Curriculum Vitae

GARETH E. ROBERTS

Professor of Mathematics
affiliated with Environmental Studies
College of the Holy Cross

Highlighted items indicate activities occurring between June 1, 2023 and May 31, 2024

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Education

BOSTON UNIVERSITY, Boston, MA. Ph.D. in Mathematics, May, 1999.
Advisor: Glen Hall
Dissertation: *Existence and Stability of Relative Equilibria in the N-Body Problem.*

OBERLIN COLLEGE, Oberlin, Ohio. B.A. in Mathematics, *High Honors*, May, 1992.

Academic Appointments

College of the Holy Cross, *Chair, Dept. of Mathematics and Computer Science*, 2019–2022.

College of the Holy Cross, *Full Professor*, 2016–Present.

College of the Holy Cross, *Associate Professor*, 2008–2016.

College of the Holy Cross, *Assistant Professor*, 2001–2008.

University of Minnesota, Minneapolis, *Visiting Professor*, Spring 2004.

Boston University, *Visiting Professor*, Fall 2003.

University of Colorado, Boulder, *NSF VIGRE Postdoctoral Research Associate*, 1999–2001.

The Hun School of Princeton, *Secondary School Teacher*, 1992–1994.

Grants, Awards, and Honors

Research Associate Award, J.D. Power Center for Liberal Arts in the World, College of the Holy Cross, Spring 2023 ($1,238).

Research Associate Award, J.D. Power Center for Liberal Arts in the World, College of the Holy Cross, Spring 2021 ($1,755).

O'Leary Award, College of the Holy Cross, July 1, 2015 – June 30, 2017 ($12,000).

Research and Publication Award, College of the Holy Cross, Spring 2015 ($1,300).

National Science Foundation Award DMS-1211675, Division of Mathematical Sciences, Applied Mathematics Program, July 1, 2012 – June 30, 2016 ($137,234).
Title: *RUI: Investigating Central Configurations in the N-Body and N-Vortex Problems.*

Faculty Fellowship, College of the Holy Cross, 2012–2013.

National Science Foundation Award DMS-0708741, Division of Mathematical Sciences, Applied Mathematics Program, July 1, 2007 – June 30, 2011 ($124,036).
Title: *RUI: Questions on Finiteness and Stability in Celestial Mechanics.*

Charles & Rosanna Batchelor (Ford) Faculty Fellowship, College of the Holy Cross, Summer 2007 ($3,500).

Council on Undergraduate Research (CUR) Student Summer Research Fellowship in Mathematics and Science, 2004 ($3,000).

Charles & Rosanna Batchelor (Ford) Faculty Fellowship, College of the Holy Cross, Summer 2002 ($3,200).

Outstanding Teaching Fellow Award, Boston University, 1998.

Presidential University Graduate Fellowship, Boston University, 1994.

Rebecca Cary Orr Memorial Prize in Mathematics, Oberlin College, 1992.

Phi Beta Kappa, Oberlin College, 1992.

Book

From Music to Mathematics: Exploring the Connections, The Johns Hopkins University Press, 320 pages, 2016.

Refereed Publications

1. Classifying Four-Body Convex Central Configurations (with M. Corbera and J. Cors), *Celestial Mechanics and Dynamical Astronomy* **131**, 34, 2019. Selected for the topical collection "50 years of Celestial Mechanics and Dynamical Astronomy."

2. Existence and Stability of Four-Vortex Collinear Relative Equilibria with Three Equal Vorticities (with B. Menezes, HC '16), *SIAM Journal on Applied Dynamical Systems*, vol. **17**, no. 1, 1023–1051, 2018.

3. Morse Theory and Relative Equilibria in the Planar N-Vortex Problem, *Archive for Rational Mechanics and Analysis*, vol. **228**, no. 1, 209–236, 2018.

4. A Four-Body Convex Central Configuration with Perpendicular Diagonals is Necessarily a Kite (with M. Corbera and J. Cors), *Qualitative Theory of Dynamical Systems*, published online: April 17, 2017.

5. Uniqueness Results for Co-Circular Central Configurations for Power-Law Potentials (with J. Cors and G. Hall), *Physica D: Nonlinear Phenomena* **280-281**, 44–47, 2014.

6. Elusive Zeros Under Newton's Method (with T. O'Brien, HC '05), *Applied Mathematics* **5**, no. 15, 2393–2407, 2014.

7. Relative Equilibria in the Four-Vortex Problem with Two Pairs of Equal Vorticities (with M. Hampton and M. Santoprete), *Journal of Nonlinear Science* **24**, 39–92, 2014.

8. Stability of Relative Equilibria in the Planar N-Vortex Problem, *SIAM Journal on Applied Dynamical Systems* **12**, no. 2, 1114–1134, 2013.

9. Conducting Mathematical Research with Undergraduates, *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies* **23**, no. 9, 785–797, 2013.

10. Four-Body Co-Circular Central Configurations (with J. Cors), *Nonlinearity* **25**, 343–370, 2012.

11. Linear Stability for Some Symmetric Periodic Simultaneous Binary Collision Orbits in the Four-Body Problem (with L. Bakker, T. Ouyang, S. Simmons and D. Yan), *Celestial Mechanics and Dynamical Astronomy* **108**, no. 2, 147–164, 2010.

12. Finiteness in the Planar Restricted Four-Body Problem (with J. Kulevich and C. Smith, both HC '08), *Qualitative Theory of Dynamical Systems* **8**, no. 2, 357–370, 2009.

13. Linear Stability Analysis of the Figure-Eight Orbit in the Three-Body Problem, *Ergodic Theory and Dynamical Systems* **27**, 1947–1963, 2007.

