

# EMİNE YILDIRIM

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## EDUCATION

*Ph.D. in Mathematics,*  
Université du Québec à Montréal, Canada. August 2015–May 2018  
Advisor : Hugh Thomas

*MSc. in Mathematics,* February 2010–June 2011  
Abant İzzet Baysal University, Turkey.  
Advisor : Tahire Özen Öztürk

*BSc. in Mathematics,* September 2006–January 2010  
Abant İzzet Baysal University, Turkey.

## WORK EXPERIENCE

*Research Fellow* October 2022–present  
University of Leeds, UK

*INI-Simons Postdoctoral Fellow* October 2021–September 2022  
Isaac Newton Institute; University of Cambridge

*Coleman Postdoctoral Fellow* July 2018–June 2021  
Queen's University, Canada

*Teaching Assistant* January 2014–August 2015  
University of New Brunswick, Canada

*Lecturer* September 2012–December 2013  
İstanbul Arel University, Turkey

## PAPERS

C. Paquette, J. D. Rock, and E. Yıldırım, *Representations of thread quivers*, in preparation.

K. Baur, L. Bittmann, E. Gunawan, and G. Todorov, *Infinite friezes of affine type D*, arXiv:2407.11232.

I. Le and E. Yıldırım, *Cluster Categorification of Rank 2 Webs*, arXiv:2402.14501.

A. Felikson, P. Tumarkin and E. Yıldırım, *Polytopal realizations of non-crystallographic associahedra*, arXiv:2401.08285.

E. Kantarcı Oğuz and E. Yildirim, *Cluster Expansions: T-walks, Labeled Posets and Matrix Calculations*, arXiv:2211.08011.

R. Marczinzik, H. Thomas, and E. Yildirim, *On the interaction of the Coxeter transformation and the Rowmotion bijection*, arXiv:2201.04446, *accepted to Journal of Combinatorial Algebra*, DOI 10.4171/JCA/101.

C. Paquette and E. Yildirim, *A Completion of Discrete Cluster Categories of type A*, Transactions of the London Mathematical Society (2021), 8(1), 35–64.

V. Bazier-Matte, N. Chapelier-Laget, G. Douville, K. Mousavand, H. Thomas, and E. Yildirim, *ABHY associahedra and Newton polytopes of F-polynomials for cluster algebras of simply laced finite type*. Journal of the London Mathematical Society (2) 2024, 109 (1), Paper No. e12817, 27.

V. Bazier-Matte, G. Douville, A. Garver, R. Patrias, H. Thomas, and E. Yildirim, *Leading Terms of  $SL_3$  Web Invariants*, International Mathematics Research Notices, (2020), rnaa110.

T. Brüstle, G. Douville, K. Mousavand, H. Thomas, and E. Yildirim, *On the combinatorics of gentle algebras*, Canadian Journal of Mathematics (2020), 72(6), 1551-1580.

E. Yildirim, *Coxeter transformation on cominuscul posets*. Algebra and Representation Theory (2019), 22(3), 699-722.

T. Özen and E. Yildirim,  *$\mathcal{X}$ -Injective and  $\mathcal{X}$ -Projective Complexes*. Bulletin of Iranian Mathematical Society (2016), 42(5), 1221-1235.

## OTHER

K. Baur and E. Yildirim, *Cluster Algebras*, Encyclopedia of Mathematical Physics 2nd edition, book title: Reference Module in Materials Science and Materials Engineering, 2023.

## AWARDS/ GRANTS

- London Mathematical Society Scheme 5: ‘Collaborations with Developing Countries’ grant.
- International Congress of Mathematicians 2022 travel grant (award not used since the conference moved to online).
- Invitation/Fund to Hausdorff Junior Trimester Program on “New Trends in Representation Theory” (award declined due to COVID-19/travel restrictions).
- Queen’s University Post-Doctoral Travel Award, 2018.
- Institute des Science du Mathématiques (ISM) Scholarships for Outstanding PhD Candidates, 2018.
- ISM Travel Grant, 2018.
- ISM Graduate Scholarships at UQAM. 2016, 2017, 2018.
- Tuition Exemption Scholarships at UQAM from 2015 to 2018.
- Graduate Scholarship from Prime Ministerial Office in Turkey. 2010-2011.

