Benjamin B. McMillan

CONTACT INFORMATION

Institute for Basic Science, Center for Complex Geometry
Daejeon, South Korea

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RESEARCH INTERESTS

Cartan's method of equivalence, exterior differential systems, conservation laws, geometric structure of differential equations, invariant differential operators, singular foliations, quasiconformal geometry.

EMPLOYMENT

Senior Researcher August 2022 – Present
Institute for Basic Science, Center for Complex Geometry, Daejeon, South Korea

Australian Research Council Grant Funded Researcher September 2019 – May 2022
University of Adelaide, Adelaide, South Australia

RTG Postdoctoral Fellow August 2016 – June 2019
Stony Brook University, Stony Brook, New York, USA

EDUCATION

University of California, Berkeley, Berkeley, CA
Ph.D., Mathematics, May 2016
- "Geometry and Conservation Laws for a Class of Second-Order Parabolic Equations"
- Advisor: Robert L. Bryant
- National Science Foundation Graduate Research Fellowship, 2011

California Institute of Technology, Pasadena, CA
B.S. with honors, Mathematics, May 2010
- Research in Stochastic Evolution Equations, Summer 2009
- Research in Graph Theory, Summer 2007

PAPERS

B. McMillan, Indecomposable quasiconformal maps of manifolds, arXiv:2605.21894.

B. McMillan, Foliation surgeries and the concordance groups of foliated spheres, arXiv:2511.09053.

L. MacDonald, B. McMillan, Chern–Weil theory for singular Haefliger foliations, *Differential Geom. Appl.*, 105 (2026), 102450, DOI, arXiv:2106.10078.

B. McMillan, A characterization of Pfaffian embeddings from (2,3,5)- into flat (4,7)-geometries, arXiv:2404.14988.

F. Costanza, M. Eastwood, T. Leistner, B. McMillan, A Calabi operator for Riemannian locally symmetric spaces, *Amer. J. Math.*, 148 (4) (2026), 1003–1028, DOI, arXiv:2112.00841.

F. Costanza, M. Eastwood, T. Leistner, B. McMillan, The range of a connection and a Calabi operator for Lorentzian locally symmetric spaces, *Asian J. Math.*, 29 (2) (2025), 171–200, DOI, arXiv:2302.04480.

B. McMillan, Geometry and conservation laws for a class of second-order parabolic equations II: conservation laws, *SIGMA Symmetry Integrability Geom. Methods Appl.*, 17 (2021), Paper No. 047, DOI, arXiv:1810.02346.

B. McMillan, Geometry and conservation laws for a class of second-order parabolic equations I: geometry, *J. Geom. Phys.*, 157 (2020), 103824, DOI, arXiv:1810.00458.

C. Y. Ku and B. McMillan, Independent sets of maximal size in tensor powers of vertex transitive graphs, *J. Graph Theory*, 60 (4) (2009), 295–301, DOI.

Conferences Organized

2025 KMS Annual Meeting Special Session — October 2025
Symmetry and Integrability of Geometric Structures, with Paul-Andi Nagy

Selected Talks

Purdue University, (online, invited) Topology Seminar — 1/21/2026
Foliation surgeries and Godbillon–Vey spheres

KMS Annual Meeting, Symmetry & Integrability of Geometric Structures Session — 10/23/2025
Foliation surgery and continuous variation of characteristic classes on spheres

IBS CCG, (three-lecture series) Complex Geometry Seminar, Daejeon — 5/20–22/2025
Secondary characteristic classes and Chern–Weil theory of singular foliations

KMS Spring Meeting, Geometry Session — 4/25/2025
Invariant prolongation of the conformal Killing equation via conformal tractors

Workshop on Parabolic Geometry and Related Topics, (invited) IBS CCG — 10/18/2023
Embeddable (2,3,5) distributions

IBS CCG, Complex Geometry Seminar, Daejeon — 9/15/2022
The image of the Killing operator

UC Davis, (online, invited) QMAP Seminar — 1/28/2022
Calabi operators for locally symmetric spaces

AustMS Annual Meeting, Special Session, Geometry with Symmetries — 12/8/2021
The secondary characteristic classes of singular foliations

AMS JMM, (invited) Special Session, Geometry of Differential Equations — 1/17/2020
Conservation laws and parabolic Monge–Ampère equations

AustMS Annual Meeting, Geometry including Differential Geometry Session — 12/5/2019
Conservation laws and parabolic Monge–Ampère equations

Ohio State University, (invited) Topology Seminar — 3/7/2019
Conservation laws and the moduli space of solutions to PDE

Stony Brook University, Geometry/Topology Seminar — 9/25/2018
Conservation laws and parabolic Monge–Ampère equations

Ohio State University, (invited) Topology Seminar — 10/25/2016
The geometry and conservation laws of parabolic equations

Rutgers University, (invited) Geometric Analysis Seminar — 9/27/2016
The geometry and conservation laws of parabolic equations

Graduate Student Topology and Geometry Conference, UT Austin — 4/5/2014
Moving frames and geometric invariants

Stanford University, The Cartan Seminar 2/27/2014
The Newlander–Nirenberg theorem

Teaching Experience

Instructor, University of Adelaide
- Analysis and Topology — First Semester 2021

Instructor, Stony Brook University
- Honors Linear Algebra — Spring 2019
- Calculus I — Fall 2018
- Introduction to Linear Algebra — Spring 2018
- Calculus IV (Ordinary Differential Equations) — Fall 2017
- Differential Geometry of Curves and Surfaces — Spring 2017
- Overview of Calculus — Fall 2016

Instructor, UC Berkeley
- Multivariable Calculus — Summer 2011

Teaching Assistant, UC Berkeley
- Discrete Math — Spring 2016
- Introductory Analysis — Spring 2015
- Pre-calculus — Spring 2012
- Calculus — Fall 2011, Fall 2010
- Multivariable Calculus — Spring 2011

Mentorship

REU Mentor, Stony Brook — May 2017 – July 2017
Ricky Simanjuntak, calibrated planes in the Lie algebra of $SU(n)$ and their minimal cycles.

Directed Reading Program, UC Berkeley
Guided undergraduates in self study of the topics:
- Galois Theory — August 2014 – December 2014
- Classification of complex semi-simple Lie algebras — January 2015 – May 2015
- Algebraic Topology — January 2016 – May 2016

Tutoring, UC Berkeley — January 2012 – December 2012
New Experiences for Research & Diversity in Science

Academic Activities

Referee
New Zealand Journal of Mathematics

Reviewer
American Mathematical Society, Mathematical Reviews

Co-organizer, with Thomas Leistner, University of Adelaide — August 2021 – May 2022
Differential Geometry Seminar

Founding Organizer, Stony Brook — February 2017 – April 2017
Exterior Differential Systems and Method of Equivalence Seminar

Founding Organizer, with Christian Hilaire, UC Berkeley — September 2012 – December 2013
Student Differential Geometry Seminar