

CHRISTINE BERKESCH ZAMAERE

Curriculum Vitae

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Career Objective

Research and teaching in the mathematical sciences

Employment

2013 – University of Minnesota, Assistant Professor
2011 – 2013 Duke University, Assistant Research Professor
2012 Fall MSRI (Mathematical Sciences Research Institute), Postdoctoral Fellow
Program: Commutative Algebra
2011 Spring Institut Mittag-Leffler, Postdoctoral Fellow
Program: Algebraic Geometry with a view towards applications
2010 – 2011 Stockholm University, NSF International Postdoctoral Fellow (Host: Mikael Passare)

Education

2010 Ph.D. Purdue University, Mathematics (Advisor: Uli Walther)
Thesis title: Euler–Koszul homology in algebra and geometry
2004 B.A. Butler University, Mathematics (with Honors Thesis)

Awards and grants

2015 – 2017 NSF DMS 1549892 Grant: Upper Midwest Commutative Algebra Colloquium
2013 – 2017 NSF DMS 1440537 Grant (before transfer: DMS 1303083)
2013 AWM-NSF Travel Grant
Spring 2013 Teaching evaluations in top 5% among undergraduate small course instructors at Duke
2012 Banff International Research Station, Research in Teams Grant
2012 AMS Mathematical Research Communities Collaboration Grant
2011 – 2013 AMS-Simons Travel Grant
2010 – 2011 NSF OISE 0964985 International Research Fellowship Program Grant
One of five partially supported by the Office of Multidisciplinary Activities
2009 – 2010 Bilsland Dissertation Fellowship
2007 Purdue University Graduate School Summer Research Grant
2004 – 2006 Clare Boothe Luce Foundation Fellowship
2004 Corrine Welling Scholarship
2004 Butler University Outstanding Graduating Mathematics Major Award
2000 – 2004 Lilly Endowment Community Scholarship
2003 Joint Mathematics Meetings Undergraduate Poster Session Award
One of the top 12 presentations
2002 Robert D. Whitesell Award for Academic Excellence in Mathematics, Butler University

Research interests

Combinatorial aspects of algebra and geometry

Papers

Peer-reviewed articles

- 2016 1. (with Jens Forsgård, Laura Felicia Matusevich) Hypergeometric functions for projective toric curves, to appear in *Adv. Math.* (Zelevinsky issue), 27 pages. [arXiv:math.AG/1412.3957](#)
- 2015 2. (with Laura Felicia Matusevich, Uli Walther) Singularities and holonomicity of binomial D -modules, *J. Algebra* **439** (2015), 360–372. [arXiv:math.AG/1308.5898](#)
3. (with Stephen Griffeth, Ezra Miller) Systems of parameters and holonomicity of A -hypergeometric systems, *Pacific J. Math.* **276-2** (2015), 281–286. [arXiv:math.AG/1302.0048](#)
- 2014 4. (with Stephen Griffeth, Steven V Sam) Jack polynomials as fractional quantum Hall states and the Betti numbers of the $(k + 1)$ -equals ideal, *Comm. Math. Phys.* **330** (2014), no. 1, pp. 415–434. [arXiv:math.MP/1303.4126](#)
5. (with Jens Forsgård, Mikael Passare) Euler–Mellin integrals and A -hypergeometric functions, *Michigan Math. J.* **63** (2014), no. 1, 101–123. [arXiv:math.CV/1103.6273](#)
- 2013 6. (with Daniel Erman, Manoj Kummini, Steven V Sam) Tensor complexes: Multilinear free resolutions constructed from higher tensors, *J. European Mathematical Society* **15** (2013), no. 6, 2257–2295. [arXiv:math.AC/1101.4604](#)
7. (with Daniel Erman, Manoj Kummini) Three flavors of extremal Betti tables, *Commutative Algebra*, Springer, New York, 2013. [arXiv:math.AC/1207.5707](#)
- 2012 8. (with Daniel Erman, Manoj Kummini, Steven V Sam) Poset structures in Boij–Söderberg theory, *International Mathematics Research Notices* (2012), vol. 2012, 5132–5160. [arXiv:math.AC/1010.2663](#)
9. (with Daniel Erman, Manoj Kummini, Steven V Sam) Shapes of free resolutions over a local ring, *Mathematische Annalen* **354** (2012), no. 3, 939–954. [arXiv:math.AC/1105.2244](#)
10. (with Jesse Burke, Daniel Erman, Courtney Gibbons) The cone of Betti diagrams over a hypersurface ring of low embedding dimension, *J. Pure Applied Algebra* **216** (2012), 2256–2268. [arXiv:math.AC/1109.5198](#)
- 2011 11. The rank of a hypergeometric system, *Compositio Mathematica* **147** (2011), no. 1, 284–318. [arXiv:math.AG/0807.0453](#)
- 2010 12. (with Anton Leykin) Algorithms for Bernstein–Sato polynomials and multiplier ideals, *ISSAC 2010: Proceedings of the 2010 International Symposium on Symbolic and Algebraic Computation*, 99–106, ACM, New York, 2010. [arXiv:math.AG/1002.1475](#)
- 2009 13. (with Laura Felicia Matusevich) A -graded methods for monomial ideals, *J. Algebra* **322** (2009), 2886–2904. [arXiv:math.AC/0807.4306](#)

