

Matthew Weidner

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Education

2014-2018 **B.S. in Mathematics (with Computer Science Minor)**, *California Institute of Technology*, Pasadena, CA.

Research

- [1] A. K. Narayanan and M. Weidner. Nearly Linear Time Encodable Codes Beating the Gilbert-Varshamov Bound. Submitted for publication.
- [2] M. Weidner. Pseudocharacters of Classical Groups. In preparation.
- [3] M. Weidner. On Conjectural Rank Parities of Quartic and Sextic Twists of Elliptic Curves. Submitted for publication.
- [4] M. Hadian and M. Weidner. On Selmer rank parity of twists. *Journal of the Australian Mathematical Society*, 102(3):316-330, June 2017.

Work Experience

- 6/2017- **Summer Undergraduate Research Fellowship**, *Caltech*, Pasadena, CA.
8/2017 Mentor: Chris Umans; Co-mentor: Anand Kumar Narayanan. Investigated fast encoding of Garcia-Stichtenoth algebraic geometry codes and developed a sub-quadratic time encoding algorithm for related codes beating the Gilbert-Varshamov bound.
- 6/2016- **Summer Undergraduate Research Fellowship**, *Caltech*, Pasadena, CA.
8/2016 Mentor: Xinwen Zhu. Generalized R. Taylor's pseudocharacters to several classical groups and used them to generalize results on conjugacy vs. element-conjugacy of representations.
- 6/2015- **Summer Undergraduate Research Fellowship**, *Caltech*, Pasadena, CA.
8/2015 Mentor: Majid Hadian. Proved patterns in the variation of p -Selmer rank parities under p -twists of abelian varieties over number fields, particularly quadratic twists of hyperelliptic curves.
- 9/2017- **Ma5a (Introduction to Abstract Algebra) Teaching Assistant**, *Caltech*,
present Pasadena, CA.
Gave office hours and graded problem sets and exams for undergraduate course on group theory.
- 1/2016- **CS21 (Decidability and Tractability) Teaching Assistant**, *Caltech*, Pasadena,
3/2016; CA.
1/2017- Gave office hours and graded problem sets and exams for undergraduate course on theory
3/2017 of computation and computational complexity.
- 6/2014- **Summer Work Program**, *Infinera, Inc.*, Allentown, PA.
9/2014 Wrote VB.Net / Microsoft T-SQL application to perform statistical process control for a manufacturing line.

Talks Given

- 11/2017 **Algebraic Geometry Error-Correcting Codes**, *Caltech Undergraduate Math Club*.
- 4/2017 **2-Selmer Rank Parities and Quadratic Twists of Elliptic Curves**, *Caltech Langlands Program Learning Seminar*.
- 11/2015 **Mordell-Weil Groups of Elliptic Curves**, *Caltech Undergraduate Math Club*.
- 10/2015 **2-Selmer Ranks of Quadratic Twists of (Hyper)elliptic Curves**, *Caltech Number Theory Seminar*.

Awards

- 2017 **Eric Temple Bell Undergraduate Mathematics Research Prize**, *Caltech Math Department*.
“[A]warded for the best original mathematics paper written by a Caltech junior or senior.”
- 2017 **Honorable Mention**, *2016 William Lowell Putnam Mathematical Competition*.
- 2016 **H. J. Ryser Scholarship**, *Caltech Math Department*.
“[A]warded to undergraduate students for academic excellence.”
- 2016 **Honorable Mention**, *2015 William Lowell Putnam Mathematical Competition*.

Selected Coursework

- Ph/CS219a **Quantum Computation**.
Quantum entanglement, quantum circuits, and quantum algorithms.
- CS151 **Complexity Theory**.
Time and space complexity, nondeterminism, circuit complexity, randomness & derandomization, alternation, and interaction.
- CMS/CS139 **Analysis and Design of Algorithms**.
Approximation algorithms, randomized algorithms, online algorithms, streaming algorithms, and research topics.
- CS150 **Probability and Algorithms**.
Probabilistic method and randomized algorithms.
- Ma130ab **Algebraic Geometry**.
Two terms covering basic properties of sheaves, schemes, and modules over a scheme; derived categories and cohomology of coherent sheaves.
- Ma120abc **Abstract Algebra**.
Three terms covering commutative algebra; Galois theory and Galois cohomology; noncommutative algebra and representation theory.

Activities

- 2014-Present Caltech-Occidental Concert Band. Band Manager, 2017-present.
- 2015-Present Caltech Deans' Office Peer Tutor for abstract algebra and algorithms courses.
- 2016-Present Student Waiter for dinners in Dabney House (my undergraduate residence). Head Waiter, 2017-present.
- Winter 2017 Pit Band, Caltech Theater Group production of “Company”.