- Undergraduate Scholarship from Prime Ministerial Office in Turkey. 2006-2010.

## ORGANIZING

I am/was a co-organizer of the following conference and seminars.

- Algebra seminars, University of Leeds, February 2023 - June 2024.
- CLAN (Clusters and their Applications in the North), since January 2024.
- The Advances in Representation Theory of Algebras IX, Queen's University, June 2023.
- Cluster algebras and Representation Theory Seminars at Isaac Newton Institute, September-December 2021.
- Virtual Advances in Representation Theory of Algebras 2021 - Online Conference in Honor of Andrzej Skowroński, May 17-May 28 2021.
- Algebra & Geometry Working Seminars, Queen's University at the math department, 2020-2021.
- Geometry and Representation Theory Seminars, Queen's University at the math department, 2019-2020.
- Quantum Groups Learning Seminars, Queen's University at the math department, 2019-2020.

## TEACHING

### University of Leeds, United Kingdom:

#### - (Advanced) Commutative Rings and Algebraic Geometry

I was the module leader of this second semester course in 2024 where I was responsible for every aspect of the teaching as in my vector calculus class. The class size was about 36 students (a mix of undergraduates and master students).

#### - Projects in Mathematics

This is a year long course for students to carry out independent research. I co-supervised 5 students for different projects in the research area of "*Friezes*."

### Queen's University, Kingston, Canada:

#### - Vector Calculus in the Fall semesters of 2018; 2019; 2020.

The class size was about 150 students in 2018 and 2019 and the online course in 2020 had about 275 students. I was the only instructor, thus the coordinator, of this course each semester and I was responsible for every aspect of the teaching including preparing and giving lectures, assigning homeworks, preparing exams and coordinating with teaching assistants for grading of the exams.

#### - Rings and Fields in the Winter semester 2019.

This was a coordinated course and I was responsible from preparing and giving lectures for my section which had about 55 students. I was also responsible for preparing weekly quizzes for my section and organizing weekly tutorial sessions with the teaching assistant.

#### - Linear Algebra for the Winter semester 2020; 2021.

This was a coordinated course and I had about 120 students in 2020 and 135 students in the online course in 2021. I was the coordinator of the online course in 2021 and was responsible for every aspect of the teaching.

### University of New Brunswick, Fredericton, Canada:

- From January 2014 to June 2015, I worked as a teaching assistant for introductory calculus classes. I was responsible for preparing exercises and grading. I conducted problem solving sessions for two hours every week.
- In addition, I worked as a tutor at the Math Help Center helping students in their homeworks and questions related to math courses.

### İstanbul Arel University, İstanbul, Türkiye:

- From September 2012 to December 2013, I was a full time lecturer. I taught introductory calculus classes in English to first and second year engineering students. I had around six sections each semester and each section included around 25 students. I was responsible from every aspect of teaching; preparing and giving lectures, assigning and grading homeworks, preparing and grading exams.

### SUPERVISING

- İlknur Öztürk, *Root Systems and Reflection Groups*, summer 2023, Directed Reading Program Türkiye.
- Temi Abbass, *Triangulations and Friezes in three dimensions*, summer 2022, In2Research Program at the University of Cambridge.
- Zeliha Sevgi, *Quiver Representations*, summer 2022, Directed Reading Program Türkiye.
- Aysel Şahin, *Conway-Coxeter Friezes and related combinatorics*, summer 2021, Directed Reading Program Türkiye.
- Elifnaz Gülsen, *Quiver representations and their interaction with algebra and combinatorics*, one semester in 2019, Directed Reading Program Queen's University.
- Molly Liu, *Cluster algebras and combinatorics*, one semester in 2019, Directed Reading Program Queen's University.

