# Tyrrell B. McAllister

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EDUCATION
- **University of California, Davis**, CA.
  Ph.D. in Mathematics, June 2006.
- **University of California, Davis**, CA.
  B.A. in Mathematics, June 2001.

CURRENT POSITION
- **Visiting Researcher**, Max-Planck-Institut für Mathematik, Bonn, Germany.
  (Fall 2008 – Spring 2009)

CITIZENSHIP
- **United States of America**

RESEARCH
- Research interests: Discrete and Polyhedral Geometry, Representation Theory, and Algebraic Geometry.
- Publications:
  - Published:
    - *Coefficient functions of the Ehrhart quasi-polynomials of rational polygons*, Proceedings of ITSL 2008, CSREA Press, 2008, 114–118.
    - *Quasi-period collapse and* $\mathrm{GL}_n(\mathbb{Z})$*-scissors congruence in rational polytopes* (with C. Haase). Contemp. Math. **452** (2008), 115–122.
    - *Degrees of stretched Kostka coefficients*, J. Algebraic Combin. **27** (2008), no. 3, 263–273.
    - *On the computation of Clebsch–Gordan coefficients and the dilation effect* (with J. A. De Loera), Experiment. Math. **15** (2006), no. 1, 7–20.
    - *Enumerating Segmented Patterns in Compositions and Encoding by Restricted Permutations* (with S. Kitaev and T. K. Petersen), Integers **6** (2006), no. 1, A34, 16 pp. (electronic).
    - *The minimum period of the Ehrhart quasi-polynomial of a rational polytope* (with K. M. Woods), J. Combin. Theory Ser. A **109** (2005), no. 2, 345–352.
    - *Vertices of Gelfand-Tsetlin polytopes* (with J. A. De Loera), Discrete Comput. Geom. **32** (2004), no. 4, 459–470.
    - *Applications of Polyhedral Geometry to Computational Representation Theory*, Ph.D. Dissertation, University of California, Davis.
  - In submission
    - *Degree bounds for type-*A *weight rings and Gelfand–Tsetlin semigroups* (with B. Howard), preprint 2008, arXiv:0812.0826v1.
    - *Flat directions and Minkowski's* $3^d$*-theorem* (with J. Draisma and B. Nill), preprint 2008, arXiv:0901.1375.
  - In progress:
    - *Internal languages for non-symmetric* $*$*-autonomous categories* (with A. Cohen, M. Hendriks, and B. Spitters).

◇ Dissertation Supervisor: Jesús A. De Loera, University of California, Davis.

◇ Postdoctoral Mentor (Fall 2006 – Spring 2008): Arjeh Cohen,

SELECTED TALKS

◇ Degree bounds for type-A weight rings and Gelfand-Tsetlin semigroups, *Annual Meeting of the German Mathematical Society (DMV)*, Erlangen, Germany, 16 Sep 2008.

◇ Coefficient functions of the Ehrhart quasi-polynomials of rational polygons, *International Conference on Information Theory and Statistical Learning (ITSL)*, Las Vegas, NV, 15 Jul 2008.

◇ Gelfand–Tsetlin polytopes and toric degenerations of the invariants of $n$ points in $\mathbb{CP}^2$, *DIAMANT/EIDMA Symposium Spring 2007*, Heeze, The Netherlands, 31 May 2007.

◇ Applications of polyhedral geometry to computational representation theory, *DIAMANT/EIDMA Symposium 2006*, Vught, The Netherlands, 30 Nov 2006.

◇ Convex Polyhedra and Representation Theory, *MAA MathFest '06*, Knoxville, TN, 10 Aug 2006.

◇ Degrees of stretched Kostka coefficients, *Joint Summer Research Conference on Integer Points in Polyhedra*, Snowbird, UT, 11 Jun 2006.

◇ Polyhedral Techniques in Computational Representation Theory, Technische Universiteit Eindhoven, 7 Jun 2006.

◇ Polyhedral Techniques in Computational Representation Theory, University of Kentucky, Lexington, 24 Apr 2006.

◇ Stretched Kostka coefficients and a conjectured generalization of the saturation theorem, University of California, Berkeley, 13 Mar 2006.

◇ Representation theory, polyhedral geometry, and a conjectured generalization of the saturation theorem, *Discrete Mathematics and Representation Theory Seminar*, University of California, Davis, 23 Feb 2006.

◇ Ehrhart Quasi-polynomials of Clebsch–Gordan Coefficients, *Euroconference on Algebraic and Geometric Combinatorics*, Anogia, Greece, 25 Aug 2005.

◇ Applications of Polytopes to Computational Representation Theory, *Séminaire Combinatoire, Informatique et Physique*, Université de Paris 13, 24 May 2005.

