Raymond Baker

morphismz.github.io
raymondgarethbaker@gmail.com
650-798-7110

Background and Interests

I graduated *summa cum laude* from the University of Colorado, Boulder with a double major in mathematics and philosophy. For my honors, I defendended a thesis in the mathematics department titled "Eckmann-Hilton and the Hopf Fibration in Homotopy Type Theory." I presented the results of my thesis at the Second International Conference on Homotopy Type Theory at Carnegie Mellon University. I have a focus in higher category theory and homotopy theory, in type theory and the foundations of math, and in connections between these subjects and computer science. As an application of the latter focus, I have experience with functional programming and the formal verification of proofs and programs. I am a contributor to the agda-unimath repository, an encyclopedia of formalized mathematics and certified programs, which comprises 300K lines of code. This library allows mathematical theorems and computer programs to be coded, machine checked, and stored for use and reuse. The library is written in Agda, a dependently typed pure functional programming language. The dependent type system of Agda is an extension of the type system of Haskell, constituting a foundation for mathematics that is naturally interpreted by a computer. To learn more about my background and interests, see my personal site or my LinkedIn. To see some of my work, see my GitHub, or my Math StackExchange.

Education

- **University Of Colorado Boulder (August 2019 - December 2023):** I graduated ***summa cum laude*** with a bachelors of arts in mathematics and in philosophy.

  Research:

  - Honors thesis, written under the direction of Professor Jonathan Wise, titled "Eckmann-Hilton and the Hopf Fibration in Homotopy Type Theory".
  - UROP grant, under the direction of Professor Raul Saucedo, studying models of the non-classical logic FDE.

  Reading Courses: Category Theory, under the direction of Professor Kieth Kearnes. Homotopy Type Theory, under the direction of Professor Jonathan Wise

  Graduates Classes: Topology I and II, Model Theory, Set Theory.

- **Foothill College (Fall 2017-Spring 2019)**: For my junior and senior year in high school, I enrolled as a student at a local community college which allowed me to take multiple college-level math courses simultaneously.
- **Palo Alto High School (Fall 2015-Spring 2017)**: I attended Paly for my first two years of high school.

Employment

- **Temple Grandin School (September 2023 - Present):** ***Lead Mathematics Instructor:*** Heading the mathematics department and teaching mathematics at Temple Grandin School, serving students with Asperger's Syndrome and similar learning profiles.
- **Just2 Tutoring (June 2023 - Present):** Tutoring a wide range of mathematics to students in the greater Boulder area.
- **CU Boulder Department of Mathematics (October 2020 - May 2023):** ***Mathematics Tutor:*** Tutoring a wide range of mathematics (from Calculus I-III to Linear Algebra and Discrete Math) to University of Colorado Boulder students in the Mathematics Academic Resource Center..

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- **CU Boulder Department of Mathematics (Sporadic, starting January 2020): *Grader:*** Grading quizzes and homework in the mathematics department across multiple semesters for classes such as Linear Algebra for Math Majors, Discrete Math, and Calculus III (Multi-variable).
- **Generation Teach (June 2021 - August 2021): *Teaching Fellow:*** Teaching 6th grade mathematics to students enrolled in the Generation Teach Strive Lake Academy.
- **CU Boulder Department of Mathematics (January 2021 - May 2021): *Class Assistant:*** Helping to facilitate learning and group work in one recitation section of Calc II, though not enrolled in the Learning Assistant program.
- **HP Labs, HP Inc (April 2019 - July 2019): *Intern:*** Conducting lab tests working under two chromatic scientists

Speaking

- Workshop on Homotopy Type Theory / Univalent Foundations, KU Leuven, April 2nd - 4th, 2024. "Eckmann-Hilton and the Hopf Fibration." https://hott-uf.github.io/2024/ - contributed talk
- Second International Conference on Homotopy Type Theory, Carnegie Mellon University, May 22nd - 25th, 2023.

  "Eckmann-Hilton and the Hopf Fibration in Homotopy Type Theory." https://hott.github.io/HoTT-2023/ - contributed talk

Service

- **President of CU Boulder Philosophy Club: (Fall 2021- Spring 2023):** Interacting with faculty, scheduling events, and organizing club meetings of 15-20 students weekly.
- **Contributor to the agda-unimath repository: (January 2023 - Current):** Writing machine checkable, formalized programs and proofs as part of a large-scale formal verification project. Selected contributions: higher coherence theorems, the universal property of the suspension of a type (both the dependent and non-dependent), as well as the suspension loop space adjunction, and many related lemmas. For a more detailed account, see my personal site.

Awards and Accomplishments

- **Latin Honors in Mathematics**, *summa cum laude*: I successfully defended an honors thesis in the mathematics department, earning the honors *summa cum laude*.
- **Jim and Laura Marshall Scholarship in Mathematics: (2021-2022):** Scholarship awarded to outstanding upper-division mathematics majors who demonstrate excellence in their studies
- **Sieglinde Talbott Haller Endowed Scholarship in Mathematics: (Fall 2020-Spring 2021):** Scholarship given annually to graduate and undergraduate students in Mathematics who show exceptional mathematical promise.
- **Dean's List (Fall 2021, Spring 2021, Spring 2020, Fall 2019)**

Tools and Skills

- Agda, Coq, Bash, Haskell, Python, Git, Emacs, Linux (Fedora)

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- Formal verification, Theorem proving, Problem solving, Analysis, Technical writing, Communication, Mathematics, Logic (Classical, Constructive, FDE), Formal methods, Type theory (MLTT, UTT, CIC, Lambda Calculus), Algebra (group theory, ring theory, representation theory)