### ACTIVITIES

I am/was a

- co-leader at the workshop "Women in Noncommutative Algebra and Representation Theory 4", Banff International Research Station, March 23 – 28, 2025.
- mentor in Directed Reading Program Türkiye in the summer of 2022 & 2023.
- mentor in Cambridge for 3 female undergraduate students in 2022.
- volunteer in the Mathematics Festival in Istanbul, 14-15 May 2022.
- host in the In2Science Program for 6 high school students at the University of Leeds between 7-11 August 2023.
- host In2Stem Program for 4 high school students at the University of Leeds between 5-9 August 2024.
- co-founder of the Maths Support Platform which provided academic resources, support and mentoring in math for undergraduate students who were affected by the major earthquake of February 2023 in Türkiye.

## PRESENTATIONS

- Thread quivers, Women in Representation Theory: quivers, mutations, and beyond, Bielefeld University, September 2024.
- *From Triangulations to Friezes and Cluster Algebras*, Mathematics Department Seminar at Yeditepe University, May 2024 (online).
- *Thread quivers*, Pure Maths Seminar at Lancaster University, May 2024.
- *Exploring Combinatorial Windmills across Algebraic Landscape*, Algebra and Number Theory seminar at the University College Dublin, April 2024.
- *Matrix computation of cluster expansions*, Continued Fractions and  $SL_2$ -tilings, Durham University, March 2024.
- *Why the Return to Pictures in Algebra?*, Pure maths colloquium, University of Sheffield, March 2024.
- *Cluster Expansion via matrices*, Cluster Algebra and Its Applications, Oberwolfach, January 2024.
- *Webs and  $Gr(3,n)$* , Arbeitsgemeinschaft: Cluster Algebras, Oberwolfach, October 2023.
- *Friz Desenlerinin Cebirsel Yorumu*, 35. National Mathematics Symposium, Trakya University, Turkey, September 2023.
- *Friezes*, Combinatorial Representation Theory in Leeds, University of Leeds, July 2023.
- *Growth of frieze patterns*, Cluster Structures in the North 2023, University of Central Lancashire, Preston, June 2023.
- *Cluster Expansions via matrices*, Combinatorial aspects of Representation Theory, Norwegian Academy of Sciences and Letters in Oslo, March 2023.
- *Computing Cluster Expansions via matrices*, Glasgow Algebra and Number Theory seminar, University of Glasgow, March 2023.
- *Cluster Expansion via matrices*, Aarhus Homological Algebra Seminar, Aarhus University, February 2023.
- *Categories from Poset Quivers*, Algebra seminar, University of Manchester, December 2022.
- *Poset Quivers*, Algebra seminar, University of Leeds, October 2022.
- *Poset Quivers*, Geometric and combinatorial methods in homological algebra, Aarhus University, July 2022.
- *Cluster-tilting subcategories*, Bridges between representation theory and algebraic geometry: Singularities, friezes and cluster categories, University of Leeds, May 2022.
- Cluster categories: classical, discrete and beyond, Algebra seminar, University of Bath, May 2022.
- What is a connection between cluster algebras and friezes?; with Emily Gunawan, The Banff International Research Station, April 2022.
- *Periodic actions*, Bilkent Algebra Seminar, February 2022 (online).

