

# 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, *to appear in SIAM J. Appl. Dynam. Syst.*, arXiv:2005.03217.

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, *to appear in Peking Math. J.*, arXiv: 1906.08153.

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

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

### Instructor of Record

Mathematical Concepts – Calculus (M131) Spring 2017

### 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

### 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.