14. Saari's Conjecture for the Restricted Three-Body Problem (with L. Melanson, HC '06), *Celestial Mechanics and Dynamical Astronomy* **97**, no. 3, 211–223, 2007.

15. Some Counterexamples to a Generalized Saari's Conjecture, *Transactions of the American Mathematical Society* **358**, no. 1, 251–265, 2006.

16. Newton's Versus Halley's Method: A Dynamical Systems Approach (with J. Horgan-Kobelski), *International Journal of Bifurcation and Chaos* **14**, no. 10, 3459–3475, 2004.

17. Linear Stability of the Elliptic Lagrangian Triangle Solutions in the Three-Body Problem, *Journal of Differential Equations* **182**, 191–218, 2002.

18. Drift by Coupling to an Anti-Integrable Limit (with R. Easton and J. Meiss), *Physica D* **156**, 201–218, 2001.

19. Linear Stability in the $1 + n$-gon Relative Equilibrium, *Hamiltonian Systems and Celestial Mechanics (HAMSYS-98)*, World Scientific Monograph Series in Mathematics **6**, 303–330, 2000.

20. Dynamical Convergence of Polynomials to the Exponential (with C. Bodelón, R. Devaney, L. Goldberg, M. Hayes and J. Hubbard), *Journal of Difference Equations and Applications* **6**, 275–307, 2000.

21. Existence and Stability of Relative Equilibria in the N-Body Problem, *International Conference on Differential Equations, Vol. 1,2 (Berlin, 1999)* World Sci. Publishing, River Edge, NJ, 30–35, 2000 (conference proceedings).

22. Spectral Instability of Relative Equilibria in the Planar N-Body Problem, *Nonlinearity* **12**, 757–769, 1999.

23. A Continuum of Relative Equilibria in the Five-Body Problem, *Physica D* **127**, nos. 3-4, 141–145, 1999.

24. Hairs for the Complex Exponential Family (with C. Bodelón, R. Devaney, L. Goldberg, M. Hayes and J. Hubbard), *International Journal of Bifurcation and Chaos* **9**, no. 8, 1517–1534, 1999.

25. On Kite Central Configurations, in preparation. ..... **New**

Other Publications

- Poem: "Fib Flowers," Holy Cross Campus Poetry Walk (2022).
  `https://crossworks.holycross.edu/poetry2022/22`

Other Publications Featuring My Research

- The N-Vortex Problem, *International Innovation: Disseminating Science, Research and Technology*, issue 191 ("What is Mathematics?"), 56–58, August, 2015.

- B. Cipra, *What's Happening in the Mathematical Sciences*, vol. 5, P. Zorn ed., American Mathematical Society, Providence, RI, 2002. A side-bar focusing on my research on central configurations appears on pp. 74–75.

Courses Taught

At Holy Cross:

CISS 275: CreateLab: Gravity and Grace
MONT 106Q: Math, Music and Memory
MONT 107Q: Math, Music and Identity
MONT 108N: Math/Music: Structure and Form

MONT 109N: Math/Music: Aesthetic Links
MATH 110: Topics in Mathematics: Mathematics and Music
MATH 125: Calculus for the Social Sciences 1
MATH 126: Calculus for the Social Sciences 2
MATH 131: Calculus for the Physical and Life Sciences 1
MATH 132: Calculus for the Physical and Life Sciences 2
MATH 133: Calculus 1 with Fundamentals
MATH 134: Calculus 2 with Fundamentals
MATH 135: Calculus 1
MATH 136: Calculus 2
MATH 136: Advanced Placement Calculus
MATH 199: STEM Foundations
MATH 241: Multivariable Calculus
MATH 242: Principles of Analysis
MATH 303: Mathematical Models
MATH 304: Ordinary Differential Equations
MATH 305: Complex Analysis
MATH 373: Principles and Techniques of Applied Mathematics
MATH 374: Dynamical Systems
MATH 392: Seminar in Celestial Mechanics
MATH 392-01: Seminar in Math and Climate
MATH 392-02: Seminar in Complex Analytic Dynamics

At the University of Colorado, Boulder:

APPM 2350: Calculus III for Engineers
APPM 3310: Matrix Methods and Applications

At Boston University:

Linear Algebra (*Instructor*)
Calculus I, Differential Equations (*Teaching Assistant*)

At the Hun School of Princeton:

Algebra I and II, Geometry, Precalculus

Honors Theses and Directed Projects

At Holy Cross:

MATH 410: Directed Project, Ryan Ferraro (HC '19)
Investigating Climate Models of Mars for Different Obliquities (Spring 2019).

MATH 410: Directed Project, Rose Kirsch (HC '19)
Global Temperature and Sea Level Rise: The Effect on Ice Sheets and Glaciers (Spr 2019).

HNRS 495: College Honors Thesis, Cara Donovan (HC '18)
A Dynamical Systems Approach to Climate Modeling (2017–2018).

MATH 410: Directed Project, Brian Menezes (HC '16)
The N-Vortex Problem (Fall 2015).

MATH 496: Mathematics Honors Thesis, Rebecca Moran (HC '12)
Central Configurations in the Planar 7-Body Problem (2011–2012).

MATH 496: Mathematics Honors Thesis, Shea Sennett (HC '10)
Collinear Central Configurations in the N-Body Problem (2009–2010).

MATH 400: Directed Project, Julianne Kulevich (HC '08) and Christopher J. Smith (HC '08), *Celestial Mechanics* (Fall 2007).

MATH 400: Directed Project, Lisa Melanson (HC '06)
Celestial Mechanics (Fall 2005).

MATH 496: Mathematics Honors Thesis, Trevor O'Brien (HC '05)
Elusive Zeros Under Newton's Method (2004–2005).

READER: College Honors Thesis, Mark Czerwinski (HC '23)
Limitation and Creativity: A Rock Album Inspired by Mathematical Constraints (Spring 2023).