Preprints

14. (with Laura Felicia Matusevich, Uli Walther) Torus equivariant D -modules and hypergeometric systems, 33 pages. [arXiv:math.AG/1308.5901](#)
15. (with Laura Felicia Matusevich, Uli Walther) Holonomicity and regularity of Horn systems, 15 pages.
16. (with Jens Forsgård, Laura Felicia Matusevich) On the parametric behavior of A -hypergeometric series, (submitted) 20 pages. [arXiv:math.AG/1603.08954](#)

Expository work

- (with Frank-Olaf Schreyer) Syzygies, finite length modules, and random curves, *Commutative Algebra and Noncommutative Algebraic Geometry*, Mathematical Sciences Research Institute Publications (2015), Vol. 1, 25–52. [arXiv:math.AC/1403.0581](#)
- Boij–Söderberg theory and tensor complexes, *Mathematisches Forschungsinstitut Oberwolfach Report* **10** (2013), no. 2, pp. 1504–1506.

Lecture series, lectures, and presentations

Lecture series

- 2013–2014 University of Minnesota: Euler–Koszul homology and hypergeometric systems [9 hours]
 2010 Oct. KTH, Stockholm: Euler–Koszul homology and hypergeometric systems [4 hours]

Invited (international audience)

- 2016 Oct. Fields Institute, Toronto, ON: Workshop on Convexity in Algebraic Geometry
 July Herstmonceux Castle, UK: Algebraic Combinatorics and Group Actions
 Apr. Banff, Canada (BIRS): Free Resolutions, Representations, and Asymptotic Algebra
 2014 Sept. Levico Terme, Italy: Meeting On Combinatorial Commutative Algebra (MOCCA)
 June Institut Mittag-Leffler, Djursholm, Sweden: Algebraic Geometry days in honor of Dan Laksov
 2013 Dec. Hanoi, Vietnam: International Conference on Commutative Algebra and Its Interactions
 July Utrecht University: Conference on special functions and special numbers for Frits Beukers
 May Berlin, Germany: Syzygies in Berlin
 May MFO, Oberwolfach, Germany: Constructive Homological Algebra
 Mar. Kleinwalsertal, Austria: Perspectives & Emerging topics in Algebra & Kombinatorics (PEAKs)
 2012 Dec. MSRI: Combinatorial Commutative Algebra and Applications
 2011 Dec. Toronto, ON (CMS): Scientific Session on Algebraic Geometry and Commutative Algebra
 Apr. University of Leiden: Intercity Number Theory Seminar
 Feb. Institut Mittag-Leffler, Djursholm, Sweden: Algebraic Geometry Program Seminar
 2010 Oct. Freie Universität, Berlin: Algebra Seminar
 Sept. KTH and Stockholm University: Algebra and Geometry Seminar
 Sept. University of Barcelona: Algebra Seminar
 Sept. Stockholm University: Pluricomplex Seminar
 June Berkeley, CA (AMS-SMM): Special Session, Commutative Algebra, Representation Theory
 Jan. Sevilla, Spain: International School of Combinatorics for Pilar Pisón-Casares
 2007 Sept. Kleinwalsertal, Austria: Summer School on Hypergeometric Functions

