

# IVAN CONTRERAS

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## Employment and Appointments

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- **Amherst College**
  - Associate Professor of Mathematics (07/2024–Present)
  - Faculty Equity and Inclusion Officer (07/2024–Present)
  - Assistant Professor of Mathematics (07/2019–06/2024)
  - Visiting Assistant Professor of Mathematics (07/2018–06/2019)
- **University of Illinois at Urbana–Champaign**
  - J.L. Doob Research Assistant Professor (01/2016–06/2018)
- **University of California, Berkeley**
  - SNSF (Swiss National Science Foundation) Postdoctoral Fellow and Visiting Scholar (01/2014–01/2016)
- **University of Zürich (Switzerland)**
  - Postdoctoral Fellow (06/2013–12/2013)

## Education

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- **University of Zürich (Switzerland) (09/2009–06/2013)**

Ph.D. in Mathematics (06/2013)  
Thesis: *Relational Symplectic Groupoids and Poisson Sigma Models with Boundary*  
Advisor: Alberto Cattaneo
- **Utrecht University (The Netherlands) (09/2008–06/2009)**

MSc. in Mathematics (06/2009)  
Thesis: *Models for Formal Groupoids*  
Advisors: Marius Crainic and Benoit Dherin
- **Universidad de los Andes (Colombia) (09/2004–05/2008)**

B.S. in Mathematics (05/2008)  
Thesis: *Dirac Structures and Foliations in Lie Groups*  
Advisor: Alexander Cardona

## Research Interests

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- Mathematical Physics: Classical and Quantum Field Theory, Geometric and Deformation Quantization, Topological Field Theory.
- Differential Geometry: Poisson and Symplectic Geometry, Lie Theory, Geometric and Topological Aspects of Information Theory.
- Discrete Geometry: Discrete Morse Theory, Differential Geometry on Graphs, Simplicial Complexes and CW Complexes.

## Published and Accepted Articles

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All published and accepted papers have been peer-reviewed with the exception of [2] and [4] which were proceeding papers and reviewed by the editors of the journal. Bibliographical information is included where possible, otherwise the accepting journal is indicated and a link to the article on the arXiv is provided. The work in each of the coauthored papers has been shared equally among all collaborators. Authors are organized alphabetically by last name. The names of Amherst student co-authors are labeled with a dagger (†), and non-Amherst student/post-baccalaureate co-authors are labeled with an asterisk (\*).