READER: Mathematics Honors Thesis, Thomas Yacovone (HC '23)
Identifiability of Phylogenetic Models (Spring 2023).

READER: College Honors Thesis, Emily O'Regan (HC '21)
Just Transitions: Balancing the Needs of People and Nature in Rural Cambodia (Spring 2021).

READER: Mathematics Honors Thesis, Elizabeth Bolduc (HC '12)
Measure Theory and Fourier Series (Spring 2012).

READER: Computer Science Honors Thesis, Erin Connors (HC '06)
The Detection of Moving Objects by Moving Observers (Spring 2006).

At the University of Colorado, Boulder:

APPM 4840: Independent Study, Jeremy Horgan-Kobelski (UC Boulder '02)
Complex Dynamics and Numerical Methods (2000–2001).

Departmental, College, and Professional Service

Service to the Department:

Calculus Coordinator (2022–2023).

Chair, Departmental Evaluation for Promotion (3 cases; 2022–2023).

Chair (2019–2022).

Faculty Co-Advisor, Math/CS Club (2007–2008, 2009–2012, 2013–2016, 2017–2023).

Co-Organizer, Math/CS Dept. Banquet (Spring 2003, 2005–2008, 2010–2012, 2014–2016, 2018–2019, 2023).

Organizer, Upper-Level Course Fair (2002–2003, 2004–2007, Fall 2009, 2010–2011, 2014–2016, 2017–2019, Spring 2022).

Member, Hiring Committee for Two-Year Visiting Professor (Spring 2018).

Study Abroad Liaison (2009–2012, 2013–2016).

Member, Proofs Course Textbook Committee (2015–2016).

Member, Calculus Readiness Test Committee (March–August 2011).

Primary Faculty Advisor, Math/CS Club (2002–2003 and 2004–2007).

Co-Organizer, Putnam Mathematics Exam (2002–2003 and 2004–2008).

Organizer, Departmental Colloquia (2002–2003 and 2004–2007).

Organizer, Pi Mu Epsilon Induction Ceremony (Spring 2003 and 2007).

Member, Calculus Textbook Committee (2005–2006).

Organizer, Departmental Research Seminar (2002–2003).

Member, Departmental Library Committee (Spring 2003).

Member, Departmental Honors Committee (2001–2002).

Co-Founder, "Tea & Games" (Spring 2002, with Sharon Frechette and Catherine Roberts).

Dept. Rep, United Way/Holy Cross Giving Campaign (2001–2002 and 2006–2007).

Service to the College:

Faculty Marshal, 2022 Baccalaureate Mass and Commencement Exercises.

Faculty & Staff Appreciation Day, Holy Cross Swimming & Diving, recognized by Gillian Giangrande '22 and four other swimmers (Nov. 13, 2021).

Gateways Advisor (2020–2022).

Title IX Hearings Panelist (2019–2023).

Member, Sexual Misconduct Policy Review Committee (Spring 2019–Summer 2020).

Member, ad hoc Committee on Faculty Sexual Misconduct (Spring 2019–Spring 2020).

Holy Cross Student-Athlete Academic Excellence Breakfast, attended with Emily DeMaso '21 (Women's Lacrosse), April 5, 2019.

Faculty & Staff Appreciation Day, Holy Cross Women's Lacrosse, recognized by Mairead Anderson '21, Riley Bergholtz '20, Emily DeMaso '21, Catherine Guanci '21, Audrey Mandaro '20, and Molly Pfaff '19, March 23, 2019.

Faculty Mentor, The Mentor Program (2005–2008, 2017–2018).

Faculty & Staff Appreciation Night, Holy Cross Women's Soccer, recognized by Emily George '18 (Oct. 18, 2017).

Presenter at the Holy Cross Campaign Kickoff Celebration, *The familiar and the new: engaged learning in the humanities* (April 30, 2016).

Member, Arts Transcending Borders Advisory Board (2013–2016).

Member, Arts Transcending Borders Steering Committee (2014–2015).

Crompton Gold Medal Award Committee (2015, 2016).

Recorder of the Faculty (2013–2014).

Panelist, *Engaged Teaching at Holy Cross*, New Faculty Orientation (March 13, 2014)

Member, Community Standards Board (2004–2008, 2010–2013).

Member, Student Life Council (2004–2006, 2010–2012).

Member, Presidential Colloquium on Jesuit Liberal Arts at Holy Cross (2011–2012).

Presenter, Montserrat Faculty Workshop (June 23, 2011).

Faculty Advisor, Holy Cross Golf Club (2009–2014).

Faculty Advisor, Holy Cross Ultimate Frisbee Team (2002–Present).

Member, Division of Student Affairs Self-Assessment Committee, "Student Learning and Developmental Outcomes" (Spring 2008).

Co-Organizer, *Hogwarts at Holy Cross VIII: Lumos Roboticus* (March 18, 2006).

Member, Consensual Sexual Relations Hearing Committee and the Harassment Grievance Committee (2005–2006).

Faculty Marshal, 2004 Baccalaureate Mass and Commencement Exercises.

Member, Engagement with Values Curriculum Group (2002–2003).

Panelist, New Faculty Orientation Program (Nov. 19, 2002).

Invited Lecturer, *Life on the Hill: A Holy Cross Sampler* (Oct. 26, 2002).

