Curriculum Vitae
Henry Kvinge

Office Address:	Mathematics Department Colorado State University Fort Collins, CO 80523-1874	Email Address: Homepage: Date of CV:	henry.kvinge@colostate.edu `https://hkvinge.github.io` August 2018

Education/Employment

2017 –	**Postdoctoral Fellow**, Pattern Analysis Lab, Colorado State University
2011-2017	**Ph.D. in Mathematics,** University of California, Davis. Advisor: Monica Vazirani. Thesis: *A Categorification of the Crystal Isomorphism* $B^{1,1} \otimes B(\Lambda_i) \cong B(\Lambda_{\sigma(i)})$ *and a Graphical Calculus for the Shifted Symmetric Functions*
2004-2010	**B.S. in Mathematics, B.A. in Biochemistry,** University of Washington, *Magna Cum Laude* Advisor: Sara Billey.

Languages and other tools: Python, C++, CUDA, Matlab, Git, LaTeX

Research interests

Data science: Geometric data analysis, use of Grassmann and flag manifolds in data analysis and machine learning, dimensionality reduction methods, hyperspectral imaging, compressive sensing, GPU computing.

Representation theory and combinatorics: categorical and combinatorial represenation theory, Heisenberg categories and Kac-Moody 2-categories, symmetric groups and their generalizations, symmetric functions, connections to noncommutative probability theory, crystal graphs.

Publications and preprints

Data science:

- Henry Kvinge, Elin Farnell, Michael Kirby and Chris Peterson, *Monitoring the shape of weather, soundscapes, and dynamical systems: a new statistic for dimension-driven data analysis on large data sets*, submitted.
- Henry Kvinge, Elin Farnell, Michael Kirby and Chris Peterson, *Too many secants: a hierarchical approach to secant-based dimensionality reduction on large data sets*, Accepted to IEEE High Performance Extreme Computing Conference 2018. arXiv:1808.01686
- Henry Kvinge, Elin Farnell, Michael Kirby and Chris Peterson, *A GPU-Oriented Algorithm Design for Secant-Based Dimensionality Reduction*, ISPDC 2018 17th IEEE International Symposium on Parallel and Distributed Computing, (2018). arXiv:1807.03425
- Elin Farnell, Henry Kvinge, Michael Kirby and Chris Peterson, *Endmember Extraction on the Grassmannian*, 2018 IEEE Data Science Workshop, (2018). arXiv:1807.01401

Representation theory and combinatorics:

- Henry Kvinge, Can Ozan Oguz, and Michael Reeks, *The center of the twisted Heisenberg category, factorial Schur Q-functions, and transition functions on the Schur graph* (submitted) arXiv:1712.09626 (2017).

  Extended abstract in Proceedings of the 30th International Conference on Formal Power Series and Algebraic Combinatorics, Sminaire Lotharingien de Combinatoire, 80B.76 (2018) 12pp.

- Henry Kvinge, Anthony Licata, and Stuart Mitchell *Khovanov's Heisenberg category, moments in free probability, and shifted symmetric functions*, to appear in Algebraic Combinatorics, arXiv:1610.04571 (2016).

  Extended abstract in Proceedings of the 29th International Conference on Formal Power Series and Algebraic Combinatorics, Sminaire Lotharingien de Combinatoire, 78B.63 (2017), 12 pp.

- Henry Kvinge and Monica Vazirani, *Categorifying the tensor product of the Kirillov-Reshetikhin crystal $B^{1,1}$ and a fundamental crystal*, Algebras and representation theory (2017) pp. 1-55.

  Extended abstract in Proceedings of the 28th International Conference on Formal Power Series and Algebraic Combinatorics, Discrete Math. Theor. Comput. Sci. Proc. (2016), pp. 719-730.

