committee: Course Coordination, Spring & Fall 2014
Member, Committee: Senior Seminar Course Guidelines, Spring 2013
Member, Committee: Capstone Course Guidelines, Fall 2012
Member, One-Year Lecturer Hiring Committee, Summer 2013
Member, Math NTT Hiring Committee, 2012–2013
Member, Stat NTT Hiring Committee, 2012–2013
Member, Math TT Hiring Committee, 2011–2012 & 2010–2011
Organizer, Math/Stat Tea, Fall 2011 to present
Co-organizer, Undergraduate Colloquium in the Mathematical Sciences, Fall 2011 to present
Co-organizer, Math/Stat Teaching Seminar, Fall 2011 to present
Co-organizer, Algebra and Combinatorics Seminar, Fall 2011 to present
Representative, CAS Affinity Group Meeting: Strategic Plan on Social Justice, Fall 2014
(Elsewhere)
Head, Textbook Search Committee for "Topics in Applied Algebra, I" (TAMU), Spring 2009
Organizer, Algebra and Combinatorics Seminar (TAMU), Fall 2008–Spring 2010
Co-organizer, Working Algebra Seminar (TAMU), Spring 2009
Organizer, Graduate Student Seminar (Rutgers), 2000–2002
Member, VIGRE Grant Proposal Committee (Rutgers), Spring 2003

University

Inteviewer, Ignatian Scholarship Competition, Spring 2015
Inteviewer, Presidential Achievement Competition, Spring 2013
Member, Hiring Committee: CSME Assistant Director for Math Programs, Spring 2015
Reviewer, Junior Science and Humanities Symposium, Loyola, Spring 2015

Other

Judge, Poster Session, Chicago Area Undergraduate Research Symposium, 2014
Judge, MAA "Undergraduate Poster Session," Joint Meetings, January 2009 & January 2008
Letter writer, undergrad. nomination for scholarships, research programs, grad. schools (24)
Letter writer, for tenure-track job search (1)
Letter writer, nomination of professor for university teaching award (1)
Participant, Loyola Math Teachers' Circle, Fall 2015
Participant, Brazos Valley Math Teachers' Circle (College Station, TX), Spring 2009–Spring 2010
Panelist, Mathematical Biology REU "Grad School Informational" (TAMU), July 2008

PROFESSIONAL SOCIETIES

American Mathematical Society, 2000 to present
Association for Women in Mathematics, 2014 to present
Mathematical Association of America, 2006 to present

PERSONAL INFORMATION

Citizenship: *United States of America* (Born: Lafayette, Louisiana).

Languages: English (native), French (working).