Invited (domestic audience; not including seminars)

- 2016 June West Lafayette, IN: EDGE Reunion Weekend Plenary Speaker
 Apr. Minneapolis, MN: Upper Midwest Commutative Algebra Colloquium Expository Lecture
 Mar. Purdue University: Mathematics Recruitment Weekend Speaker
 2015 Oct. Chicago, IL (AMS): Special Session, Commutative Algebra
 Aug. West Lafayette, IN: Midwest Commutative Algebra Meeting
 Jan. San Antonio, TX (JMM): Special Session, Syzygies
 2014 Oct. Chicago, IL: Algebra, Geometry, and Combinatorics Day 11 (AlGeCom)
 Oct. Moscow, ID: Western Algebraic Geometry Symposium (WAGS)
 Sept. Eau Claire, WI (AMS): Special Session, Directions in Commutative Algebra
 2013 Oct. Philadelphia, PA (AMS): Special Session, Combinatorial Commutative Algebra
 Aug. Fort Collins, CO (SIAM): Minisymposium on D -modules in Applied Algebraic Geometry
 Aug. Fort Collins, CO (SIAM): Minisymposium on Algebro-geometric approaches to tensor spaces
 Mar. Purdue University: Mathematics Recruitment Weekend Speaker
 Jan. University of Illinois, Urbana-Champaign: Departmental Colloquium
 Jan. North Carolina State University: Special Departmental Seminar
 Jan. University of Notre Dame: Departmental Colloquium
 2012 Dec. University of Minnesota: Special Departmental Seminar
 Apr. Wake Forest University: Departmental Colloquium
 Mar. Lawrence, KA (AMS): Special Session, Topics in Commutative Algebra

- 2011 Oct. Salt Lake City (AMS): Special Session, Computational & Algorithmic Algebraic Geometry
 Oct. Raleigh, NC (SIAM): Minisymposium on Combinatorial Structures in Algebraic Statistics
 Sept. Winston-Salem, NC (AMS): Special Session, Combinatorial Algebraic Geometry
 Sept. ICERM, Providence, RI (AWM): Special Session, Algebraic Geometry, Commutative Algebra
 June MSRI: Summer Graduate Workshop in Commutative Algebra
 Jan. New Orleans, LA (JMM): Special Session, Combinatorial Algebraic Geometry
- 2010 Mar. Butler University: Departmental Colloquium
 Feb. Sam Houston State University: Departmental Colloquium
 Jan. San Francisco, CA: Joint Mathematics Meeting, Special Session, Commutative Algebra
- 2009 Apr. Raleigh, NC (AMS): Special Session, Recent Advances in Symbolic Algebra and Analysis
- 2008 Apr. Bloomington, IN (AMS): Special Session, D -modules

Seminars (domestic)

- 2014 Dec. University of Minnesota: Introduction to Research Seminar
 Feb. University of Minnesota: Combinatorics Seminar
 Jan. Texas A&M University: Geometry Seminar
- 2013 Nov. University of Wisconsin: Algebraic Geometry Seminar
 Oct. University of Minnesota: Introduction to Research Seminar
 Feb. Duke University: Algebraic Geometry Seminar
- 2012 Nov. San Francisco State University: Algebra, Geometry, and Combinatorics Seminar
 Nov. Texas A&M University: Geometry Seminar
 Sept. UC Berkeley: Commutative Algebra and Algebraic Geometry Seminar
 Apr. North Carolina State University: Algebra and Combinatorics Seminar
 Apr. University of North Carolina: Geometric Representation Theory Seminar
 Feb. University of Michigan: Commutative Algebra Seminar
 Jan. Texas A&M University: Algebra and Combinatorics Seminar
- 2011 Nov. North Carolina State University: Symbolic Computation Seminar
 Jan. Stanford University: Algebraic Geometry Seminar
- 2010 Mar. Purdue University: Bridge to Research Seminar
 Feb. University of Nebraska, Lincoln: Commutative Algebra Seminar
 Feb. University of Nebraska, Lincoln: Mathematical Landscapes Seminar
- 2009 Nov. University of Illinois, Urbana-Champaign: Algebra-Geometry-Combinatorics Seminar
 Oct. University of Michigan: Commutative Algebra Seminar
 Sum. Purdue University: Multiplier Ideals Seminar
 Apr. MSRI: Algebraic Geometry Program Graduate Student Seminar
 Feb. Purdue University: Student Commutative Algebra Seminar
 Feb. University of Notre Dame: Algebraic Geometry and Commutative Algebra Seminar
- 2008 Oct. Texas A&M University: Geometry Seminar
 Oct. Purdue University: Boij–Söderberg Conjectures Seminar
 Oct. Purdue University: Working Algebraic Geometry Seminar
 Sum. Purdue University: Characteristic Classes Topology Seminar