Grants and fellowships

2017	Travel grant to speak at the Formal Power Series and Algebraic Combinatorics (FPSAC) Conference.
2016	Travel grant to present a poster at the Formal Power Series and Algebraic Combinatorics (FPSAC) Conference.
2015	Travel Grant to speak at AMS Fall Sectional at Loyola University
2013	Graduate Assistance in Areas of National Need Fellowship (summer)
2012	NSF VIGRE Fellowship (summer)

Selected talks

2018 June, Conference: Interactions of quantum affine algebras with cluster algebras, current algebras and categorification
Heisenberg categories, towers of algebras, and symmetric functions

2018 May, University of Washington Combinatorics Seminar
Symmetric functions, towers of algebras, and Heisenberg categories

2018 May, University of Colorado Algebraic Lie Theory Seminar
Symmetric functions, towers of algebras, and centers of Heisenberg categories

2018 March, Pacific Northwest Combinatorics Day
Centers of Heisenberg categories, symmetric functions, and the combinatorics of induction/restriction functors

2017 October, University of Colorado Algebraic Lie Theory Seminar
The Kirillov-Reshetikhin crystal $B^{1,1}$ and cyclotomic quiver Hecke algebras

2017 September, University of Virginia Algebra Seminar
Khovanov's Heisenberg category, the asymptotic representation theory of symmetric groups, and shifted symmetric functions

2017 September, Rocky Mountain Combinatorics Seminar - Colorado State University
Khovanovs Heisenberg category, moments in free probability, and shifted symmetric functions

2017 July, Formal Power Series and Algebraic Combinatorics Conference (FPSAC), London
Khovanov's Heisenberg category, moments in free probability, and shifted symmetric functions

2016 October, AMS Sectional - University of St. Thomas, Minneapolis (invited talk)
Special Session on Combinatorial Representation Theory
A surprising connection between Khovanov's Heisenberg category and the asymptotic representation theory of symmetric groups.

2016 September, Arizona State University Discrete Math Seminar
A graphical calculus for the shifted symmetric functions.

2016 March, University of Oregon, Algebra Seminar
The influence of the Kirillov-Reshetikhin crystal $B^{1,1}$ on the structure of simple cyclotomic KLR modules.

2016 February, University of Washington, Algebra and Algebraic Geometry Seminar
The influence of the KR crystal $B^{1,1}$ on the structure of simple cyclotomic KLR modules.
2016 January, UC Berkeley (invited talk)
Berkeley/Davis Combinatorics Gathering
The influence of the KR crystal $B^{1,1}$ on the structure of simple cyclotomic KLR modules.
2015 October, AMS Sectional - Loyola University, Chicago (invited talk)
Special Session on Combinatorial and Geometric Representation Theory
The influence of the KR crystal $B^{1,1}$ on the structure of simple cyclotomic KLR modules.
2015 October, UC Davis Algebra and Discrete Math Seminar
The influence of the KR crystal $B^{1,1}$ on the structure of simple cyclotomic KLR modules.
2013 September, Arizona State University Discrete Math Seminar
The Okounkov-Vershik approach to the representation theory of the symmetric group

Poster presentations

2017 December, Future Directions in Representation Theory, University of Sydney
The center of the twisted Heisenberg category, factorial Schur P-functions, and up/down transition functions on the Schur graph
2016 July, Formal Power Series and Algebraic Combinatorics Conference (FPSAC), UBC
Categorifying the tensor product of the KR crystal $B^{1,1}$ and a fundamental crystal
2016 June, US-Mexico Conference on Representation Theory, Categorification, and Noncommutative Algebra, USC
Khovanov's Heisenberg category and the asymptotic representation theory of symmetric groups

Teaching activities

Courses taught at Colorado State

2018 Fall Advanced Calculus (Math 417)

Courses taught at UC Davis

2016 Summer Combinatorics (Math 145)
2015 Winter Calculus for Biology and Medicine (Math 17B)

Service

2013 – 2016 Graduate mentor for the Women in Science and Engineering (WISE) Mentoring Program. WISE Mentoring Program aims to further gender equity in the fields of science, technology, engineering, and mathematics (STEM) by providing a supportive, gender positive environment in which students work together with mentors to achieve their academic and professional goals.

2011– 2016 Volunteer math tutor for STEM Café (formally known as Math Café), a tutoring center that serves women and other underrepresented groups in math. STEM Café provides a supportive and non-competitive study environment for women in the STEM fields. It involves weekly evening meetings, two hours in length, where members gather to study and do homework in groups.