Tom Mainiero

Curriculum Vitae

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Education

2015 The University of Texas at Austin: PhD in Physics. Advisor: Andrew Neitzke

2008 Caltech: BS in Physics

Employment

2022 Fall–Present St. Joseph's University, NY, Long Island: Dept. of Math and Computer Science: Assistant Professor

2021 Fall Rutgers Department of Physics: Part-time Lecturer.

2015–2020 Rutgers New High Energy Theory Center, Department of Physics: Postdoctoral Researcher.

Preprints/Publications

T. Mainiero. *Higher Information from Families of Measures*. GSI 2023. Lecture Notes in Computer Science, vol 14071. Springer, Cham.

T. Mainiero. *Homological Tools for the Quantum Mechanic*. arXiv:1901.02011 [hep-th].

T. Mainiero. *Algebraicity and Asymptotics: An explosion of BPS indices from algebraic generating series*. arXiv:1606.02693 [hep-th].

D. Galakhov, P. Longhi, T. Mainiero, G.W. Moore, and A. Neitzke. *Wild Wall Crossing and BPS Giants*. JHEP 1311 (2013) p. 046. arXiv:1305.5454 [hep-th].

T. Mainiero and M.A. Porter. *Quantization of a Free Particle Interacting Linearly with a Harmonic Oscillator*. Chaos 17 (2007) p. 043130. arXiv:nlin/0702025.

T. Mainiero and M.A. Porter. *Avoided Level Crossings in the Quantization of a Mixed Regular-Chaotic System*. Chaos 17 (2007) p. 041106.

In Progress R. Geiko, T. Mainiero, and G.W. Moore. *A Categorical Triality: Matrix Product Factors, Positive Maps, and von Neumann Bimodules*. **Draft Available Upon Request**.

Contributed Talks

2025 Jul ICBS 2025 (BIMSA, Beijing); *Quantum Informatic Trinitarianism: von Neumann bimodules, CP maps, and matrix product states* (recorded).

2023 Nov Caltech; Information, Geometry, and Physics Seminar. *Higher Information: The untold topological secrets of information.*

2022 May CUNY; Symposium on the Categorical Semantics of Entropy. *Higher Entropy* (recorded).

2020 Jul String Math 2020. *The Secret Topological Life of Mutual Information* (recorded) .

2019 Mar Arizona State University, Differential Geometry and Control Theory Seminar. *Bill and Ted's Entropic Adventure*.

2018 Dec University of Maryland, Joint RIT on Quantum Information Seminar. *Some homological tools for the quantum mechanic.*

2018 Jan Arizona State University; Differential Geometry and Control Theory Seminar. *A Probability Talk that Spaces Out.*

2016 Oct	Arizona State University; Differential Geometry and Control Theory Seminar. *(Dr.) Strange Duality or: how I learned to stop dozing off and learned to love (the) Boolean algebras.*
2015 Nov	Arizona State University; Differential Geometry and Control Theory Seminar. *Morse(t) I listen to this talk?*
2014 Nov	Kansas State; Mathematics M-Seminar. *This one weird trick has algebraic functions generating Donaldson-Thomas invariants from home!*
2014 Sep	Texas A&M, High Energy Theory Seminar. *The Joy of Watching your BPS States Grow Up* (recorded).
2014 Jul	West Coast Algebraic Topology Summer School on TFTs. *Quantum Chern Simons.*
2014 May	Emphasis Year Workshop on Rep. Theory, Integrable Systems, and Quantum Fields. *Functional Equations and DT-Invariants from Spectral Networks: Revenge of the m-herds.*

Teaching Experience

Title	Course #	Semesters	Institute	Notes
Intro. to AI	COM 147	25S	SJNY	Co-taught with A. Lane
Seminar	MA 471	24S–25F	SJNY	
Calculus I	MA 205	22F–23F; 24F–25F	SJNY	
Calculus II	MA 206	24S	SJNY	
Calculus III	MA 207	23S; 23F; 24F; 25S	SJNY	
Linear Algebra	MA 356	22F–24S; 25F	SJNY	
Real Analysis	MA 307	24S; 25F	SJNY	Inquiry-Based Style
Quantum Info.	MAT 490	24F	SJNY	Independent Study
Measure Theory	MAT 490	24F	SJNY	Independent Study
E&M/Mdrn. Phys. Lab	PH 206	21F	Rutgers	Part-time lecturer
Multivariable Calculus	M 427L	15S	UT Austin	TA
Differential Eqs.	M 427K	13F	UT Austin	TA
Sequences, Series, and Multivariable Calculus	M 408D	12F	UT Austin	TA
Mechanics Intro. Lab	PS 303	10F–12S	UT Austin	Instructor
Mechanics/E&M for Engineers	PHY 303K/L	08F–10Su	UT Austin	TA

Key: F = Fall; S = Spring; Su = Summer; SJNY = St. Joseph's University, NY

Other Teaching

22, 23, 24 Sum	Instructor for numerous topics courses (e.g. Dynamical Systems, Number Theory, Knot Theory) during the "Week of Chaos" at Mathily-Er (an inquiry based summer program for high school students).
13 Fall–14 Spr	Directed Reading Program Mentor; UT Austin: mentoring program for undergraduates interested in mathematics

Service

24 Spr–25 Fall	St. Joseph's Undergraduate Research Symposium Committee
18 Fall–19 Fall	Co-organizer for Rutgers High Energy Theory Seminar