- [22] *On Examples and Classification of Frobenius Objects in Rel*, with Adele Long\*, Sophia Marx\* and Rajan Mehta, Higher Structures in Geometry, Topology and Physics, Contemporary Mathematics, Volume 802, American Mathematical Society (2024).
- [21] *Combinatorial QFT on Graphs: First Order Formalism*, with Santosh Kandel, Pavel Mnev and Konstantin Wernli, to appear in Annales de l'Institut Henri Poincaré D: Combinatorics, Physics and their Interactions. arXiv: 2308.07801(2024), 72 pages.
- [20] *On Discrete Gradient Vector Fields and Laplacians of Simplicial Complexes*, with Andrew Tawfeek†, Annals of Combinatorics, Vol. 28, Issue 1 (2024), pp 67–91, DOI: 10.1007/s00026-023-00655-1.
- [19] *Laplace and Dirac Operators on Graphs*, with Beata Casiday\*, Thomas Meyer†, Sabrina Mi\* and Ethan Spingarn†, Linear and Multilinear Algebra, Vol. 72:2 (2024), pp 325–365, DOI: 10.1080/03081087.2022.2158297.
- [18] *Defects via Factorization Algebras*, with Chris Elliott and Owen Gwilliam, Letters in Mathematical Physics, Vol. 113 (2), 46 (2023), 26 pages.
- [17] *Frobenius Objects in the Category of Spans*, with Molly Keller\*, and Rajan Mehta, Reviews in Mathematical Physics Vol. 34, Issue 10, 2250036 (2022), 34 pages.
- [16] *Kähler Fibrations in Quantum Information Theory*, with Michele Schiavina, Manuscripta Mathematica, Vol. 168 (2022), pp 325–349.
- [15] *Convolution Algebras for Relational Groupoids and Reduction*, with Nima Moshayedi and Konstantin Wernli, Pacific Journal of Mathematics, Vol. 313, No. 1 (2021), pp 75–102.
- [14] *Genus Integration, Abelianization and Extended Monodromy*, with Rui Fernandes, International Mathematics Research Notices (IMRN), Issue 14 (2021), pp 10798–10840.
- [13] *Poly-symplectic Geometry and the AKSZ Formalism*, with Nicolás Martínez Alba, Reviews in Mathematical Physics, Vol. 33, No. 09, 2150030, 14 pages (2021).
- [12] *Split Canonical Relations*, with Alberto Cattaneo, Annales Henri Lebesgue, Vol. 4 (2021), pp 155–185.
- [11] *Gluing of Graph Laplacians and Their Spectra*, with Michael Toriyama\* and Chengzheng Yu\*, Linear and Multilinear Algebra, Vol. 68, No 4 (2020), pp 710–749.
- [10] *The Graph Laplacian and Morse Inequalities*, with Boyan Xu\*, Pacific Journal of Mathematics, Vol. 300 (2019), No. 2, pp 331–345.
- [9] *Poly-Poisson Sigma Models and their Relational Poly-Symplectic Groupoids*, with Nicolás Martínez Alba, Journal of Mathematical Physics, Vol. 59, Issue 7 (2018), 23 pages.
- [8] *A Functorial Construction for Quantum Subtheories*, with Ali Duman, Entropy, Vol. 19, Issue 5, 220 (2017), 20 pages.
- [7] *Geometric Quantization and Epistemically Restricted Theories: The Continuous Case*, with Ali Duman, Electronic Proceedings in Theoretical Computer Science, Vol. 236 (2017) pp 40–50.
- [6] *On the Geometry of Mixed States and the Fisher Information Tensor*, with Elisa Ercolessi and Michele Schiavina, Journal of Mathematical Physics, Vol. 57, Issue 6 (2016), 23 pages.
- [5] *Relational Symplectic Groupoids*, with Alberto Cattaneo, Letters in Mathematical Physics, Vol. 105, Issue 5 (2015), pp 723–767.
- [4] *Groupoids, Frobenius Algebras and Poisson Sigma Models*, Mathematical Aspects of Quantum Field Theories, Mathematical Physical Studies, Springer, Part III (2015), pp 413–427.
- [3] *Groupoids and Poisson Sigma Models with Boundary*, with Alberto Cattaneo, Geometric and Topological Methods for Quantum Field Theory, World Scientific (2014), pp 315–330.
- [2] *Models for Formal Groupoids*, Geometric and Topological Methods for Quantum Field Theory, Cambridge University Press (2013), pp 322–339.
- [1] *Relative Frobenius Algebras are Groupoids*, with Alberto Cattaneo and Chris Heunen, Journal of Pure and Applied Algebra, Vol. 217, Issue 1 (2013), pp 114–124.

## Submitted Articles and Preprints

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- [1] *Frobenius and Commutative Pseudomonoids in the Bicategory of Spans*, with Rajan Mehta and Walker Stern, arXiv: 2311.15342 preprint (2023), 46 pages. Submitted to Journal of Geometry and Physics.

## Articles in Preparation

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- [2] *On  $*$ -Exponentials of Quadratic Forms: The Complex Metaplectic Groupoid*, with Pedro Rios.
- [1] *The Factorization Algebra of a Magnetic Monopole*, with Chris Elliott and Owen Gwilliam.

## Books (as Editor)

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- [2] *Geometric and Topological Methods for Quantum Field Theory*, with Alexander Cardona and Andrés Reyes-Lega, Cambridge University Press, ISBN: 978-1-107-02683-4 (2013), 383 pages.
- [1] *A Pathway Through Algebra*, with Javier Madroñero, Editorial Universidad Antonio Nariño, ISBN: 978-958-9423-67-7 (2007), 161 pages.

## Editorial Boards

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- **Quantum Journal**, Open Journal for Quantum Sciences (Verein zur Förderung des Open Access Publizierens in den Quantenwissenschaften), ISSN 2521-327X, Austria. Editorial Board Member (2022–Present).

