

Jake Francis Baer

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RESEARCH INTERESTS

Stable and unstable homotopy groups via the Adams spectral sequence and synthetic methods.

EDUCATION

Wayne State University 2021 – Present

Ph.D. Mathematics Advisors: Dan Isaksen and William Balderrama

Reed College 2016 – 2021

B.A. Mathematics Advisor: Kyle Ormsby

Thesis: “Connective K -theory Cooperations and Numerical Polynomials”

PREPRINTS

- The algebraic Novikov spectral sequence for topological modular forms. Submitted.
arxiv.org/abs/2404.05573
- Stable comodule deformations and the synthetic Adams–Novikov spectral sequence, with Max Johnson and Peter Marek. Submitted.
arxiv.org/abs/2402.14274

WORK IN PROGRESS

- Automated proofs of unstable Adams differentials.
- Metastable homotopy groups of spheres, joint with William Balderrama, Eva Belmont, and Dan Isaksen.

INVITED TALKS

Joint Mathematics Meetings January 2026

Washington D.C., New Voices in Homotopy Theory

“Automated Proofs of Unstable Adams Differentials”

The University of Chicago Topology Seminar October 2025

“Composition Methods in the Unstable Adams Spectral Sequence”

Case Western Reserve University Topology Seminar April 2025

“Composition Methods in the Unstable Adams Spectral Sequence”

CONTRIBUTED TALKS

Young Topologists Meeting June 2025

KTH/Stockholm University — “Composition Methods in the Unstable Adams Spectral Sequence”

Graduate Student Geometry and Topology Conference April 2025

Bloomington, Indiana — “Composition Methods in the Unstable Adams Spectral Sequence”

Wayne State Topology Seminar
“The algebraic Novikov spectral sequence for tmf ”

March 2024

GRANTS AND AWARDS

Graduate Research Assistantship, National Science Foundation	Summer 2022, 2023
Summer Opportunity Fellowship Award, Reed College	Summer 2021

TEACHING

Instructor for Calculus 2, Wayne State University	Winter 2026
Instructor for College Algebra, Wayne State University	Fall 2025
Instructor for Calculus 1, Wayne State University	Fall 2023
Instructor for Calculus 1, Wayne State University	Winter 2023
Instructor for College Algebra, Wayne State University	Fall 2022

SEMINARS ORGANIZED

Homotopy Theoretic Methods in Manifold Theory, Wayne State University	Winter 2024
Hochschild Cohomology and Deformation Theory, Wayne State University	Summer 2023

SELECTED WORKSHOPS AND CONFERENCES

Computations in Stable Homotopy Theory, AIM, Pasadena	October 2025
Secondary Steenrod Algebra Seminar, eCHT (online)	Fall 2025
Beyond the Telescope Conjecture, Isaac Newton Institute, Cambridge	June 2025
Kan Seminar, eCHT (online)	September – December 2024
tmf Seminar, eCHT (online)	January – May 2023
Mahowald Invariant Seminar, eCHT (online)	September – December 2022
EWM-EMS Summer School, Institut Mittag-Leffler (online)	June 2022
Synthetic Spectra Reading Seminar, eCHT (online)	January – April 2022