

**Michael K. Brown**  
CURRICULUM VITAE

**Citizenship:** United States

**E-mail:** mkb0096@auburn.edu

**Education:**

Ph.D. in Mathematics, University of Nebraska-Lincoln, 2015

Advisor: Mark E. Walker

Dissertation Title: *Knörrer Periodicity and Bott Periodicity*

**Employment:**

- Auburn University  
Assistant Professor, 2020 -
- University of Wisconsin-Madison  
Van Vleck Visiting Assistant Professor, 2017 - 2020
- Hausdorff Center for Mathematics, Bonn, Germany  
Postdoc, 2015 - 2017

**Grants:**

- SEC Faculty Travel Grant, \$1150, 2024 - 2025.
- NSF grant DMS - 2302373, “Multigraded commutative algebra and the geometry of syzygies”, \$220,000, 2023 - 2026.

**Publications and Preprints:**

- *The Hodge structure on the singularity category of a complex hypersurface* (with Mark E. Walker).
- *Orlov’s Theorem for dg-algebras* (with Prashanth Sridhar).
- *Déviissage for periodic cyclic homology of complete intersections* (with Mark E. Walker), to appear in Annals of K-theory.
- *Periodicity of ideals of minors in free resolutions* (with Hailong Dao and Prashanth Sridhar).
- *A short proof of the Hanlon-Hicks-Lazarev Theorem* (with Daniel Erman), Forum of Mathematics, Sigma (2024), Vol. 12:e56 1–6.
- *Positivity and nonstandard graded Betti numbers* (with Daniel Erman), Bulletin of the London Mathematical Society 56(1) (2024), 111-123.
- *Linear syzygies of curves in weighted projective space* (with Daniel Erman).
- *Idempotent completions of equivariant matrix factorization categories* (with Mark E. Walker), Journal of Algebra 634 (2023), 554–562.
- *A short resolution of the diagonal for smooth projective toric varieties of Picard rank 2* (with Mahrud Sayrafi), to appear in Algebra & Number Theory.

- *Linear strands of multigraded free resolutions* (with Daniel Erman), *Mathematische Annalen*, [published online](#) (2024).
- *Tate resolutions on toric varieties* (with Daniel Erman), *Journal of the European Mathematical Society*, [published online](#) (2024).
- *Minimal free resolutions of differential modules* (with Daniel Erman), *Transactions of the AMS* 375(10) (2022), 7509–7528.
- *A proof of a conjecture of Shklyarov* (with Mark E. Walker), *Journal of Noncommutative Geometry* 16(4) (2022), 1479–1523.
- *Standard Conjecture D for matrix factorizations* (with Mark E. Walker), *Advances in Mathematics* 366 (2020), 107092.
- *On the topological K-theory of twisted equivariant perfect complexes* (with Tasos Moulinos), *Homology, Homotopy and Applications* 25(1) (2023), 173–187.
- *A Chern-Weil formula for the Chern character of a perfect curved module* (with Mark E. Walker), *Journal of Noncommutative Geometry* 14(2) (2020), 709–772.
- *Topological K-theory of equivariant singularity categories* (with Tobias Dyckerhoff), *Homology, Homotopy and Applications* 22(2) (2020), 1–29.
- *Adams operations on matrix factorizations* (with Claudia Miller, Peder Thompson, and Mark E. Walker), *Algebra & Number Theory* 11-9 (2017), 2165–2192.
- *On a conjecture of Dao-Kurano*, *Journal of Algebra* 490 (2017), 462–473.
- *Cyclic Adams operations* (with Claudia Miller, Peder Thompson, and Mark E. Walker), *Journal of Pure and Applied Algebra* 221 (2017), no. 7, 1589–1613.
- *Knörrer periodicity and Bott periodicity*, *Documenta Mathematica* 21 (2016), 1459–1501.

#### Software:

- *The multigraded BGG correspondence in Macaulay2* (with Maya Banks, Tara Gomes, Prashanth Sridhar, Eduardo Torres Davila, and Alexandre Zotine).
- *Computing Schur complexes* (with Hang Huang, Robert P. Laudone, Michael Perlman, Claudiu Raicu, Steven V Sam, and João Pedro Santos), *Journal of Software for Algebra and Geometry* 9-2 (2019), 111–119.