## Grants and Awards

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- **NSF Conference Grant DMS–2232673 (2022–2024)** (Role: Principal Investigator) Conference: Gone Fishing: a Series of Meetings in Poisson Geometry (\$42,000).
- **Five College Consortium: Symposium Fund (2022–2023)** (Role: Main Contact) (\$2,000).
- **SUMRY REU Program at Yale University (2020–2023)** (Role: Senior Personnel) NSF Grant DMS–2050398 (\$6,000).
- **Provost and Dean of the Faculty’s Research Fellowship (2021–2022)** Amherst College (to cover the annual salary for the 2021–2022 sabbatical leave).
- **Gregory Call Academic Internship Award (2019–2023)**, Amherst College, (\$12,240 and \$11,900).
- **Swiss National Science Foundation Grant (2014–2015)**, Advanced Postdoc Mobility Grant, PBZHP2–147294 (\$49,400).
- **Swiss National Science Foundation Grant (2013–2014)**, Early Postdoc Mobility Grant, P300P2–154552 (\$67,200).
- **Forschungskredit Grant (2012)** For Graduate Students at University of Zürich, No. 57103506 (\$45,000).

## Honors

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- **Keynote Speaker**, Be-Long International Graduation Ceremony, Amherst College (2024).
- **Guest Speaker, Advanced Lectures in Theoretical Physics (2023 and 2022)**, the Abdus Salam International Centre for Theoretical Physics (ICTP), Physics Without Frontiers, Trieste (Italy).
- **Latinx and Hispanics in the Mathematical Sciences (Lathisms) Honoree (2018)** Calendar in honor of Hispanic Heritage Month.
- **Illinois Geometry Lab Award for Undergraduate Research (2018)** Second Place, University of Illinois, Urbana–Champaign.
- **Illinois Geometry Lab Award for Undergraduate Research (2017)** First Place, University of Illinois, Urbana–Champaign.
- **Distinguished Teaching Award in Mathematics (2017)** for Non-Tenure-Track Faculty, University of Illinois, Urbana–Champaign.
- **Editor’s Pick**, for the paper: *On the Geometry of Mixed States and the Fisher Information Tensor*, Journal of Mathematical Physics (2016).
- Included in the **List of Teachers Ranked as Excellent (2016–2018)** University of Illinois, Urbana–Champaign, Spring 2016, Summer 2016, Fall 2017, Spring 2018.
- **Mathematical Research Institute (MRI) Scholarship (2007–2008)** University of Utrecht, The Netherlands.

- **Mathematics Olympiads (2000–2007)**

- International Mathematics Competition for University Students (IMC): Second prize (2007), Third prize (2006).
- International Mathematics Olympiads (IMO): Bronze medal (2002, 2001), Honorable mention (2003).
- Iberoamerican Mathematics Olympiad: Bronze medal (2000).
- Río de la Plata Mathematics Olympiad: Silver medal (2000).
- Colombian Mathematics Olympiad: First place (2003).

## Short Stays

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- **University of Notre Dame**, as part of the Program “Mathematics of Quantum Field Theory”, Center of Mathematics at Notre Dame (CMND)(06/2024).
- **Universidad Nacional de Colombia (Bogotá)**, as part of the Programs “Aspectos Geométricos en Física Matemática” and “Encuentro Colombiano de Geometría y Topología (01/2024 and 07/2024)
- **Galileo Galilei Institute for Theoretical Physics**, as part of the Program “Emergent Geometries from Strings and Quantum Fields”, National Centre for Advanced Studies, Florence (Italy) (06/2023–07/2023).
- **University of Massachusetts, Amherst**, Visiting Researcher (02/2022–07/2022).
- **Yale University**, Visiting Assistant Professor, as part of the 2021 SUMRY (Summer Undergraduate Math Research at Yale) Program (06/2021–08/2021).