◇ Using Polytopes in the Representation Theory of Lie Algebras, *Oberseminar Kombinatorische Geometrie*, Technische Universität Berlin, 28 April 2005.

◇ Solving the Clebsch–Gordan Problem with Polytopes, *Program on Algebraic Combinatorics*, Institut Mittag-Leffler, 17 Feb 2005.

◇ Integrality of Polytopes from Representation Theory, Otto-von-Guericke-Universität Magdeburg, 26 Aug 2004.

◇ Two Conjectured Generalizations of the Saturation Theorem, Mathematisches Forschungsinstitut Oberwolfach, 16 Aug 2004.

◇ Polytopes and Tensor Product Multiplicities, *IAS/PCMI Summer Session 2004*, Park City, UT, 16 Jul 2004.

◇ Faces of Gelfand–Tsetlin Polytopes, *Combinatorics Seminar*, University of Washington, Seattle, 21 Apr 2004.

◇ Vertices of Gelfand–Tsetlin Polytopes, *Eisenbud Commutative Algebra Seminar*, University of California, Berkeley, 2 Dec 2003.

◇ Vertices of Gelfand–Tsetlin Polytopes, *Discrete Mathematics and Representation Theory Seminar*, University of California, Davis, 14 Nov 2003.

◇ Ehrhart Quasi-Polynomial Collapse of Gelfand–Tsetlin Polytopes, *Joint Summer Research Conference on Integer Points in Polyhedra*, Snowbird, UT, 16 Jul 2003.

FELLOWSHIPS

- ◇ Visiting Research Scholarship, Max-Planck-Institut für Mathematik (Fall 2008 – Spring 2009)
- ◇ Postdoctoral Research Fellowship (Winter 2007 – Spring 2008)
- ◇ DIAMANT Postdoctoral Fellowship (Fall 2006)
- ◇ VIGRE Summer Research Fellowship (Summer 2004, Summer 2005)
- ◇ GPC Summer Research Fellowship (Summer 2004)
- ◇ VIGRE Fellowship (Fall 2002 – Summer 2003)
- ◇ GAANN Fellowship (Fall 2001 – Winter 2002, Fall 2003)

SERVICE

- ◇ Co-organized invited paper session "Computational Convexity and its Applications" at the MAA MathFest, 2006.
- ◇ Journal referee: Journal of Combinatorial Theory, Series A; Proceedings of the 32nd International Symposium on Mathematical Foundations of Computer Science; Journal of Symbolic Computation.
- ◇ Article reviews: Zentralblatt MATH; Mathematical Reviews.

COLLABORATORS

- ◇ Arjeh Cohen (TU/Eindhoven, The Netherlands), Jesús De Loera (UC Davis, CA), Jan Draisma (TU/Eindhoven, The Netherlands), Christian Haase (FU-Berlin, Germany), Maxim Hendriks (TU/Eindhoven, The Netherlands), Benjamin J. Howard (U. Michigan, MI), Sergey Kitaev (Reykjavik U., Iceland), Benjamin Nill (FU-Berlin, Germany), T. Kyle Petersen (U. Michigan, MI), Bas Spitters (TU/Eindhoven, The Netherlands), Kevin Woods (Oberlin College, OH).

WORK EXPERIENCE

- ◇ **Visiting researcher**, Max-Planck-Institut für Mathematik, Bonn, Germany (Fall 2008 – Spring 2009).
- ◇ **Post-doctoral researcher**, Technische Universiteit Eindhoven (Fall 2006 – Summer 2008).
- ◇ **Associate instructor**, University of California, Davis (Summer 2007).
- ◇ **Associate instructor**, University of California, Davis (Summer 2006).
- ◇ **Lecturer**, University of California, Davis (Fall 2005).
- ◇ **Teaching assistant**, University of California, Davis (Fall 2004).
- ◇ **Teaching assistant**, University of California, Davis (Spring 2002).

TEACHING EXPERIENCE

- ◇ Calculus and Combinatorics (as lead instructor). Vector Calculus and Differential Equations (as teaching assistant).

REFERENCES

- ◇ **Bernd Sturmfels**, University of California, Berkeley, `bernd@math.berkeley.edu`
- ◇ **Arjeh Cohen**, Eindhoven University of Technology, `amc@win.tue.nl`
- ◇ **Jesús De Loera**, University of California, Davis, `deloera@math.ucdavis.edu`
- ◇ **Martin Henk**, University of Magdeburg, `henk@math.uni-magdeburg.de`
- ◇ **Anne Schilling**, University of California, Davis, `anne@math.ucdavis.edu`
- ◇ **Michèle Vergne**, École Polytechnique, `vergne@math.polytechnique.fr`
- ◇ **E. O. Milton**, University of California, Davis, `milton@math.ucdavis.edu` (teaching)