- *Periodic actions on distributive lattices and counterparts in algebra*, FD Seminar, November 2021 (online).
- *Cluster structures*, New developments in Representation Theory arising from Cluster Algebras, Isaac Newton Institute, September 2021 (online).
- *The manifestations of Rowmotion in Representation Theory of Algebras*, Summer School of Algebraic Combinatorics, June 2021 (online).
- *Composition of the rowmotion and the Coxeter transformation*, Virtual Advances in Representation Theory of Algebras, May 2021 (online).
- *Webs and Modules*, TRAC Online Seminars, University of Sherbrooke, April 2021 (online).
- *Generalized Associahedra*, Algebra Seminar, University of Leeds, March 2021 (online).
- *Tilting theory and Quiver mutation*, LPA Seminars, Turkey, February 2021 (online).
- *Discrete cluster categories of type A and beyond*, Flash Talks in Representation Theory, NTNU, January 2021 (online).
- *The orbits of the Coxeter Transformation and Rowmotion for cominusculé posets*, Dynamical Algebraic Combinatorics, Banff International Research Station, October 2020 (online).
- *Graphs and Combinatorics in Representation Theory of Algebras.*, Queen's University Colloquium, October 2020 (online).
- *Associahedra and Quiver Representations*, Gebze Technical University, October 2020 (online).
- *The Coxeter Transformation and Rowmotion for cominusculé posets*, Kentucky Discrete Math Seminar, September 2020 (online).
- *Cluster categories*, Uluslararası Cebirsel Geometri Neşesi, 2020 (online).
- *Cluster categories capturing combinatorics of infinite cluster variables*, Algebra Seminar, University of Sherbrooke, Quebec, February 2020.
- *The Coxeter Transformation and Promotion*, Algebra Seminar, University of Toronto, Toronto, January 2020.
- *A completion of discrete cluster categories of type A*, Seventh Conference on Geometric Methods in Representation Theory, University of Missouri, Columbia, November 2019.
- *Rowmotion and Coxeter transformation*, Applied Algebra Seminar, York University, Toronto, September 2019.
- *A slight extension of discrete cluster categories*, Cluster Algebras and Quiver Representations, Centre de Recherches Mathématiques (CRM), August 2019.
- *Cluster categories for an infinite rank cluster algebra*, Summer Day of Representation Theory of Algebras, Université de Sherbrooke-Bishop's University, QC, July 2019.
- *The bounded derived category for cominusculé posets*, Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, MA, April 2019.

- *The Web Basis and Preprojective Algebras*, American Mathematical Society Sectional Meeting, Hartford, CT, April 2019.
- *Associahedra and Newton Polytopes of F-Polynomials*, Cluster structures in geometry, physics, combinatorics and representation theory, Jerusalem, December 2018.
- *The bounded derived category for cominuscule posets*, Algebra seminar, Queen's University, Kingston, ON, September 2018.
- *Generalized Associahedra and Newton polytopes of F-polynomials*, Algebra seminar, Carleton University, Ottawa, ON, September 2018.
- *Associahedra via quiver representations*, Canadian Mathematical Society Summer Meeting, Fredericton, NB, June 2018.
- *The periodicity of the Coxeter transformation*, The XXI<sup>e</sup> Colloque panquébécois des étudiants de l'Institut des Sciences mathématiques (ISM), Université de Sherbrooke, QC, May 2018.
- *The Coxeter transformation on cominuscule posets*, Séminaire de combinatoire, Université du Québec à Montréal, LaCIM, QC, February 2018.
- *The Coxeter transformation on cominuscule posets*, Department seminar, Mimar Sinan University, Istanbul, December 2017.
- *The Coxeter transformation on grid posets*, Department seminar, Istanbul Technical University, Istanbul, December 2017.
- *Cluster Monomials in Web Basis*, Algebra seminar, University of Sherbrooke, QC, November 2017.
- *Cluster Monomials in Web Basis*, Cluster algebras seminar, University of Connecticut, CT, November 2017.
- *Coxeter transformation on cominuscule posets*, Cluster algebras seminar, University of Connecticut, CT, October 2017.
- *Coxeter transformation on cominuscule posets*, Combinatoric seminar, University of Minnesota, MN, September 2017.
- *Auslander-Reiten translation on cominuscule posets*, Advances in Representation Theory of Algebras VI: Geometry and Homology (ARTA), Luminy, September 2017.
- *Periodic behavior of Auslander-Reiten translation*, The Mathematical Congress of the Americas (MCA), Montreal, QC, July 2017.
- *On the combinatorics of gentle algebras*, XXVIIIth Meeting on Representation Theory of Algebras, Sherbrooke, QC, September 2016.
- *Coxeter transformation of the poset of order ideals in a grid*, International Conference on Representations of Algebras, Syracuse, NY August 2016.
- *Cluster Algebras*, Graduate Seminars, University of New Brunswick, NB, April 2015.
- *Two dimensional Yetter-Drinfeld modules over  $U_q(sl_2)$  are trivial*, Hopf Algebras in (Co)Action workshop, NB, June 2014.