## Invited & Contributed Talks

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- **Seminars**

- *Mathematics & High Energy Seminar*, The Abdus Salam International Centre of Theoretical Physics (ICTP), Trieste (Italy) (11/2023).
- *Topology Seminar*, University of Virginia (04/2023).
- *TQFT Seminar*, Instituto Superior Tecnico (IST), Lisbon (Portugal) (04/2023).
- *UIUC–WashU Joint Symplectic Geometry Seminar*, University of Illinois, Urbana–Champaign (04/2023).
- *Mathematical Physics Seminar*, University of California, Riverside (03/2023).
- *DEI in Math Seminar*, University of California, Santa Cruz (01/2023).
- *Applications to QFT*, The Abdus Salam International Centre of Theoretical Physics (ICTP), Trieste (Italy) (12/2022).
- *Non Commutative Geometry and Analysis Seminar*, Universidad Nacional de Colombia (08/2022).
- *Talks in Mathematical Physics*, ETH Zürich (Switzerland) (05/2022).
- *Beyond Research Program*, Universidad Nacional de Colombia (03/2022).
- *Symplectic Geometry Seminar*, Stanford University (02/2022).
- *Differential Geometry and Mathematical Physics Seminar*, Universidad Nacional de Colombia (01/2022).
- *Undergraduate Seminar*, Colgate University(11/2021).
- *Undergraduate Seminar*, Trinity University (10/2021).
- *Discrete Mathematics Seminar*, University of Massachusetts, Amherst (10/2021).
- *Geometry and Topology Seminar*, University of Pennsylvania (12/2020).
- *REU Seminar*, University of Connecticut, Storrs (06/2020).
- *Differential Geometry Seminar*, Dartmouth College (10/2019).
- *Representation Theory and Mathematical Physics Seminar*, University of California, Berkeley (05/2019).
- *Geometry and Topology Seminar*, University of Massachusetts, Amherst (09/2018).
- *Mathematical Physics Seminar*, Purdue University (02/2018).
- *Representation Theory and Math-Physics Seminar*, University of California, Berkeley (11/2017).

- *Topology Seminar*, University of Notre Dame (11/2016).
  - *Symplectic and Poisson Geometry Seminar*, University of Illinois, Urbana–Champaign (02/2016).
  - *Representation Theory and Geometry Seminar*, University of California, Berkeley (11/2015).
  - *Symplectic Geometry Seminar*, University of California, Berkeley (09/2015).
  - *Oberseminar*, Max Planck Institute of Mathematics, Bonn (Germany) (05/2015).
  - *RTGC Seminar*, University of California, Berkeley (02/2015).
  - *Northern California Symplectic Geometry Seminar*, University of California, Berkeley (12/2014).
  - *Talks in Mathematical Physics*, ETH Zürich (Switzerland) (05/2014).
  - *Derived Symplectic Geometry Seminar*, University of California, Berkeley (04/2014).
  - *Seminar on Factorization Algebras in Quantum Field Theory*, University of California, Berkeley (04/2014).
  - *Geometry, Representation theory and Combinatorics Seminar*, University of California, Berkeley (03/2014).
  - *Derived Algebraic Geometry Seminar*, ETH Zürich (Switzerland) (02/2014).
  - *Knot Theory Seminar*, University of Geneva (11/2012) (Switzerland).
  - *Noncommutative Geometry Seminar*, National and Kapodistrian University of Athens (Greece) (03/2012).
- **Conferences, Schools and Workshops**
    - *NEAT MAPS (New England Algebraic Topology and Mathematical Physics Seminar)*, Providence College (11/2024)
    - *AMS Sectional Meeting, Special Session on Structural Features in Mathematical Physics*, University of California, Riverside (10/2024).
    - *Encuentro Colombiano de Geometría y Topología*, Universidad Nacional de Colombia (07/2024).
    - *Mathematics of Quantum Field Theory*, Center of Mathematics at Notre Dame (CMND), University of Notre Dame (06/2024).
    - *Higher Segal Spaces and their Applications to Algebraic K-Theory, Hall Algebras, and Combinatorics*, BIRS Banff, Canada (01/2024)
    - *Aspectos Geométricos en Física Matemática*, Universidad Nacional de Colombia (01/2024)
    - *Joint Mathematics Meetings (JMM)*, Contributed Paper Session in Geometry, Boston (01/2023).
    - *Online Workshop on Topology and Quantum Field Theory*, University of Notre Dame (06/2022).
    - *Gone Fishing Meeting in Poisson Geometry and Mathematical Physics*, Georgia Southern University (04/2022).
    - *AMS Sectional Meeting, Special Session on Higher Structures in Topology, Geometry and Physics*, Purdue University (03/2022).
    - *Higher Structures in QFT and String Theory*, Gong Show Talk (07/2021).
    - *AMS Sectional Meeting, Special Session on Noncommutative Algebra, Poisson Geometry and Representation Theory* (04/2021).
    - *Hudson River Undergraduate Mathematics Conference*, Keene State College (04/2021).
    - *36th SIDIM (Inter-University Research Seminar in Mathematical Sciences)* (02/2021).
    - *A Gauge Summer with BV* (06/2020).
    - *Gone Fishing Meeting in Poisson Geometry and Mathematical Physics* (05/2020).
    - *Union College Mathematics Conference*, Differential Geometry, Geometric Analysis and Mathematical Physics Session, Union College (09/2019).
    - *String Field Theory, BV Quantization, and Moduli Spaces*, Simons Center for Geometry and Physics, Stony Brook University (05/2019).
    - *Joint Mathematical Meetings*, Special Session on Latinx in Mathematics, Baltimore MD (01/2019).
    - *AMS Sectional Meeting, Special Session on Cluster Algebras, Poisson Geometry, and*