Poster Presentations

- 2011 June Stockholm: Effective Methods in Algebraic Geometry (MEGA), Invited Poster Session
- 2010 Sept. Barcelona: First Swedish-Catalan Conference in Mathematics
 Apr. Amherst, MA: Algebraic Geometry Northeastern Series (AGNES)
- 2004 Jan. Phoenix, AZ: Joint Mathematics Meetings, Undergraduate Poster Session
- 2003 Jan. Baltimore, MD: Joint Mathematics Meetings, Undergraduate Poster Session

Teaching activities

Courses taught at Minnesota

- 2017 Spring General Algebra II (Math 8202)
- 2016 Fall General Algebra I (Math 8201)
- 2016 Fall Introduction to Modern Algebra (Math 4281)
- 2016 Spring Calculus I (Math 1271)
- 2015 Spring Commutative and Homological Algebra II (Math 8212)
- 2014 Fall Commutative and Homological Algebra I (Math 8211)
- 2014 Spring Introduction to Modern Algebra (Math 4281)
- 2013 Fall Introduction to Modern Algebra (Math 4281)

Courses taught at Duke

- 2013 Spring Introduction to Algebraic Structures II (Math 502)
- 2012 Spring Abstract algebra (Math 121)
- 2012 Spring Honors multivariable calculus (Math 105)
- 2011 Fall Graduate course on hypergeometric systems (Math 378, 5 weeks)
- 2011 Fall Multivariable calculus (Math 103)

Courses taught at Purdue

- 2008 Fall Second semester business calculus (Math 224), with exam-writing responsibilities
- 2007 Fall First semester business calculus (Math 223), with exam-writing responsibilities
- 2007 Spring Algebra/trigonometry (Math 154)
- 2006 Fall Single-variable engineering calculus (Math 161E), recitation for at-risk students

Other teaching activities

- 2011 June MSRI Workshop Postdoc TA: Summer Graduate Workshop in Commutative Algebra
- 2009 Spring Grader for the undergraduate abstract algebra course, Purdue University
- 2003–2004 Butler University Mathematics Tutoring Lab Student Coordinator
- 2002–2004 Butler University Mathematics Tutoring Lab Tutor

Mentoring activities

Initial advisor of graduate students at Minnesota

- 2014– Cora Brown, Sunita Chepuri, Michelle Pinharry

Undergraduate students advised at Minnesota

- 2014 Fall Zach Adams, Senior project
- Milton Stephens IV, Senior project
- 2014 Spring Samuel Jirele, Senior project
- Milton Stephens IV, Senior project
- Xuan Wang, Senior project

Undergraduate student advised at Duke

- 2011–2012 Danny Thielman (Mathematics major), Senior thesis: *Chemical Reaction Networks* (following summer PRUV project under the guidance of Anne Shiu)

Mentoring program organization and participation

- 2016 June EDGE Reunion Weekend Plenary Speaker
- 2016 Mar. Purdue University Mathematics Recruitment Weekend Speaker
- 2014– Association for Women in Mathematics Mentor Network mentor
- 2014 Aug. Interview for Girls' Angle Bulletin, a mathematical magazine for girls in grades 5-12
- 2014– Leader of the Minnesota cluster of the EDGE Mentoring Network

