

# ROBERT KRONE

UC Davis Department of Mathematics  
1 Shields Avenue  
Davis, CA 95616

rkrone@math.ucdavis.edu  
(732) 221 2024  
<http://www.rckr.one>

## EMPLOYMENT

2017– Krener Assistant Professor, **University of California - Davis**  
2015–2017 Postdoctoral Fellow, **Queen’s University**

## EDUCATION

2010–2015 Ph.D. in Mathematics, **Georgia Institute of Technology**  
Advisor: Anton Leykin  
Thesis: “Symmetric ideals and numerical primary decomposition”  
Minor: Computer Science  
2004–2008 B.A. in Mathematics, **Princeton University**  
Certificate in Computer Science

## RESEARCH INTERESTS

Applied algebraic geometry, computation, commutative algebra, combinatorial algebra.

## PAPERS

- Hector Baños, Nathaniel Bushek, Ruth Davidson, Elizabeth Gross, Pamela E Harris, Robert Krone, Colby Long, Allen Stewart, and Robert Walker. Dimensions of Group-based Phylogenetic Mixtures, *preprint* arXiv:1711.08686 (2017).
- Madeline Brandt, DJ Bruce, Taylor Brysiewicz, Robert Krone, and Elina Robeva. The degree of  $SO(n)$ , *preprint* arXiv:1701.03200 (2017).
- Hector Baños, Nathaniel Bushek, Ruth Davidson, Elizabeth Gross, Pamela E Harris, Robert Krone, Colby Long, Allen Stewart, and Robert Walker. Phylogenetic Trees, *preprint* arXiv:1611.05805 (2016).
- Chris Hillar, Robert Krone and Anton Leykin. Equivariant Gröbner bases, *preprint* arXiv:1610.02075 (2016).
- Robert Krone, Anton Leykin and Andrew Snowden. Hilbert series of symmetric ideals in infinite polynomial rings via formal languages, *preprint* arXiv:1606.07956 (2016).
- Robert Krone. Equivariant Gröbner bases of symmetric toric ideals, *In Proceedings of the 41th International Symposium on Symbolic and Algebraic Computation, ISSAC '16* (to appear).
- Robert Krone and Anton Leykin. Eliminating dual spaces, *Journal of Symbolic Computation* (to appear).
- Robert Krone and Anton Leykin. Numerical algorithms for detecting embedded components, *Journal of Symbolic Computation* (to appear).

Robert Krone. Numerical Hilbert functions for Macaulay2, *preprint* arXiv:1405.5293 (2014).

Thomas Kahle, Robert Krone, Anton Leykin. Equivariant lattice generators and markov bases, *In Proceedings of the 39th International Symposium on Symbolic and Algebraic Computation, ISSAC '14*, pages 264–271. ACM (2014).

Jan Draisma, Rob Eggermont, Robert Krone, Anton Leykin. Noetherianity for infinite-dimensional toric varieties, *Algebra & Number Theory* 9-8, pages 1857–1880 (2015).

Robert Krone. Numerical algorithms for dual bases of positive-dimensional ideals, *Journal of Algebra and Its Applications* 12.06 (2013).

## SOFTWARE

PhylogeneticTrees package for Macaulay2 computer algebra system for computing invariants of phylogenetic tree statistical models.

NumericalHilbert package for Macaulay2 computer algebra system for numerically computing local Hilbert functions.

EquivariantGB package for Macaulay2 computer algebra system for computing equivariant Gröbner bases.

