

# Zeyu (Derek) Zeng

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## EDUCATION

### Beijing 101 High School

2021.9 - 2024.7

### University of Illinois Urbana-Champaign

2024.8 - present

(Current) GPA: 3.93

Bachelor of Science Program in Physics, Dual degree in Mathematics

(Current) Technical GPA: 3.91

#### Courses:

**Fall 2024:** MATH 423 (Differential Geometry, A), PHYS 225 (Relativity & Math, A), PHYS 211 (University Physics: Mechanics, A), ESL 111 (Introduction to Academic Writing I, A), HK 110 (Contemporary Health, A), ENG 100 (Engineering Orientation, A)

**Spring 2025:** MATH 416H (Abstract Linear Algebra Honor Session, A+), MATH 441 (Differential Equations, A-), MATH 347H (Introduction to Abstract Mathematics Honor Session, A), PHYS 325 (Classical Mechanics I, A), PHYS 214 (University Physics: Quantum, B+), ESL 112 (Introduction to Academic Writing II, A+), MATH 497 (Individual Study, A+)

**Fall 2025:** MATH 518 (Differentiable Manifold I, A+), MATH 535 (General Topology, A+), MATH 424 (Honors Real Analysis, A+), PHYS 435 (Electromagnetic Fields I, A-), MATH 492 (Undergraduate Research, S), RST 335 (Leisure and Consumer Culture, A+)

**Spring 2026**<sup>1</sup>: MATH 519 (Differentiable Manifold II, MATH 525 (Algebraic Topology I), MATH 500 (Abstract Algebra I), PHYS 486 (Quantum Mechanics I), MATH 492 (Reading Course on Differential Topology and Cobordism)

**Fields Institute Shared Graduate Courses:** Geometry of Quantum Mechanics (Fall 2025), Mathematics Inspired by Quantum Field Theory (Winter 2025-2026)

## RESEARCH EXPERIENCES

### Exploring the Teapot Effect: Microscale Investigations and Mechanistic Analysis

2023.4 - 2023.9

- Research Instructor: Prof. Baoyi Chen
- Studied the formation and the factor of the teapot effect.
- S. -T. Yau High School Science Competition Semifinalist.

### Relativistic Corrections to Hadron-Hadron Correlation Function

2023.11 - 2025.6

- Research Instructor: Prof. Baoyi Chen, Prof. Jiaxing Zhao
- Examine relativistic corrections to scattering phase shifts and correlation functions using the two-body Dirac equation framework.
- See arXiv:2506.19240 [hep-ph]

### Undergraduate Research, Schwarzschild-like Metric in Isotropic Coordinates

2025.3 - present

- Research instructor: Dr. Elena Kopteva
- Derive the coordinate transformation from the canonical form to the isotropic coordinate.
- Develop a general method for transforming Kiselev solutions into isotropic coordinates

### Illinois Math Lab Research Project, Arithmetics of Polynomials in Knots Theory

2025.8 - 2025.12

- Research instructor: Dr. Yi Wang
- Study the Knots theory by the factorization of a polynomial related to the trace field of  $-a/b$ -Dehn filling.

## ACADEMIC ACTIVITIES

### UIUC Undergraduate Research Symposium, Poster Presenter

2025.4

- Poster named “Derivation of Conformally Flat Metric for Generalized Schwarzschild-like Solutions”

### “The Largest and The Smallest”, SJTU Summer School on Physics, Participant

2025.7

- Delivered the presentation named “Gauge Theory of Shallow Water” with collaborators.

## HONORS

### S. -T. Yau High School Science Award, Semi-Finalist

2023.9

### UIUC James Scholar

2025.2 - present

### Dean’s List, Fall 2024, UIUC Grainger College of Engineering

2025.4

### Ralph O. Simmons Undergraduate Research Scholarship

2025.4

<sup>1</sup>The grading is pending.