Service to the Profession:

Member, Mathematical Association of America Subcommittee on Research by Undergraduates (Jan. 1, 2015 – Jan. 31, 2018)

Panelist: Project NExT session, *Setting a New Standard: Implementing Standards-Based Grading*, AMS 2024 Joint Mathematics Meetings, San Francisco, January 3–6, 2024. .☜ **New**

Reviewer (Journal submissions):

Advances in Mathematics
American Mathematical Monthly
Celestial Mechanics: Dedicated to Donald Saari for his 60th Birthday, *Contemporary Mathematics* Vol. 292 (Conference Proceedings)
Celestial Mechanics and Dynamical Astronomy
Discrete and Continuous Dynamical Systems – Series A
Dynamics of Continuous, Discrete and Impulsive Systems
Dynamical Systems: An International Journal
Electronic Journal of Differential Equations
Journal of Computational and Applied Mathematics
Journal of Differential Equations
Journal of Dynamics and Differential Equations
Journal of Fixed Point Theory and Applications
Journal of Geometric Mechanics
Journal of Mathematical Analysis and Applications
Journal of Mathematical Physics
Mathematical Reviews (17 published reviews)
Nonlinearity
Physica D: Nonlinear Phenomena
Physics Letters A
PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies
Proceedings of the American Mathematical Society
Proceedings of the Royal Society A
Publicacions Matemàtiques
Qualitative Theory of Dynamical Systems
SIAM Journal on Applied Dynamical Systems
SIAM Journal on Mathematical Analysis

Reviewer (Grant proposals):

National Science Foundation, Division of Mathematical Sciences, Washington, D.C. Panelist to review grant proposals for three consecutive days during the spring of 2013.

Centre de Recerca Matemàtica (CRM), Barcelona, Spain
External reviewer of a proposal for a CRM Research Programme, Fall 2011.

Textbook Reviewer:

Book Proposal: *Theoretical and Practical Pedagogy of Mathematical Music Theory: Music for Mathematics and Mathematics for Musicians, from School to Postgraduate levels*, World Scientific Publishing Company, 2017.

An Introduction to Celestial Mechanics, R. Fitzpatrick, Cambridge University Press, 2012.

Differential Equations, Dynamical Systems and An Introduction to Chaos, Second Edition, Hirsch, Smale and Devaney, Elsevier Academic Press, 2004.

Judge: MAA Poster Session on Research by Undergraduate Students

- AMS/MAA Joint Mathematics Meetings (held virtually), Jan. 6–9, 2021.
- AMS/MAA Joint Mathematics Meetings, Denver, Jan. 15–18, 2020.
- AMS/MAA Joint Mathematics Meetings, San Diego, Jan. 10–13, 2018.
- AMS/MAA Joint Mathematics Meetings, Atlanta, January 4–7, 2017.
- AMS/MAA Joint Mathematics Meetings, San Francisco, January 13–16, 2010.

Organizer: Conferences, Special Sessions, Minisymposia, and Panels

SIAM Conference on the Applications of Dynamical Systems (held virtually), May 23–27, 2021. Member of the conference organizing committee (15 members).

Geometric Approaches to Point Vortex Dynamics and Applications, Minisymposium (MS94), SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 19–23, 2019). Co-organized with Alanna Hoyer-Leitzel (Mount Holyoke College) and Anna M. Barry (University of Auckland).

Panel: Student Perspectives and Feedback on REUs, sponsored by the MAA Subcommittee on Research by Undergraduates, AMS/MAA Joint Mathematics Meetings, San Diego (Jan. 10–13, 2018). Co-organized with Thomas Wakefield (Youngstown State University) and Aklilu Zeleke (Michigan State University).

Algebraic and Topological Approaches to the N-Body and N-Vortex Problems, Minisymposium (MS166 and MS179), SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 21–25, 2017).

Special Session on Celestial Mechanics, AMS/MAA Joint Mathematics Meetings, San Diego (Jan. 9–12, 2013). Co-organized with Zhifu Xie (Virginia State University).

Special Session on Celestial Mechanics, 2011 AMS Spring Eastern Section Meeting, Worcester, (April 9–10, 2011). Co-organized with Glen Hall (Boston University).

Special Session on the Mathematics of Climate Change, 2009 AMS Spring Eastern Section Meeting, Worcester, (April 25–26, 2009). Co-organized with Catherine Roberts (HC) and Mary Lou Zeeman (Bowdoin College).

Special Session on Celestial Mechanics, Joint AMS/MAA Mathematics Meetings, Phoenix, Arizona (Jan. 7–10, 2004). Co-organized with Samuel R. Kaplan (Univ. North Carolina at Asheville).

Session Chair: *Hamiltonian Dynamics - Part II of II*, 2005 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 22–26, 2005).

Featured Speaker:

Liberal Arts Distinguished Lecture Series, *Math and Music: The Greatest Hits*, Quinsigamond Community College, Worcester, MA (March 28, 2019)

Public Mathematics Colloquium, *Math and Music: The Greatest Hits*, University of Southern Mississippi, College of Science and Technology (March 30, 2017).

Marvin I. Freedman Memorial Colloquium, Boston University (April 8, 2016)
Invited lecture, *Math and Music: The Greatest Hits*, presented to over 100 attendees from Boston University and the surrounding community.

Mathematics Field Day, Boston University (Nov. 5, 2012)
Invited lecture, *Rhythm, Symmetry and Bell Ringing: Finding the Math in the Music*, presented to over 300 high school students and teachers.

Mathematics Field Day, Boston University (Oct. 17, 2006)
Invited lecture, *Math and Music: Exploring the Connections*, presented to over 500 high school students and teachers.

Textbook Project Manager:

Boston University (1995–1997), *Differential Equations*, Blanchard, Devaney and Hall, Brooks/Cole, 1998.

Professional Organizations:

Member: American Association of University Professors (AAUP), American Mathematical Society (AMS), Council on Undergraduate Research, Mathematical Association of America (MAA), Mathematics Climate Research Network (MCRN) ..... **New**

Phi Beta Kappa, Society for Industrial and Applied Mathematics (SIAM).