## CONFERENCE TALKS AND POSTERS

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|------------|---|
| Aug 2017   | SIAM Conference on Applied Algebraic Geometry (Georgia Tech)<br>Talk: “Modules over FI-algebras”  |
| Jul 2017   | Applied Macaulay2 Tutorials (Georgia Tech)<br>Talk: “Degree of SO(n)”   |
| Jan 2017   | AMS Joint Mathematics Meeting (Atlanta)<br>Talk: “The degree of the special orthogonal group”   |
| Nov 2016   | AMS Southern Sectional Meeting (North Carolina State University)<br>Talk: “Hilbert series of infinite symmetric ideals”   |
| July 2016  | ISSAC 2016 (Wilfrid Laurier University)<br>Talk: “Equivariant Gröbner Bases of Symmetric Toric Ideals”  |
| Jul 2016   | SIAM 2016 Annual Meeting (Boston)<br>Talk: “Hilbert series of invariant ideals”   |
| April 2016 | Free Resolutions, Representations, and Asymptotic Algebra workshop (BIRS)<br>Talk: “Equivariant Gröbner bases”  |
| Oct 2015   | Route 81 Conference (Queen’s University)<br>Talk: “Equivariant Gröbner bases”   |
| Oct 2015   | AMS Central Sectional Meeting (Loyola University)<br>Talk: “Equivariant Gröbner bases of toric ideals”  |
| April 2015 | Meeting on Algebraic Geometry and Applications (Georgia Tech)<br>Talk: “Equivariant Gröbner basis algorithms”   |
| Oct 2014   | AMS Western Sectional Meeting (San Francisco State)<br>Talk: “Finite generation of symmetric toric ideals”<br>Talk: “Equivariant lattice generators and Markov bases” |
| July 2014  | ISSAC 2014 (Kobe University)<br>Talk: “Equivariant lattice generators and Markov bases”   |
| July 2014  | Workshop on applications of algebraic geometry and algebraic analysis (Kobe University)<br>Talk: “Finite generation of symmetric toric ideals”                        |
| June 2014  | Computational Nonlinear Algebra conference (ICERM)<br>Poster: “Numerical Primary Decomposition”   |
| Jan 2014   | Macaulay2 Workshop (MSRI - UC Berkeley)<br>Talk: “Equivariant Gröbner Bases”  |
| Aug 2013   | SIAM Conference on Applied Algebraic Geometry (Colorado State)  |

Jun 2013      Talk: "Macaulay Dual Space and Numerical Primary Decomposition"  
 Effective Methods in Algebraic Geometry 2013 (Goethe-Universität)  
 Jun 2013      Talk: "Algorithms for equivariant Gröbner Bases"  
 DIAMANT Symposium 2013 (Heeze, Netherlands)  
 Oct 2012      Talk: "Noetherianity for infinite-dimensional toric varieties"  
 RTG Workshop: Tensors and their Geometry in High Dimensions (UC Berkeley)  
 Apr 2012      Talk: "Algorithms for symmetric Gröbner bases"  
 Texas Algebraic Geometry Symposium 2012 (Texas A&M)  
 Oct 2011      Poster: "Numerical algorithms for dual bases of positive-dimensional ideals"  
 SIAM Conference on Applied Algebraic Geometry (North Carolina State)  
 Talk: "Numerical algorithms for dual bases of positive-dimensional ideals"

## TEACHING

2017 Winter    MATH 16B: Short Calculus B  
 2017 Fall      MATH 67: Modern Linear Algebra  
 2017 Fall      MATH 16B: Short Calculus B  
 2017 Winter    MATH 228: Complex Analysis  
 2016 Fall      MATH 221: Vector Calculus  
 2016 Spring    APSC 172: Calculus II  
 2016 Winter    APSC 171: Calculus I  
 2013 Fall      Lead Instructor - MATH 1522: Linear Algebra  
 2012 Fall      Recitation TA - MATH 1512: Honors Calculus II  
 2012 Spring    Recitation TA - MATH 2605: Linear and Discrete Mathematics  
 2011 Fall      Recitation TA - MATH 2605: Calculus III for Computer Science  
 2011 Spring    Recitation TA - MATH 2602: Linear and Discrete Mathematics  
 2010 Fall      Recitation TA - MATH 2602: Linear and Discrete Mathematics  
 2009–2010     Private Tutor - high school math and science

## HONORS AND AWARDS

2016            Best Thesis Award, Georgia Institute of Technology - School of Mathematics  
 2015            Top Graduate Student Award, Georgia Institute of Technology - School of Mathematics  
 2014 Spring    Algorithms & Randomness Center Student Fellowship, Georgia Institute of Technology  
 2010–2014     President's Fellowship, Georgia Institute of Technology

## SERVICE

Jul 2017      SIAM Conference on Applied Algebraic Geometry  
                  mini-symposium on Theory of Numerical Algebraic Geometry - co-organizer  
 Jan 2017      AMS Joint Meeting  
                  mini-symposium on Numerical Algebraic Geometry - co-organizer  
 2012–2013     Georgia Tech Research Horizons seminar - co-organizer