

Paul Gustafson

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<https://github.com/PaulGustafson>

Employment

Wright State University

September 2018 – Present

Research Scientist, Department of Electrical Engineering

Knowledge Based Systems, Inc.

October 2011 – September 2012

Programmer Analyst

Education

Texas A&M University

2013 – 2018

Doctor of Philosophy in Mathematics

Advisor: Eric Rowell

Texas A&M University

2012 – 2013

Bachelor of Science in Mathematics

Princeton University

2007 – 2011

Research Interests

Category theory, hybrid dynamical systems, topological quantum computation

Visiting Position

University of Pennsylvania

October 2018 – Present

Visiting Scholar, Electrical and Systems Engineering Department

Publications and Preprints

M. Kvalheim, P. Gustafson, D. E. Koditschek, Conley's fundamental theorem for a class of hybrid systems, *SIAM J. Appl. Dynam. Syst.* 20 (2021), no. 2, 784-825.

J. Culbertson, P. Gustafson, D. E. Koditschek, P. F. Stiller, Formal composition of hybrid systems, *Theory and Applications of Categories* 35 (2020), no. 45, 1634-1682.

P. Gustafson, A. Kimball, E. C. Rowell, Q. Zhang, Braid group representations from twisted tensor products of algebras, *Peking Math. J.* 2 (2020), 103-130.

A. Deaton, P. Gustafson, L. Mavrakis, E. C. Rowell., S. Poltoratski, S. Timmerman, B. Warren, Q. Zhang, Integral metaplectic modular categories, *J. Knot Theory Ramifications*, 29 (2020), no. 5, 2050032.

P. Gustafson, E. C. Rowell, Y. Ruan, Metaplectic categories, gauging and Property F, *Tohoku Math. J.* 72 (2020), no. 3, 411-424.

P. Bruillard, P. Gustafson, J. Plavnik, E. C. Rowell, Dimension as a quantum statistic and the classification of metaplectic categories, in *Topological phases of matter and quantum computation*, 89–113, Contemp. Math., 747, Amer. Math. Soc., Providence, RI, 2020.

P. Gustafson, Finiteness for mapping class group representations from twisted Dijkgraaf-Witten theory, *J. Knot Theory Ramifications* 27 (2018), no. 6, 1850043.

R. Fernandes, B. Li, K. Vadakkevedu, A. Verma, P. Gustafson, et al., Agent-based analysis of trustworthiness in wireless sensor networks, *Proc. SPIE* 8407, Multisensor, Multisource Information Fusion: Architectures, Algorithms, and Applications 2012, 84070W (May 1, 2012); doi:10.1117/12.920781.

P. Gustafson, N. Savir, E. Spears, A characterization of refinable rational functions, *Am. J. Undergrad. Res.* 5 (3): 11-20 (Nov. 11, 2006).

Conference Presentations

TRIPODS/DATA-INSPIRE Workshop on Dynamics, Topology, and Robotic Control, hosted online by Rutgers University, May 2021.

BIRS-CMO Workshop on Topological Complexity and Motion Planning, hosted online by Banff International Research Station, September 2020.

AMS Special Session on Applied Category Theory, U.C. Riverside, Riverside, CA, November 2019.

Workshop on Higher Category Approach to Certifiably Correct Quantum Information Processing Systems, Washington, D.C., February 2019.

AMS Special Session on Quantum Symmetries, The Ohio State University, Columbus, OH, March 2018.

AMS Special Session on Tensor Categories: Bridging Algebra, Topology, and Physics; U.C. Riverside, Riverside, CA, November 2017.

AMS Special Session on Invariants of Links and 3-Manifolds, U. North Texas, Denton, TX, September 2017.

AMS Special Session on Fusion Categories and Applications, Indiana University, Bloomington, IN, April 2017.

AMS Special Session on Fusion Categories and Topological Phases of Matter, University of Utah, Salt Lake City, UT, April 2016.

Teaching Experience (Texas A&M University)

Mentor

REU on Mathematics of TQC	Summer 2017, Summer 2018
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Instructor of Record

Mathematical Concepts – Calculus (M131)	Spring 2017
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Teaching Assistant

Engineering Mathematics II (M152)	Fall 2015, Spring 2018
Engineering Mathematics I (M151)	Spring 2016, Fall 2017

Grader

Algebraic Topology I (M643)	Fall 2016
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Counselor

SMaRT High School Math Camp

Summer 2009, Summer 2010

Workshop Participation

Research School on Quantum Symmetries, Universidad de los Andes, Bogota, Colombia, June 2019.

AMS Mathematical Research Community on Quantum Symmetries, Whispering Pines, RI, June 2018.

School and Workshop on Univalent Mathematics, University of Birmingham, UK, December 2017.

AMS Mathematical Research Community on Homotopy Type Theory, Snowbird, UT, June 2017.

Agda Implementors' Meeting XXV, Chalmers University of Technology, Gothenburg, Sweden, May 2017.

Graduate Workshop on Topological Quantum Field Theory, Simons Center for Geometry and Physics, Stony Brook, NY, August 2015.

Oregon Programming Languages Summer School, University of Oregon, July 2013.