Service to the Community:

Musical Performances (piano) with Jazz Group Blue Champagne:

Touchstone Community School 35th Birthday Party event, March 24, 2018.
YWCA Annual Daybreak Breakfast against Domestic Violence, (solo), Holy Cross, Oct., 2009, 2011, 2013, 2014, 2015.
First Night Worcester, Worcester, Dec. 31, 2013.
Trustees' Reception and Dinner, Holy Cross, Sept. 7, 2012.
Clambake for Grants Group, *Some Corporate and Foundation Relations Officers*, Holy Cross, July 11, 2012.
Montserrat Jazz, Performance and Lecture for the Core Human Questions Cluster, Holy Cross, Feb. 22, 2012.
Tribute Reception for outgoing President Father McFarland, Holy Cross, Dec. 14, 2011.
Benefit for the Nativity School of Worcester, Holy Cross, October, 2009, 2010, 2011.
Trustees' Reception and Dinner, Holy Cross, Sept. 9, 2011.
Reception for Collegium, Holy Cross, June 23, 2011.
Jody Ziegler Memorial/Celebration, Holy Cross, February 5, 2011.
CAB 10 Spot at Crossroads, Holy Cross, November, 2009, 2010.
Gardner Summer Concert Series, Gardner, MA, July 24, 2010.
Benefit Concert for Haitian Relief, Holy Cross, January 23, 2010.
Benefit for the Beverly School of Kenya, Holy Cross, December 5, 2009.

Volunteer Soccer Coach:

Grafton Soccer Club, Boys U10 & U12 Coordinator, 2018–2020.
Grafton Soccer Club, Boys and Girls Town and Travel Teams, 2016–Present.
Worcester Youth Soccer League, Under 8, 2015–2016.

Invited Lectures and Presentations

Outside the United States:

On the Uniqueness of the Regular N-Gon Central Configuration
10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 7–11, 2014.

Stability of Relative Equilibria in the Planar N-Vortex Problem: A Topological Approach
10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 7–11, 2014.

Celestial, Molecular, and Atomic Dynamics (CEMAD), Victoria, BC, Canada, July 29 – Aug. 2, 2013.

Stability of Relative Equilibria in the N-Vortex Problem
2012 CMS Winter Meeting, Montreal, Canada, Dec. 7–10, 2012.

Relative Equilibria in the Four-Vortex Problem with Two Pairs of Equal Vorticities
New Trends in Dynamical Systems, Salou (Tarragona), Spain, Oct. 1–5, 2012.

Cyclic Central Configurations in the Four-Body Problem
Equadiff 2011, Loughborough University, Loughborough, England, August 1–5, 2011.

The Sixth International Symposium (HAMSYS-2010) on Hamiltonian Systems and Celestial Mechanics, Mexico City, Mexico, Nov. 29 – Dec. 3, 2010 (invited lecture—name listed on conference poster).

Using BKK Theory in Restricted N-Body Problems
2008 Canadian Mathematical Society Winter Meeting, Ottawa, Canada, December 6–8, 2008.

The Fifth International Symposium (HAMSYS-2008) on Hamiltonian Systems and Celestial Mechanics, CIMAT, Guanajuato, Mexico, July 7–11, 2008.

Linear Stability Analysis of the Figure-Eight Orbit
Laurier Dynamics Seminar, Wilfrid Laurier University, Waterloo, Ontario, Canada, December 3, 2008.

On Linear Stability in the N-Body Problem
Dynamical Systems Seminar, Institute of Mathematics, Academia Sinica, Taipei, Taiwan, May 22, 2007.

On Linear Stability in the N-Body Problem I, II, and III
NCTS Workshop on Dynamical Systems, National Center for Theoretic Sciences, Hsinchu, Taiwan, May 14–18, 2007. One of five invited speakers to present a mini-course consisting of 3 one-hour lectures.

Linear Stability Analysis of the Figure-Eight Orbit
Celestial Mechanics Workshop, Banff International Research Station, Banff, Canada, April 17–22, 2004.

Some Counterexamples to a Generalized Saari's Conjecture
Equadiff 2003, Hasselt, Belgium, July 22–26, 2003.

When Numerical Methods Fail: A Dynamical Systems Approach
New Directions in Dynamical Systems, Kyoto University, Kyoto, Japan, Aug. 5–15, 2002.

Linear Stability of the Elliptic Lagrangian Triangle Solutions in the Three-Body Problem
The Fourth International Symposium on Hamiltonian Systems and Celestial Mechanics, Guanajuato, Mexico, March 19–24, 2001.

Existence and Stability of Relative Equilibria in the N-Body Problem
Equadiff 99, Berlin, Germany, Aug. 1–7, 1999.

Special Seminar in Celestial Mechanics, Astronomie et Systèmes Dynamiques, Bureau des Longitudes, Paris, France, July 29, 1999.

Stability of Relative Equilibria in the N-Body Problem
The Third International Symposium on Hamiltonian Systems and Celestial Mechanics, Patzcuaro, Michoacan, Mexico, Dec. 6–12, 1998.

Inside the United States:

On Kite Central Configurations ..... **New**

AMS Special Session on Hamiltonian Systems and Celestial Mechanics, AMS 2024 Joint Mathematics Meetings, San Francisco, January 3–6, 2024.

Faculty Research Seminar, Department of Mathematics and Comp. Sci., College of the Holy Cross, November 29, 2023.

Bartók, Fibonacci, and the Golden Ratio: Fact or Fiction?
MAA Contributed Paper Session on Mathematics and Music, AMS/MAA Joint Mathematics Meetings (held virtually), Jan. 6–9, 2021.

Modeling Martian Climate with Low-Dimensional Energy Balance Models
2019 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 19–23, 2019.

Shall We Dance? An Embodied Learning Approach to the Mathematics of Change Ringing
HCAA Classroom Revisited, College of the Holy Cross, April 6, 2019.