#### Talks:

- Joint Mathematics Meetings, special session “Homological interactions between commutative and noncommutative algebra”, Seattle, 2025
- AMS-AustMS-NZMS International Meeting, special session “Computations and Applications of Algebraic Geometry and Commutative Algebra”, Auckland, 2024
- AMS Sectional Meeting, special session “Singularities in commutative algebra”, University at Albany - SUNY, 2024
- Two-week lecture series at SLMath summer school “Multigraded and differential graded methods in commutative algebra”, St. Mary’s College, 2024

- AMS Sectional Meeting, special session “Commutative and noncommutative algebra, together at last”, San Francisco State University, 2024
- AMS Sectional Meeting, special session “Homological methods in commutative algebra & algebraic geometry”, San Francisco State University, 2024
- Recent Developments in Commutative Algebra, SLMath, 2024
- Georgia State University, Algebra Seminar, 2024
- Joint Mathematics Meetings, special session “Commutative algebra and algebraic geometry”, San Francisco, 2024
- Cornell University, Algebra Seminar, 2023
- AIM Workshop: “Macaulay2: expanded functionality and improved efficiency”, 2023
- AIM Workshop: “Syzygies and mirror symmetry”, 2023
- Macaulay2 Mini-school and Workshop, Institute for Mathematics and its Applications, University of Minnesota, 2023
- AMS Sectional Meeting, special session “Recent Developments in Commutative Algebra”, Georgia Institute of Technology, 2023
- University of Hawaii, Colloquium, 2023
- University of Minnesota, Commutative Algebra and Algebraic Geometry Seminar, 2022
- Boise State University, Topics in Algebra, Topology, Etc. Research Seminar, 2022 (virtual)
- AMS Sectional Meeting, special session “Building Bridges Between Commutative Algebra and Nearby Areas”, University of Utah, 2022
- University of South Carolina, Algebra, Geometry, and Number Theory Seminar, 2022
- University of Nebraska, Commutative Algebra Seminar, 2021
- University of Wisconsin, Algebra and Algebraic Geometry Seminar, 2021
- AMS Sectional Meeting, special session “Homological Methods in Commutative Algebra”, Creighton University, 2021 (virtual)
- AMS Sectional Meeting, special session “Commutative Algebra and its Interaction with Algebraic Geometry and Combinatorics”, Georgia Institute of Technology, 2021 (virtual)
- University of Minnesota, Commutative Algebra Seminar, 2021 (virtual)
- MSRI “Fellowship of the Ring” Commutative Algebra Seminar, 2020 (virtual)
- University of Notre Dame, Algebraic Geometry/Commutative Algebra Seminar, 2020
- Iowa State University, Algebra and Geometry Seminar, 2019
- University of Illinois at Urbana-Champaign, Algebraic Geometry Seminar, 2019
- RRAGE: Ragnar’s Ramifications in Algebra and Geometry Emerging, Fields Institute, Toronto, 2019

- Maurice Auslander Distinguished Lectures and International Conference, Cape Cod, Massachusetts, 2019
- Northeastern University, Representation Theory and Related Topics Seminar, 2019
- Matrix Factorizations and Mirror Symmetry, KIAS, Seoul, 2018
- Stable Cohomology: Foundations and Applications, Snowbird, Utah, 2018
- University of Utah, Commutative Algebra Seminar, 2018
- University of Illinois at Chicago, Algebraic  $K$ -theory Seminar, 2017
- University of Nebraska, Commutative Algebra Seminar, 2017
- Matrix Factorisations and Related Topics, ICMS, Edinburgh, July 2017
- Universität Bielefeld, Representation Theory Seminar, 2016
- Workshop on Matrix Factorizations and Related Topics, Kavli IPMU, Tokyo, 2016
- University of Utah, Commutative Algebra Seminar, 2015
- Opening Perspectives in Algebra, Representations, and Topology, Centre de Recerca Matemàtica, Barcelona, 2015
- Commutative Algebra and Related Topics 2015, University of Kansas, 2015
- AMS Sectional Meeting, Singularities: Algebraic and Analytic Aspects, Georgetown University, 2015
- University of Copenhagen, Algebra/Topology Seminar, 2015
- Northeastern University, Representation Theory and Related Topics Seminar, 2014
- Harvard University, Thursday Seminar, 2014
- UCLA, Algebra Seminar, 2014
- University of Toronto, Homological Methods Seminar, 2014
- Syracuse University, Algebra Seminar, 2014
- KUMUNU 2014, University of Missouri, 2014