- Related Topics, University of Michigan (10/2018).
- *AMS Sectional Meeting*, Special Session on Aspects of Geometric Mechanics and Dynamics, University of Michigan (10/2018).
- *Great Lakes Mathematical Physics Meeting*, Michigan State University (06/2018).
- *Higher Structures and Field Theories BIRS*, Oaxaca (Mexico) (06/2017).
- *Gone Fishing Conference in Poisson Geometry*, University of Notre Dame (05/2107).
- *Mathematics for Students*, Universidad de Los Andes (Colombia) (11/2016).
- *Gone Fishing Meeting in Poisson Geometry*, University of Colorado, Boulder (03/2016).
- *Gone Fishing Meeting in Poisson Geometry*, University of California, Berkeley (11/2014).
- *Derived Algebraic Geometry Winter School*, Flumserberg (Switzerland) (11/2013).
- *Colombian Congress of Mathematics*, Barranquilla (Colombia) (07/2013).
- *Winter School in Mathematical Physics*, Les Diablerets (Switzerland) (02/2013).
- *Summer School "Geometric, Algebraic and Topological Methods for Quantum Field Theory"*, Villa de Leyva (Colombia) (07/2011).
- *Summer School "Geometric, Algebraic and Topological Methods for Quantum Field Theory"*, Villa de Leyva (Colombia) (07/2009).

- **Colloquia**

- Reed College (04/2024).
- Physics Colloquium, Amherst College (02/2024).
- Universidad Nacional de Colombia (11/2021).
- *SUMRY Colloquium*, Yale University (07/2021).
- *Talk Math with Your Friends*, Online Talk Series (03/2021).
- Amherst College (09/2020).
- Amherst College (09/2019).
- *SUMRY Colloquium*, Yale University (08/2019).
- Smith College (02/2019).
- Rutgers University, Newark (01/2019).
- Mount Holyoke College (01/2019).
- Bucknell University (01/2019).
- University of Hartford (12/2018).
- Union College (03/2018).
- Amherst College (01/2018).
- *Beling Lectures*, Wesleyan University, Illinois (09/2017).
- *Doob Colloquium*, University of Illinois, Urbana–Champaign (03/2017).
- *Dissertation Colloquium*, University of Zürich (Switzerland) (06/2013).
- *Zürich Graduate Colloquium*, ETH Zürich (Switzerland) (11/2012).

## Teaching at Amherst College

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- **as Assistant Professor:**

- MATH/PHYS 102: Geometry and Relativity (Spring 2021 (21 students)).
- MATH 105: Calculus with Algebra (Fall 2024 (), Fall 2023 (30 students)).
- MATH 111i: Introduction to Calculus (Intensive Section) (Fall 2019 (27 students)).
- MATH 121: Intermediate Calculus (Spring 2023, 26 students).
- MATH 211: Multivariable Calculus (Spring 2020 (30 students)).
- MATH 220: Mathematical Reasoning and Proof (Spring 2025 (), Spring 2021 (18 students)).
- MATH 255: Geometry (Fall 2020 Section 01 (21 students) and Fall 2020 Section 02 (14 students) ).
- MATH 271: Linear Algebra (Spring 2020 (30 students)).
- MATH 280: Graph Theory (Fall 2023 (27 students), Fall 2022 (31 students), Fall 2019 (30 students)).
- MATH 290: Special Topics (Spring 2024 (2 students)).