Classifying Four-Body Convex Central Configurations
Faculty Research Seminar, Department of Mathematics and Comp. Sci., College of the Holy Cross, February 4, 2019.

Midwest/McGehee Dynamical Systems Conference, University of Minnesota, Minneapolis, MN, November 1–4, 2018.

BU Dynamical Systems Seminar, Boston University, October 1, 2018.

AMS Special Session on New Trends in Celestial Mechanics, AMS/MAA Joint Mathematics Meetings, San Diego, January 10–13, 2018.

Undergraduate Research in Conceptual Climate Modeling
2018 SIAM Conference on Applied Mathematics Education, Portland, Oregon, July 9–11, 2018.

Ernő Lendvai and the Bartók Controversy
MAA Session on Good Math from Bad: Crackpots, Cranks, and Progress
AMS/MAA Joint Mathematics Meetings, San Diego, January 10–13, 2018.

From Music to Mathematics: Exploring the Connections
Authors on the Hill Lecture Series, Holy Cross Libraries
College of the Holy Cross, Oct. 19, 2017

Music, Math, Symmetry and Groups
Summer Research Seminar, Department of Mathematics and Comp. Sci.,
College of the Holy Cross, June 27, 2017.

Morse Theory and Stability of Relative Equilibria in the Planar N-Vortex Problem
2017 SIAM Conference on Applications of Dynamical Systems,
Snowbird, Utah, May 21–25, 2017.

Faculty Research Seminar, Department of Mathematics and Comp. Sci.,
College of the Holy Cross, March 24, 2017.

Existence and Stability of Vortex Crystals
Mathematics Colloquium, University of Southern Mississippi,
March 31, 2017.

Using Morse Theory in the Planar N-Vortex Problem
AMS Contributed Paper Session on Dynamical Systems, Ergodic Theory,
Difference and Functional Equations, AMS/MAA Joint Mathematics
Meetings, Atlanta, January 4–7, 2017.

We Got The Beat: Using Rhythm to Teach and Motivate Mathematics
MAA Session on Mathematics and the Arts, AMS/MAA Joint Mathematics
Meetings, Atlanta, January 4–7, 2017.

Fun with the Fibonacci Numbers: Applications in Nature and Music
Holy Cross Summer Science Research Lunch Seminar, July 12, 2016.
Joint talk with research program in the social sciences, humanities, and arts.

Math and Music: The Greatest Hits
Math Chats, Middlebury College, October 25, 2016.

Faculty Scholarship Lunch Series, College of the Holy Cross,
October 21, 2015.

New England Mathematical Association of Two Year Colleges 7th Fall
Dinner/Speaker Event, Worcester, MA, September 18, 2015.

Change Ringing, Dance and Memory: An Embodied Learning Approach to Abstract Algebra
MAA Special Session on Mathematics and the Arts, AMS/MAA Joint Mathematics Meetings, Seattle, WA, January 6–9, 2016.

Stability of Relative Equilibria in the Planar N-Vortex Problem: A Topological Approach
Rocky Mountain Dynamical Systems Conference, Provo, Utah, June 8–11, 2015.

47th Spring Topology and Dynamics Conference, Central Connecticut State University, March 23–25, 2013.

On the Uniqueness of the Regular N-Gon Central Configuration
Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, March 12, 2014.

Stability of Relative Equilibria in the Planar N-Vortex Problem
2013 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 19–23, 2013.

Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, April 3, 2013.

BU Dynamical Systems Seminar, Boston University, March 18, 2013.

Fun with Fibonacci Numbers: Applications in Nature and Music
Holy Cross Summer Research Lunch Seminar, July 11, 2012.

Relative Equilibria in the Four-Vortex Problem with Two Pairs of Equal Vorticities
Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, Sept. 17, 2012.

AMS Session on Mechanics and Mathematical Physics, AMS/MAA Joint Mathematics Meetings, Boston, January 4–7, 2012.

Composing with Mathematics: Final Projects in a Math and Music Course
MAA Special Session: Arts and Mathematics, Together Again, AMS/MAA Joint Mathematics Meetings, Boston, January 4–7, 2012.

Cyclic Central Configurations in the Four-Body Problem
AMS 2011 Spring Eastern Sectional Meeting, Special Session in Celestial Mechanics, College of the Holy Cross, April 9–10, 2011.

Clavius Seminar, College of the Holy Cross, July 8, 2010.

AMS Session on Differential and Difference Equations, IV, AMS/MAA Joint Mathematics Meetings, San Francisco, January 13–16, 2010.

Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, December 1, 2009.

Elusive Zeros Under Newton's Method
MAA MathFest 2010, Complex Dynamics: Opportunities for Undergraduate Research, Pittsburgh, PA, August 5–7, 2010.

On Central Configurations
Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, February 5 and 12, 2009.

I've Got a Three-Body Problem
Mathematics Colloquium, Fitchburg State College, November 13, 2008.

Using BKK Theory in Restricted N-Body Problems
Dynamical Systems Seminar, Department of Mathematics
Brigham Young University, October 21, 2008.

Algebraic Geometry Research Group, Department of Mathematics, Brigham Young University, October 23, 2008.

Using Algebraic Geometry in Celestial Mechanics
Conference on Innovation in Undergraduate Teaching and Research, Montclair State University, June 4–5, 2008.

Math and Music: Exploring the Connections
Invited Speaker, Pi Mu Epsilon Massachusetts Gamma Chapter Induction Ceremony, Bridgewater State College, Bridgewater, MA, April 27, 2008.

Classroom Revisited 2008: Continuing Education Day, College of the Holy Cross, April 5, 2008.