- *Monomial ideals of path algebras*, Research Seminars, University of New Brunswick, NB, March 2014.

## Research Visits

- Charles Paquette, Queen's University, 26 May - 26 June 2023.
- Esther Banaian, Aarhus University, 14-18 February 2023.
- Léa Bittmann, University of Edinburgh, 29 November - 1 December 2022.
- Anna Felikson and Pavel Tumarkin, Durham University, 15-18 July 2022.
- Alastair King, University of Bath, 3-5 May 2022.
- Ana Garcia Elsener, University of Glasgow, 9-12 April 2021.
- Ibrahim Assem, University of Sherbrooke, 30 June - 6 July 2019.
- Ralf Schiffler, University of Connecticut, 29 October - 3 November 2017.

## CONFERENCES ATTENDED

- Women in Representation Theory: quivers, mutations, and beyond, Bielefeld University, September 2024.
- Clusters and their Applications in the North (CLAN), University of Central Lancashire, Preston, June 2024.
- Continued Fractions and  $SL_2$  tilings, Durham University, March 2024.
- Clusters and their Applications in the North (CLAN), University of Glasgow, February 2024.
- Cluster Algebra and Its Applications, Oberwolfach, January 2024.
- Current Trends in Representation Theory, Cluster Algebras and Geometry, Centre International de Rencontres Mathématiques (CIRM), Luminy, November 2023.
- Combinatorial Representation Theory in Leeds, University of Leeds, July 2023.
- Functor Categories, Model Theory, and Constructive Category Theory, University of Málaga, July 2023.
- Cluster Structures in the North 2023, University of Central Lancashire, Preston, June 2023.
- Advances in Representation Theory of Algebras IX, Queen's University, Kingston, June 2023.
- Combinatorial aspects of Representation Theory, Norwegian Academy of Sciences and Letters in Oslo, March 2023.
- Geometric and combinatorial methods in homological algebra, Aarhus University, July 2022.
- Bridges between representation theory and algebraic geometry: Singularities, friezes and cluster categories, University of Leeds, May 2022.
- Counting conjectures and beyond, The Isaac Newton Institute, Cambridge, May 2022.
- ARTIN meeting, the University of Manchester, March 2022.



- Representation Theory and Geometry, Queen's University - RMC, February 2022 (online).
- Combinatorial Algebra meets Algebraic Combinatorics, 19th Annual Meeting, The Fields Institute, January 2022 (online).
- Dynamical Algebraic Combinatorics, Banff International Research Station (BIRS), November 2021 (online).
- New developments in representation theory arising from cluster algebras, Isaac Newton Institute, September 2021 (online).
- Summer School of Algebraic Combinatorics, June 2021 (online).
- Virtual ARTA 2021 - Online Conference in Honor of Andrzej Skowroński, May 2021 (online).
- Additive categories between algebra and functional analysis, March 2021 (online).
- Flash Talks in Representation Theory, NTNU, January 2021 & 2023 (online).
- Dynamical Algebraic Combinatorics, BIRS, October 2020 (online).
- Winter School "Connections between representation theory and geometry", Hausdorff Research Institute for Mathematics, October 2020 (online).
- Meeting on Representation Theory of Algebras – Corona Edition, Sherbrooke, QC, September 2020 (online).
- Categorifications in Representation Theory, September 2020 (online).
- Cluster Algebras 2020 (online).
- McKay correspondence, mutation and related topics, Kavli IPMU, August 2020 (online).
- Dimers in Combinatorics and Cluster Algebras, University of Michigan, August, 2020 (online).
- Seventh Conference on Geometric Methods in Representation Theory, University of Missouri, Columbia, November 2019.
- The 29th Annual Route 81 Conference on Commutative Algebra and Algebraic Geometry, Kingston, ON, October 2019.
- The XXXIst Meeting on Representation Theory of Algebras, Sherbrooke, QC, September 2019.
- Quiver Varieties and Representation Theory, Centre de Recherches Mathématiques (CRM), Montreal, QC, August 2019.
- Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, Massachusetts, MA, April 2019.
- American Mathematical Society Sectional Meeting, Hartford, CT, April 2019.
- Cluster structures in geometry, physics, combinatorics and representation theory, Jerusalem, December 2018.
- The 28th Annual Route 81 Conference on Commutative Algebra and Algebraic Geometry, Syracuse, September 2018.