- MATH 350: Groups, Rings and Fields (Spring 2023 (22 students)).
- MATH 355: Real Analysis (Spring 2023 (37 students))
- COLL 390–H: Learning by Doing: Internship and Fieldwork Reflection (Fall 2023, Fall 2022 (33 students)).
- MATH 405: Lie Groups and Lie Algebras (Fall 2022 (18 students)).
- MATH 452: Differential Geometry (Spring 2024 (22 students)).
- MATH 490: Special Topics (Spring 2023 (2 students), Fall 2022 (3 students), Fall 2020 (1 student); Fall 2019 (4 students)).
- MATH 498–MATH 499: Senior Honors (Spring 2023, Fall 2022, Fall 2020, Spring 2020, Fall 2019).

Chronologically:

- Fall 2024: MATH 105, MATH 498
- Spring 2024: MATH 355, MATH 452, MATH 499.
- Fall 2023: MATH 105, MATH 280, COLL 390–H, MATH 498.
- Spring 2023: MATH 121, MATH 350, MATH 490, MATH 499.
- Fall 2022: MATH 280, COLL 390-H, MATH 405, MATH 490, MATH 498.
- Spring 2021: MATH/PHYS 102, MATH 220.
- Fall 2020: MATH 255 (Sections 01 and 02), MATH 490, MATH 498.
- Spring 2020: MATH 211, MATH 271, MATH 499.
- Fall 2019: MATH 111, MATH 280, MATH 490, MATH 498.

- **as Visiting Assistant Professor:**

- MATH 405: Lie Groups and Lie Algebras (10 students, Spring 2019).
- MATH 220: Mathematical Reasoning and Proof (24 students, Fall 2018; 18 students, Spring 2019).
- MATH 111i: Introduction to Calculus (Intensive Section) (13 students, Fall 2018).

Chronologically:

- Spring 2019: MATH 405 and MATH 220.
- Fall 2018: MATH 111 and MATH 220.

- **Senior Thesis Students, Amherst College**

- Bek Hertz [Physics Thesis]: *Combinatorial QFT on Graphs* (2024–2025) (Co–Advisor: Kannan Jagannathan)
- Karen Kang: *Virasoro Algebras and Conformal Field Theory* (2024–2025)
- Leandro Arcos Román: *The Graph Laplacian and Discrete Morse Theory (Can we Hear the Shape of a Graph?)* (2023–2024).
- Samantha Winton (Breusch Prize Co–winner): *Representation Theory of  $SU(2)$*  (2022–2023).
- Andrew Tawfeek (Breusch Prize Co–winner): *Discrete Morse Theory: Enumeration of Discrete Gradient Vector Fields* (2019–2020) (Co–Advisor: Alejandro Morales (UMass)).
- Alexander Mangiafico: *Persistent Homology in Topological Data Analysis* (2019–2020).

- **Special Topics Courses (Independent Study), Amherst College**

- MATH 290: Applied Graph Theory (2 students, Spring 2024).
- MATH 490: Mathematics and Quantum Information Theory II (2 students, Spring 2023).
- MATH 490: Mathematics and Quantum Information Theory I (3 students, Fall 2022).
- MATH 490: Lie Theory and Symmetries in Physics (1 student, Fall 2020).
- MATH 490: Differential Geometry and Classical Mechanics (4 students, Fall 2019).