**Courses Taught at Auburn University:**

- Special Topics: Algebraic Geometry; Spring 2024
- Honors Linear Algebra; Spring 2024
- Homological Algebra; Spring 2023
- Introduction to Abstract Algebra II; Spring 2023
- Algebra II; Spring 2022
- Introduction to Algebraic Geometry (designed course); Fall 2021
- Algebra I; Fall 2021, Fall 2024
- Commutative Algebra; Spring 2021, Fall 2022, Fall 2024

- Linear Algebra; Spring 2021
- Introduction to Abstract Algebra I; Fall 2020, Fall 2022

### Postdocs Supervised:

- Justin Lyle, Fall 2024 -
- Prashanth Sridhar, Fall 2022 -

### Service

- Co-organizer of AIM workshop “Macaulay2 Workshop on Homological Mirror Symmetry and Multigraded Commutative Algebra”, 2025 (co-organized with Christine Berkesch, David Favero, and Sheel Ganatra)
- Co-organizer for AMS Fall Southeastern Sectional special session entitled “Topics in Commutative Algebra and Algebraic Geometry”, Georgia Southern University, 2024 (co-organized with Prashanth Sridhar)
- Co-organizer of SLMath summer school “Multigraded and differential graded methods in commutative algebra”, 2024 (co-organized with Claudia Miller)
- Leader of the development of a Macaulay2 project at the Utah M2 and String Theory Workshop, University of Utah, 2024
- Co-organizer of weekly virtual seminar “Syzygies and Mirror Symmetry”, Spring 2024 (co-organized with Matthew Ballard, Christine Berkesch, David Favero, Daniel Erman, Sheel Ganatra, and Andrew Hanlon)
- Scientific committee member for the “Fellowship of the Ring” virtual commutative algebra seminar (co-organized with Christine Berkesch, Dale Cutkosky, David Eisenbud, Claudiu Raicu, Irena Peeva, Claudia Polini, Karl Schwede, and Bernd Ulrich), 2023 - present
- Professional development panel, Macaulay2 Mini-School and Workshop, University of Minnesota, 2023
- Leader of the development of a Macaulay2 project at a Macaulay2 Mini-School and Workshop, University of Minnesota, 2023
- Guest on “COSAM weekly”, a podcast hosted by Auburn University on which faculty in the College of Sciences of Mathematics discuss their research for a general audience, 2023
- Co-organizer of weekly virtual seminar on multigraded commutative algebra, Spring 2023 (co-organized with Christine Berkesch and Daniel Erman)
- Co-organizer for a conference entitled “Commutative Algebra in The South” (CATS), University of Alabama, April 2023 (co-organized with Lance Miller and Thomas Polstra)
- Co-organizer for AMS Spring Southeastern Sectional special session entitled “Commutative Algebra and its Interactions with Algebraic Geometry”, Georgia Tech University, March 2023 (co-organized with Hal Schenck)
- Co-organizer for outreach program toward veterans in mathematics courses at Auburn University (co-organized with Hal Schenck), 2021 - present
- Organizer for the Auburn University Algebra Seminar, 2021 - present

- Co-organizer for AMS Fall Central Sectional special session entitled “Homological and Characteristic  $p > 0$  Methods in Commutative Algebra”, University of Wisconsin-Madison, September 2019 (co-organized with Eric Canton)
- Co-organizer for week-long summer school entitled “Derived Noncommutative Geometry”, Hausdorff Center for Mathematics in Bonn, Germany, Summer 2017 (co-organized with Anthony Blanc and Tobias Dyckerhoff)
- Co-organizer for KUMUNUjr, an annual NSF-funded conference for graduate students and post-docs in commutative algebra in the Midwest; 2013, 2014 (co-organized with Amanda Croll, Courtney Gibbons, and Jason Lutz in 2013, and with Jason Lutz in 2014)
- Referee for the following: Acta Mathematica; Advances in Mathematics; Bulletin of the LMS; Forum of Mathematics, PI; Homology, Homotopy and Applications; International Journal of Mathematics; Journal of Algebra; Journal of Commutative Algebra; Journal of the LMS; Journal of Pure and Applied Algebra; Proceedings of the AMS; Selecta Mathematica; Transactions of the AMS.