- The XXXth Meeting on Representation Theory of Algebras, Sherbrooke, QC, September 2018.
- Canadian Mathematical Society Summer Meeting, Fredericton, NB, June 2018.
- The  $XIX^e$  Colloque panquébécois des étudiants de l'ISM, Université de Sherbrooke, QC, May 2018.
- Cluster Algebras: Twenty Years On, Centre International de Rencontres Mathématiques (CIRM), Luminy, 2018.
- Combinatorial Algebra meets Algebraic Combinatorics, 15th Annual Meeting, Hamilton, ON, January 2018.
- The XXIXth Meeting on Representation Theory of Algebras, Sherbrooke, QC, September 2017.
- Advances in Representation Theory of Algebras VI: Geometry and Homology (ARTA), CIRM, Luminy, 2017.
- The Mathematical Congress of the Americas (MCA), Montreal, QC, July 2017.
- Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, MA, April 2017.
- Combinatorial Algebra meets Algebraic Combinatorics, Fourteenth Annual Meeting, Montreal, QC, January 2017.
- The XXVIIIth Meeting on Representation Theory of Algebras, Sherbrooke, QC, September 2016.
- International Conference on Representations of Algebras, Syracuse, NY, August 2016.
- The  $XIX^e$  Colloque panquébécois des étudiants de l'ISM, QC, May 2016.
- Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, MA, April 2016.
- Canadian Mathematical Society Winter Meeting, Montreal, QC, December 2015.
- The XXVIIth Meeting on Representation Theory of Algebras, Sherbrooke, QC, September 2015.
- Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, MA, April 2015.
- Fall Eastern Sectional Meeting Dalhousie University, Halifax, NS, October 2014.

## **WORKSHOPS ATTENDED**

- Arbeitsgemeinschaft: Cluster Algebras, Oberwolfach, October 2023.
- Mutations in Representation Theory of Algebras, University of Isfahan, May 2023 (online).
- Masterclass: Cluster Algebras and Representation Theory, University of Copenhagen, November 2022.
- Women in Noncommutative Algebra and Representation Theory 3, The Banff International Research Station, April 2022 (online).
- Cluster Algebras and Representation Theory, Semester-Program at the Isaac Newton Institute, Sept-Dec 2021, Cambridge, UK.

- Introductory Workshop: Group Representation Theory and Applications, Mathematical Sciences Research Institute, Berkeley, February 2018.
- Connections for Women: Group Representation Theory and Applications, Mathematical Sciences Research Institute, Berkeley, CA February 2018.
- School and Workshop: Algebraic and Geometric Combinatorics of Reflection Groups, Montreal, QC, June 2017.
- Sage Days 86, UQAM, Montreal, QC, April 2017.
- Workshop on Representations of Algebras, Syracuse, NY, August, 2016.
- Positive Grassmannians, CRM, Montreal, QC, July 2015.
- Cluster algebras, Poisson Structure, Networks and Integrable Systems, CRM, Montreal, QC, July 2015.
- Hopf Algebras in (Co)Action, Fredericton, NB, June 2014.
- Noncommutative Geometry and Quantum Groups, Bahçeşehir University, Istanbul, September 2014.
- Path Algebras and Homology, Bahçeşehir University, Istanbul, January 2013.

## **SKILLS**

*Languages:* Turkish (native), English (fluent), French (intermediate).

*Software:* SAGE, GAP, PYTHON, R, JUPYTER.

*Art:* Painting, Photography.