The Planar, Circular, Restricted Four-Body Problem
Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, April 17, 2008

AMS Session on Applications of Mathematics III, AMS/MAA Joint Mathematics Meetings, San Diego, January 6–9, 2008.

Saari's Conjecture for the Restricted Three-Body Problem
2007 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 28 – June 1, 2007.

AMS Session on Applications of Mathematics I, AMS/MAA Joint Mathematics Meetings, New Orleans, January 5–8, 2007.

An Amazing Bifurcation Diagram Arising from Newton's Method
MAA Session "Chaos and Fractals," AMS/MAA Joint Mathematics Meetings, New Orleans, January 5–8, 2007.

When Numerical Methods Fail but Undergraduates Succeed
Invited lecture, Spring Meeting of the Northeastern Section of the Mathematical Association of America, Boston University, June 2–3, 2006.

Using BKK Theory in Celestial Mechanics
Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, April 20, 2006.

Symmetry and Stability in Hamiltonian Systems
2005 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 22–26, 2005.

Dancing with the Stars: Circles, Figure-Eights and Braids in the N-Body Problem
WPI 2005 Math Awareness Month Lecture, WPI, April 28, 2005.

Interesting Symmetric Orbits in the Three-Body Problem
WPI Partial Differential Equations Seminar, WPI, February 2, 2005.

The Amazing Figure-Eight Orbit of the Three-Body Problem and its Linear Stability
Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, October 14 and 21, 2004.

The Amazing Figure-Eight Orbit of the Three-Body Problem
Dynamical Systems Seminar, Boston University, November 22, 2004.

Fall 2004 Meeting of the Northeastern Section of the MAA, WPI, Nov. 19–20, 2004.

Holy Cross Summer Research Lunch Seminar, June 30, 2004.

Graduate Colloquium, University of Minnesota, Duluth, May 5, 2004.

Linear Stability Analysis of the Figure-Eight Orbit
Dynamical Systems Seminar, University of Minnesota, Minneapolis, April 12, 2004.

Some Counterexamples to a Generalized Saari's Conjecture
Special Session on Celestial Mechanics, AMS/MAA Joint Mathematics Meetings, Phoenix, Arizona, January 7–10, 2004.

"Solving" Complicated Differential Equations: An Introduction to the N-Body Problem
Undergraduate Colloquium, Department of Mathematics, Oberlin College, Nov. 3, 2003.

Saari's Conjecture for a Certain Class of N-Body Problems
Faculty Research Seminar, College of the Holy Cross, Oct. 7 and 14, 2003.

Dynamical Systems Seminar, Boston University, Sept. 29, 2003.

Saari's Conjecture: The Case For and Against
Workshop on Variational Methods in Celestial Mechanics, The American Institute of Mathematics, Pal Alto, California, June 9–14, 2003.

Relative Equilibria and Saari's Conjecture
2003 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 26–31, 2003.

Central Configurations and Their Importance in the N-Body Problem
Undergraduate Colloquium, Montclair State University, March 3, 2003.

Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, Nov. 6 and 13, 2002.

When Numerical Methods Fail: A Dynamical Systems Approach
Pi Mu Epsilon Colloquium, College of the Holy Cross, April 18, 2002.

Newton's versus Halley's method: An Approach via Complex Dynamics
Dynamics Days 2002, Baltimore Maryland, Jan. 4–7, 2002 (poster presentation).

Faculty Research Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, Sept. 27, 2001.

Seminar in Dynamical Systems, Department of Applied Mathematics, University of Colorado at Boulder, Nov. 16, 2000.

Linear Stability of the Elliptic Lagrangian Triangle Solutions in the Three-Body Problem
2001 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 20–24, 2001.

Southwest Dynamics Workshop, University of Southern California, Nov. 16–19, 2000.

Dynamical Systems Seminar, Boston University, October 2, 2000.

The Theory of the Moon Gives Me Headaches: An Introduction to the N-Body Problem
Job Talk, College of the Holy Cross, Feb. 12, 2001.

Stability of Elliptic Periodic Orbits in the N-Body Problem
International Conference on Dynamical Systems and Differential Equations, Kennesaw State University, May 18–21, 2000.

Colloquium in Applied Mathematics, University of Colorado at Boulder, April 7, 2000.

Seminar in Dynamical Systems, University of Colorado at Boulder, April 6, 2000.

Midwest Dynamical Systems Conference, University of Florida at Gainesville, March 9–12, 2000.

Seminar in Dynamical Systems, Department of Applied Mathematics, University of Colorado at Boulder, Dec. 9, 1999.

Interesting Families of Central Configurations
International Conference on Celestial Mechanics, Northwestern Univ., Dec. 15–19, 1999.

Tufts-UMass/Lowell-Northeastern Dynamics Seminar, Northeastern Univ., Feb. 4, 1999.

Hairs for the Complex Exponential and Polynomial Families
Seminar in Applied Mathematics, University of Colorado at Boulder, July 20, 1999.

Existence and Stability of Relative Equilibria in the N-Body Problem
Dynamical Systems Seminar, Boston University, April 5, 1999.

Seminar in Dynamical Systems, Department of Applied Mathematics, University of Colorado at Boulder, Feb. 18, 1999.

Stability of Periodic Solutions in the N-Body Problem: Rings, Kings and Other Fun Things
Job Talk, Colgate University, Feb. 10, 1999.

Job Talk, Connecticut College, Feb. 2, 1999.

Job Talk, Bloomsburg University, Jan. 28, 1999.

Relative Equilibria in the N-Body Problem
Semi-Annual Dynamical Systems and Related Topics Workshop, Penn State University, Oct. 8–11, 1998.

Dynamical Systems Seminar, Dept. of Mathematics, Boston University, April 6, 1998.

The Reform Course in Differential Equations: A Teaching Fellow's Perspective
Workshops on Teaching Differential Equations with a Dynamical Systems Perspective, DePaul University, June 22–25, 1997 and Davidson College, June 1–4, 1997.

