XUANCHUN LU

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EDUCATION

University of Cambridge *Oct 2023 — Ongoing*
PhD in Pure Mathematics and Mathematical Statistics
Supervisor: Prof. Mark Gross

University of Warwick *Sept 2019 — July 2023*
MMath with First Class Honours
Relevant modules and marks:
- · `MA4A5` Algebraic Geometry (100%)
- · `MA4M6` Category Theory (100%)
- · `MA3G6` Commutative Algebra (100%)
- · `MA4J8` Commutative Algebra II (97%)
- · `MA4L7` Algebraic Curves (96%)

AWARDS AND PRIZES

Department Prize *2020/21, 2021/22, 2022/23*
University of Warwick

- · I was awarded the Department Prize during the final three years of my undergraduate programme. The prize is awarded for academic excellence by the Warwick Mathematics Institute to normally the top three students from each year.

PROJECTS

Double ramification cycles in the punctured setting
Ongoing

- · In the first part of the project, I showed that the punctured Gromov–Witten theory of a logarithmic point is fully described by higher-rank double ramification cycles. This should be seen as a first step in the ongoing work of comparing punctured Gromov–Witten theory and the theory of relative stable maps to rubber targets, which will form the second part of the project.

MMath Thesis: Birational Geometry of Wonderful Compactifications
Oct 2022 — June 2023

- · I studied birational geometry of wonderful compactifications of hyperplane arrangement complements, in particular their Mori cones. I showed that the previous bounds on Mori cones obtained by Gibney–Maclagan are not tight even in the case of line arrangements, and that these bounds can be refined assuming that there is a general description of tropicalisations of projective duals. I then computed tropical projective duals for generic cubic curves and some other mildly degenerate cubic curves in $\mathbb{P}^3$.
- · Supervisor: Professor Diane Maclagan

Third Year Essay Project: Mirror Symmetry for dP_5 *Oct 2021 — June 2022*
Research Module at University of Warwick

- · I produced an exposition on the mirror construction of Gross–Hacking–Keel for log Calabi–Yau surfaces, and described the procedure explicitly for the del Pezzo surface of degree 5.
- · Module marks: 96% (essay), 99% (oral presentation)
- · Supervisor: Professor Miles Reid

URSS Project: Lines on Quintic Threefolds *July 2021 — Sept 2021*
Undergraduate Research at University of Warwick

· I undertook a summer reading project concerning intersection theory on Grassmannians, culminating in the enumeration of lines on general quintic threefolds. A bursary of £850 was awarded by the *Undergraduate Research Support Scheme* to carry out this 8-week long project.
· Supervisor: Dr. Chunyi Li

READING GROUPS AND SEMINARS

Reading Groups
· Categorical enumerative invariants (*Michaelmas 2024/25*, ongoing)
  · Talks given:
    · An introduction to A_∞-algebras and their Hochschild/periodic cyclic homology
    · Partition function of a general topological field theory
    · Comparison with the Fock space formalism of Coates–Givental
· Gopakumar–Vafa invariants (*Lent (Term 2), 2023/24*)
· Virtual fundamental classes (*Michaelmas (Term 1), 2023/24*)
  · Talks given:
    · Motivation of the construction
    · Introduction to cone stacks
    · Perfect obstruction theory for spaces of stable/logarithmic/punctured maps
· Stacks and descent (*Autumn term, 2022/23*)
· Toric varieties (based on *Toric Varieties* by Cox, Little, Schenck) (*Spring term, 2021/22*)
· Scheme theory (*Autumn term, 2021/22*)

Seminar Talks
· Junior Algebraic Geometry Seminar, Warwick (*5 Dec 2024, Upcoming*)
  · Title: Double ramification cycles in the punctured setting

· Junior Geometry Seminar, Cambridge (*25 Oct 2024*)
  · Title: Double ramification cycles in the punctured setting

· Graduate Seminar on Algebraic Surfaces, Warwick (*14 Oct 2021*)
  · Title: Lines and other combinatorial structures on dP_5.

TEACHING EXPERIENCES

Supervisor *Jan 2024 — Present*
University of Cambridge

· Conducted 2-to-1 teaching sessions for undergraduate students and graded their assignments.
· Courses taught: Part II Algebraic Geometry (5 Students, Lent 2023/24); Part IA Revision (6 Students, Easter 2023/24)

Teaching Assistant *Oct 2022 — June 2023*
University of Warwick

· Responsible for conducting weekly 1-hour small group sessions for three groups of five first year undergraduate students, and the grading of their coursework assignments.