## Research Advising and Mentoring

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- **At Amherst College:**

- **Summer Undergraduate Research Fund (SURF)/Greg Call Fund, Amherst College**

- \* *Algebras of Directed Graphs*: Ephrata Getachew, Yvan Grinspan, Emma Keenan, Alex Kupersmith, Seth Yoo (Co-mentor: Daniel van Wyk) (Summer 2023).
- \* *Spinors and Graph Theory*: Thomas Meyer (Fall 2021).
- \* *Small World Networks and the Shape of Data*: Leo Xu, Zahra Sha, Kathryin Lingen, Malaika Kironde (Summer 2020).
- \* *Quantum Entropy and Graph Theory*: Maria-Cristiana Gîrjău, Andrew Moore, Audrey Rosevear, Matthew Sanders, Andrew Tawfeek, Dawit Wachelo (Summer 2019).
- **At Yale University:**
  - **SUMRY (Summer Undergraduate Math Research at Yale)** Visiting Assistant Professor and Mentor.
    - \* *Spinors and Graph Theory*: Beata Casiday, Thomas Meyer, Sabrina Mi, Ethan Spingarn (Summer 2021).
- **At University of Illinois, Urbana–Champaign:**
  - **Illinois Geometry Lab (IGL)**
    - \* *Poisson Geometry in Low Dimensions*: Joel Villatoro (Graduate student), Rodrigo Araiza Bravo, Jessica Bai, Leonardo Rodriguez, Jordan Stempel (Spring 2018).
    - \* *Statistical Mechanics and Thermodynamics on Graphs and CW-Complexes*: Andrew Eberlein, Mateo Muro, Yunting Zhang, Schur Zhao (Summer 2017).
    - \* *Graph Quantum Mechanics and Thermodynamics*: Sarah Loeb (Graduate student), Rodrigo Araiza Bravo, Sai Aishwara Koroukanti, Leonardo Rodriguez (Spring 2017).
    - \* *Quantum Mechanics on Graphs and CW-Complexes*: Sarah Loeb, Zhe Hu, Michael Toriyama, Boyan Xu, Chengzheng Yu (Fall 2016).
  - **Illinois Scholars Undergraduate Research Program (ISUR)**
    - \* *A Novel Graph Laplacian Approach to Efficiently Computing Electronic Structures of Matter*: Michael Toriyama (Fall 2017–Spring 2018).
  - **University Laboratory High School (Uni High)**
    - \* *Dynamics on Fractals*: Albert Lee, Ethan Muchnik, Ethan Ashbrook (Summer 2018).
- **At Universidad Nacional de Colombia:**
  - **Beyond Research Program**
    - \* *Computational Aspects in Differential Geometry and Mechanics*: Carlos Salas, Federico Garcia, Federico Villadiego, Jhon Edison Bravo, Juan Camilo Cabrera, Nicolás Niño, Santiago Martínez (Spring 2022).

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## Service

- **Professional Service**
  - National Science Foundation (NSF) External Panel Reviewer for Division of Mathematical Sciences (03/2024).
  - Member of the AMS–Simons Travel Grants Committee, American Mathematical Society (AMS) (02/2024–01/2027).
  - Member of the *Award for Mathematics Programs that Make a Difference* Selection Committee, American Mathematical Society (AMS) (02/2024–01/2027).
  - Member of the Organizing Committee of *Encuentro Colombiano de Geometría y Topología (ECOGyT)*, at Universidad Nacional de Colombia (07/2024).
  - Member of the Local Organizing Committee of the *9th Gone Fishing Conference in Poisson Geometry*, at Amherst College (03/2023).
  - Member of the Editorial Board of *Quantum Journal*, Open Journal for Quantum Sciences (Verein zur Förderung des Open Access Publizierens in den Quantenwissenschaften) (2022–Present).
  - Co-organizer of the Special Session: *Latinx in Number Theory, Combinatorics, Geometry and Topology*, AMS Sectional Meeting, University of Massachusetts, Amherst (10/2022).