Research Colleagues Hosted at Holy Cross

- Josep M. Cors, Departament de Matemàtica Aplicada III, Universitat Politècnica de Catalunya, Barcelona, Spain. Research visit (July 31 – Aug. 7, 2017).
- Esther Barrabés, Dept. Informàtica, Matemàtica Aplicada i Estadistica, Universitat de Girona, Girona, Spain. Research visits (Aug. 13, Oct. 30, and Dec. 18, 2013).

- Manuele Santoprete, Associate Professor of Mathematics, Wilfrid Laurier University, Waterloo, Ontario, Canada. Research visit (Feb. 29 – March 4, 2012).
- Josep M. Cors, Departament de Matemàtica Aplicada III, Universitat Politècnica de Catalunya, Barcelona, Spain. Research visit (April 7–14, 2011).

Research Visits to Other Institutions

- Visiting researcher at the University of Southern Mississippi, March 29–31, 2017. Invited by Zhifu Xie, Professor and Wright W. and Annie Rea Cross Endowed Chair in Mathematics and Undergraduate Research, Department of Mathematics.
- Participant in a BIRS Special Workshop titled "New Perspectives on the N-body Problem," sponsored by the Banff International Research Station, Banff, Alberta, Canada, Jan. 14–18, 2013.
- Visiting researcher at the Universitat Autònoma de Barcelona, Barcelona, Spain, Oct. 5–12, 2012. Invited by Jaume Llibre, Professor, Departament de Matemàtiques.
- Participant in a SQuaREs (Structured Quartet Research Ensembles) program titled "Towards solving Smale's sixth problem," sponsored by the American Institute of Mathematics, Palo Alto, California, May 23–27, 2011, May 24–28, 2010, and March 9–13, 2009.
- Visiting researcher at Wilfrid Laurier University, Waterloo, Ontario, Canada, Dec. 2–5, 2008. Invited by Manuele Santoprete, Assistant Professor, Department of Mathematics.
- Visiting researcher at the Department of Mathematics at Brigham Young University, Oct. 20–24, 2008. Invited by Lennard Bakker, Assistant Professor, Department of Mathematics.
- Visiting researcher at Academia Sinica, Taipei, Taiwan, May 21–23, 2007. Invited by Yi-Chiuan Chen, Assistant Research Fellow, Institute of Mathematics.
- Visiting researcher at the University of Ontario Institute of Technology, Oshawa, Ontario, Canada, June 19–24, 2005. Invited by Pietro-Luciano Buono, Assistant Professor of Mathematics, Faculty of Science.
- Visiting researcher at the University of Minnesota, Duluth, May 5–7, 2004. Collaborated with Bruce Peckham, Associate Professor, Department of Mathematics and Statistics.

Research with Undergraduates

$*$ indicates a refereed paper was co-authored with this student

- Abigail Hoyt, HC '23, Spring 2023.
- Olivia Ferrara, HC '22, Spring 2021.
- Ryan Ferraro and Rose Kirsch, HC '19, Spring 2019.
- Cara Donovan, HC '18, Summer 2017 – Spring 2018.
- Xinyi (Elena) Wang, HC '20, Summer 2017.
- Timothy Arnold and Brian Menezes*, HC '16, Summer – Fall 2015.
- Margaret Hauser and Gopal Yalla, HC '15, Summer 2013.
- John O'Connor, HC '13, Summer 2012.
- Rebecca Moran, HC '12, Summer 2011 – Spring 2012.
- Chelsea Dalphond, HC '11, Summer 2010.
- Shea Sennett, HC '10, Summer 2008, Fall 2009 – Spring 2010.
- Skyler Simmons*, BYU '09, Fall 2008 – Spring 2009.
- Julianne Kulevich* and Christopher J. Smith*, HC '08, Summer 2007 – Spring 2008.
- Lisa Melanson*, HC '06, Summer – Fall 2005.
- Trevor O'Brien*, HC '05, Summer 2004 – Spring 2005.
- Gabe Weaver, HC '04, Summer 2002.
- Jeremy Horgan-Kobelski*, University of Colorado, Boulder '02, Fall 2000 – Summer 2001.

Interviews Given

- L. A. Buckner and N. Sol, Music from the Golden Ratio and Fibonacci Sequence, *Sound Field*, PBS Digital Studios, Episode 4, Aired March 13, 2019.

  `https://www.pbs.org/video/music-from-the-golden-ratio-and-fibonacci-sequence-afdd5k/`

- M. Chen, K. Lange and E. Williams, Mathematical Conversations outside the Classroom, *Math Horizons*, vol. 25, no. 4, 23–27, 2018.

- Arts Transcending Borders, promotional videos for Holy Cross website, August 2015.
- D. Mackenzie, Rethinking "Star Soup," *SIAM News*, vol. 46, no. 7, September 2013.
- C. Steuer, Professors by Day – Jazz Musicians by Night, *Linden Line*, Holy Cross, Dec. 1, 2010.
- J. Lawless, Paths to Knowledge, *Oberlin Alumni Magazine*, 12–17, Summer 2005.
- D. Mackenzie, NSF Moves With VIGRE to Force Changes in Academia, *Science* **296**, 1389–1390, May 24, 2002.

Computer Experience

Maple, Mathematica, Matlab, Pascal, Unix, LaTeX, TeX.

Miscellaneous

Member, Blue Champagne Jazz Quartet (15 years); Worcester Chorus (7 years); Boston Pops Holiday Chorus (1 year); Choruses of the Worcester Consortium (1 year).

Hobbies: Stand-Up Paddleboarding, Biking, Jazz Piano, Golf, Soccer, Ultimate Frisbee.