Hieu Trung Vu

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Research interests

Integrable combinatorics, integrable probability, cluster algebra, exactly solved models, integrable lattice systems, representation theory.

Technical skills

Programming and markdown languages
Proficient in: Python, MATLAB, R, HTML, CSS, LaTeX, Mathematica
Familiar with: C++, Julia

Softwares and packages
Proficient in: Sage, Macaulay2

Languages
English (fluent), Vietnamese (fluent)

Education

2020 – Present **University of Illinois at Urbana-Champaign** – Urbana, Illinois
PhD in Mathematics
Advisors: Professor Philippe Di Francesco and Professor Rinat Kedem

2020 – 2021 **University of Illinois at Urbana-Champaign** – Urbana, Illinois
M.Sc in Mathematics
Advisors: Professor Philippe Di Francesco and Professor Rinat Kedem

2016 – 2020 **St. Olaf College** – Northfield, Minnesota
BA in Mathematics with Concentration (minor) in Neuroscience

Honors and scholarships

2023 University of Illinois at Urbana-Champaign Research Board Funding Recipient

2022-2023 Bourgin Departmental Fellowship - University of Illinois at Urbana-Champaign

Summer 2022 R. Ranga and Shantha Rao Scholarships - University of Illinois at Urbana-Champaign

2019 Steen Fellowship - St. Olaf College
$4,170 to fund independent summer research project

Publications

2024 **Arctic Curves of T-system with Slanted Initial Data**
Philippe Di Francesco, Trung Vu
J. Phys. A: Math. Theor. 57 335201, 2024..

2018 **Matrix Square Roots of Polynomials**
Kosmas Diveris, Trung Vu
Pi Mu Epsilon Journal.

Work in Progress

Work in progress

Higher-Rank Generalized Macdonald Operators and q-TASEP
Philippe Di Francesco, Leonid Petrov, Hieu Trung Vu

T-system Dimer, Rail-yard Graph and t-embedding
David Keating and Hieu Trung Vu

Height Fluctuation and T-system Dimer Density
Philippe Di Francesco and Hieu Trung Vu

FK(2)-percolation and Its Limit Shape Theory
Terrence George, Richard Kenyon, Marianna Russkihk and Hieu Trung Vu

Teaching

At University of Illinois at Urbana - Champaign

Sp '21, '22, F '23 Teaching Assistant for Calculus 2, Ranked as Excellent by Students

F '21 Teaching Assistant for Calculus 1, Ranked as Excellent by Students

At. St. Olaf College

Sp '20 Teaching assistant for Real Analysis 1 and Combinatorics

F '19 Supplemental Instructor for Linear Algebra

Sp '19 Supplemental Instructor for Linear Algebra

Sp '18 Supplemental Instructor for Principles of Statistics

F '17 Academic Tutor for Calculus 1, Calculus 2 and Linear Algebra

F '17 Teaching Assistant for General Chemistry

Workshops and Conferences

July 2024 University of Virginia Integrable Probability Summer School
Charlottesville, VA

June 2024 Jim Propp's Birthday Conference, Statisical and Dynamical Combinatorics
Massachussett Institute of Technology, Cambridge, MA

March - June 2024 IPAM Long Program in Geometry, Statistical Mechanics, Integrability Seminar
Institute for Pure and Applied Mathematics, UCLA

August 2023 Dimers: Combinatorics, Representation Theory and Physics
New York, NY

January 2023 Joint Mathematical Meeting
Boston, MA

April 2022 Analytic Combinatorics in Several Variables Workshop
American Institute of Mathematics, San Jose, CA

Talks and Poster Presentations

Talks

October 2024 Arctic Curves of T-system with Slanted Initial Data
University of Michigan Combinatorics Seminar

October 2024 Arctic Curves of T-system with Slanted Initial Data
Purdue University Mathematical Physics Seminar

July 2024 Arctic Curves of T-system with Slanted Initial Data
University of Virginia Integrability Summer School

April 2023 Arctic Curves of T-system with Slanted Initial Data
IPAM Long Program in Geometry, Statistical Mechanics, Integrability Seminar

August 2023 — Slanted T-system Arctic Phenomenon
Dimers: Combinatorics, Representation Theory and Physics, New York, NY

April 2023 — Slanted T-system Arctic Phenomenon
IRT Seminar, University of Illinois at Urbana-Champaign

January 2023 — T-system and Dimers
Joint Mathematical Meeting, Boston, MA

May 2022 — Introduction to Analytic Combinatorics in Several Variables with Examples
IRT Seminar, University of Illinois at Urbana-Champaign

March 2022 — XXZ Model and Trigonometric R-matrix
IRT Seminar, University of Illinois at Urbana-Champaign

February 2022 — Introduction to Bethe Ansatz's Equation and the Algebraic Bethe Ansatz
IRT Seminar, University of Illinois at Urbana-Champaign

February 2022 — Introduction to Yang-Baxter Equation and Quantum Integrable System
IRT Seminar, University of Illinois at Urbana-Champaign

October 2021 — T-system with Slanted Initial Data and Pinecone
IRT Seminar, University of Illinois at Urbana-Champaign

October 2021 — Arctic Curve Phenomenon of T-system via Multivariate Generating Function
IRT Seminar, University of Illinois at Urbana-Champaign

May-June 2021 — T-system, Dimers and Networks (A series of 5 talks)
IRT Seminar, University of Illinois at Urbana-Champaign

February 2021 — Introduction to the Pentagram Map, Part 1 - Part 3
IRT Seminar, University of Illinois at Urbana-Champaign

December 2020 — Cluster Algebra and Y-patterns
IRT Seminar, University of Illinois at Urbana-Champaign

October 2019 — Matrix Square Roots of Polynomial
Northfield Undergraduate Mathematics Symposium, St. Olaf College, Northfield, MN.

September 2019 — Application of Algebraic Geometry and Geometric Invariant Theory on Functional Neuroimaging
Steen's Fellowship Event, St. Olaf College, Northfield, MN.

Poster Presentations

January 2019 — Matrix Square Roots of Polynomial
Joint Mathematics Meeting, Undergraduate Poster Session, Baltimore, MD.

May 2018 — Pupillometry as A Measure of Auditory Cognitive Processes and Listening Effort.
175th Annual Meeting of the Acoustical Society of America, Minneapolis, MN

May 2018 — A Comparison of Free-field and Headphone Based Sound Localization Tasks.
175th Annual Meeting of the Acoustical Society of America, Minneapolis, MN

Undergraduate Research Experience

Joint work at St. Olaf College and University of Illinois at Urbana - Champaign via Steen Fellowship

Summer 2019 — **Application of Algebraic Geometry and Geometric Invariant Theory on Functional Neuroimaging**
Mentor: Graduate Student Megan Finnegan

At. St. Olaf College

Summer 2018 — **Geographic Variation in Temporal Pattern Recognition in The Acoustic Parasitoid Fly Ormia Ochracea**
Mentor: Professor Norman Lee

Fall 2017 – Sping 2020 — **Free Field Sound Localization Using the Sound Localization Arc**
Mentor: Professor Jeremy Loebach

Fall 2017 – Spring 2019 — **Pupillometry and Auditory Cognition in Normal Hearing Listeners, Hearing Impaired Individuals and Cochlear Implant Users**
Mentor: Professor Jeremy Loebach

Summer 2017 **Matrix Square Roots of Polynomial Project**
Mentor: Professor Kosmas Diveris.