- 2013– University of Minnesota Women in Mathematics (WiM) Program
 2013 Mar. Purdue University Mathematics Recruitment Weekend Speaker
 2012–2013 Co-founder and organizer of MATH MENTORING
 A mentoring program for women in mathematics at Duke University
 (with Carla Cederbaum, Ben Cooke, Sarah Schott)
 2012 Mar. Organized North Carolina EDGE Mentoring Network Day at Duke University
 2004– Member of the EDGE Mentoring Network
 2004–2008 Purdue University Graduate Women in Science Program

Professional service

Organizing activities for conferences and meetings

- 2017 Aug. International conference on local cohomology in celebration of the 60th birthday of Gennady Lyubeznik (with Uli Walther, Wenliang Zhang), Minneapolis, MN
 2015– Upper Midwest Commutative Algebra Colloquium (with Daniel Erman), a weekend algebra meeting alternating between the University of Minnesota and the University of Wisconsin, held once each semester, supported by the NSF
 2014 Sept. AMS Special Session, New trends in toric geometry (with Daniel Erman, Hal Schenck), Eau Claire, WI
 2012 Feb. Triangle Lectures in Combinatorics (with Ezra Miller, Sonja Mapes), Duke University
 2011 Oct. AMS Special Session, Hypergeometric functions and differential equations (with Laura Felicia Matusevich), Salt Lake City, UT
 2011 Jan. Joint Mathematics Meeting, AMS Special Session, Commutative Algebra (MRC) (with Bhargav Bhatt, Jason McCullough, Javid Validashti), New Orleans, LA

Journals refereed

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| Advances in Mathematics | Communications in Algebra |
| Compositio Mathematica | International Mathematics Research Notices |
| J. of Combinatorial Theory, Series A | J. of Commutative Algebra |
| J. of Mathematical Analysis and Applications | J. of Pure and Applied Algebra |
| J. of Software for Algebra and Geometry | J. of Symbolic Computation |
| J. of the European Mathematical Society | London Mathematical Society Lecture Notes |
| Proceedings of the AMS | Rocky Mountain J. of Mathematics |

Professional memberships

- AMS (since 2004) AWM (since 2006) MAA (since 2010)
 SI(AG)²: SIAM Activity Group in Algebraic Geometry (since 2010)

Seminars organized

- 2013– Commutative Algebra Seminar (Minnesota)
 2012 Fall MSRI Commutative Algebra Program Postdoc Seminar
 2010 Fall Pluricomplex Seminar (Stockholm University)
 2009 Sum. Multiplier Ideals Seminar (Purdue)
 2008 Fall Boij–Söderberg Theory Seminar (Purdue)

Committees at Minnesota

- 2015–2017 School of Mathematics Computer Committee
 2014–2017 School of Mathematics Graduate Studies Committee
 2014–2015 School of Mathematics Newsletter Committee
 2013–2014 School of Mathematics Undergraduate Programs Committee

Committees at Purdue

- 2007–2009 College of Science Grade Appeals Committee
- 2006–2007 Graduate Student Representative to the Department of Mathematics
- 2004–2006 Graduate Women in Science Program Leadership Team

Committees at Butler

- 2003–2004 College of Liberal Arts and Sciences Dean's Student Advisory Committee

Invited participation at conferences and research experiences

- 2012 Aug. Syzygies in Algebraic Geometry, with an exploration of a connection with String Theory, BIRS, Banff, Canada
- 2010 June AMS Mathematical Research Communities: Commutative Algebra, Snowbird, UT
- 2009 Oct. Invited participant and developer: Macaulay2 Conference, Implementing algebraic geometry algorithms, AIM, Palo Alto, CA
- 2008 June AMS Mathematical Research Communities: Computational Algebra and Convexity, Snowbird, UT
- 2004 June The EDGE Program for women and minorities entering graduate school in mathematics, Spelman College, Atlanta, GA
- 2003 Sum. Butler Summer Institute Research Program, Butler University (Mentor: Prem Sharma)
- 2002 Sum. NSF REU, Central Michigan University (Mentor: Ken W. Smith)

References

Available upon request.