- Co-organizer of the Special Session: *Higher Structures and Homotopical Algebras*, AMS Sectional Meeting, University of Massachusetts, Amherst (10/2022).
- Participant in *Creating a Better Summer Experience: A DEI Workshop for REU Directors and Faculty Mentors*, hosted by the Center for Minorities in the Mathematical Sciences (05/2021).
- Evaluator of the Masters Thesis: *Symmetries and Reductions of Dirac-Jacobi Structures*, by Darlyn Yamid Yela Rosero, Universidad Nacional de Colombia (07/2021).
- Co-organizer of the Virtual International Seminar: *Differential Geometry and Mathematical Physics* (Summer 2020–Present).
- Grader, Putnam Mathematical Competition (2020, 2021, 2022).
- Grader, United States of America Mathematics Olympiad (USAMO) (2022).
- Judge, Undergraduate Poster Session, Joint Mathematics Meetings (JMM) (2021, 2019).
- Session Chair, REU Virtual Conference, University of Connecticut (07/2021).
- Panelist for graduate admissions, Math REU Conference, University of Connecticut (07/2020).
- Panelist for the Association of Women in Mathematics *Teaching Philosophy Statement Panel*, University of Illinois, Urbana–Champaign (05/2017).
- Co-organizer of the Symplectic and Poisson Geometry Seminar, University of Illinois, Urbana–Champaign (2016–2018).
- Co-organizer and Co-founder of the Doob Colloquium, University of Illinois, Urbana–Champaign (2016–2018).
- Co-organizer of the thematic session: *Geometric Structures in Mathematical Physics*, Fifth Latin-American Congress of Mathematics, Barranquilla, Colombia (06/2017).
- Coordinator (grader) of the LIV International Mathematics Olympiad, Colombia (07/2013).
- Co-organizer of the Graduate Colloquium of Mathematics, University of Zürich and ETH, Switzerland (2010–2013).
- Colombian Team Deputy Leader, Vojtěch Jarník International Mathematical Competition (2010).
- Colombian Team Deputy Leader, Central American Mathematical Olympiad (2007).
- Member of the American Mathematical Society (AMS), the Mathematical Association of America (MAA), the International Association of Mathematical Physics (IAMP) and Sigma Xi.
- Math Alliance Mentor.
- Referee for: *Journal of Differential Geometry*, *Communications in Mathematical Physics*, *Letters in Mathematical Physics*, *Higher Structures*, *Differential Geometry and its Applications*, *Journal of Geometric Mechanics*, *Journal of Applied and Computational Topology*, *Analysis and Mathematical Physics*, *Communications in Analysis and Mechanics*, *SIGMA*, *Axioms*, *Banach Center Publications*, *Entropy*, *International Journal of Theoretical Physics*, *MDPI Physics*, *MDPI Symmetry*, *Physical Science International Journal*, *College Mathematics Journal*, *European Physical Journal Plus*, *Mathematical Physics Studies* (Springer).
- Reviewer for *Mathematical Reviews* (12 reviews).

- **College Service**

- Faculty Equity and Inclusion Officer (FEIO) (2024–Present).
- Summer Bridge Faculty Instructor (2024).
- Member of the College Council (2023–2024).
- Amherst College Representative at the LACOL (Liberal Arts Collaborative for Digital Innovation) Faculty Council (2022–Present).
- Panelist, *StemSibs* (03/2024).
- Panelist, *STEM Research Invitational*, Biology DEI Committee (11/2023).
- Invited Guest, *A Seat at the Table*, Multicultural Research Center (10/2023).
- Panelist, *CHI Forum on Languages across Disciplines* (10/2023).
- Panel Facilitator for the Provost Retreat on Teaching and Learning (08/2023).

- Member of the Orientation and Placement Faculty Team (08/2023, 08/2022).
- Instructor of COLL 390-H: *Learning by Doing: Internship and Fieldwork Reflection* (Fall 2023, Fall 2022).
- Panelist, *New Faculty Orientation* (Fall 2021).
- Panelist, *Instruction at Amherst College*, Board of Trustees Meeting (Spring 2021).
- Panelist, *Math and Science Panel*, Admissions Office (Spring 2021).
- Panelist, *The Amherst Classroom During COVID-19*, Event with Parents (Fall 2020).
- Panelist for La Causa, *Latinx identity for Latinx Heritage Month*, Amherst College (Fall 2020).
- Orientation Advisor (Summer 2020–Present).

- **Departmental Service**

- Math Table Coordinator (2024–2025).
- Event Planning Subcommittee (2024).
- Math Colloquium Coordinator (2024–2025, 2023–2024).
- Putnam Exam Coordinator (2023, 2022, 2020).
- Tenure Line Faculty Search Committee (2024, 2023, 2022).
- Lecturer Search Committee (2023, 2022).
- Faculty Coordinator of the Math and Stats DEI Committee (2024, 2023, 2022).
- Panelist, *Conversations with Math and Stats Faculty*, Amherst College Math Club (2023, 2022).
- Grader, Walker Exam (2022).
- Math Fellows Co-coordinator (2021).
- Visiting Faculty Search Committee (2021).
- Mathematics Major Advisor (2019 to Present).
- Senior Thesis Advisor (2019 to Present).
- Roster Manager for MATH 220, MATH 271, MATH 350 and MATH 355 (Spring 2020, Fall 2020, Fall 2022, Spring 2024).
- Department Meeting Minutes Note Taker (Fall 2019, Spring 2020).
- Connecticut Valley Mathematics Colloquium Chair (Fall 2019).
- Grader, Mathematics Comprehensive and Honors Qualifying Exams (Spring 2024, Spring 2023, Spring 2021, Spring 2020, Spring 2019).