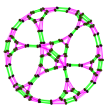

William R. Munizzi

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Tempe, AZ 85281
(708) 466-5526

EDUCATION

Doctor of Philosophy, Physics — expected May 2024
Master of Science, Physics — Feb 2022
Arizona State University, Tempe, AZ
Doctoral Advisor: Dr. Cynthia Keeler

Bachelor of Science, Physics — December 2017
Grand Valley State University, Allendale, MI
Advisor: Dr. Kingshuk Majumdar
Thesis: *Investigation of the Role of Competing Interactions in a One-Dimensional Heisenberg Spin-1/2 Chain.*

Bachelor of Science, Mathematics — December 2017
Grand Valley State University, Allendale, MI
Advisor: Dr. David Austin
Thesis: *Invariants of Knots Through Quandles.*

RESEARCH OVERVIEW

Primary Interests: Quantum Information, Holography, and Mathematical Analysis.
Current Research:

- Developing new mathematical methods to perform geometric and topological analyses of entanglement structure in quantum systems.
- Advancing conformal bootstrap techniques and semi-definite programming.
- Classical and quantum aspects of gauge-gravity duality with a primary focus on entanglement entropy.
- Developing quantum algorithms for implementation in precision measurement experiments.

Publications:

- C. Cardona, C. Keeler, W. Munizzi, "Four-point correlation modular bootstrap for OPE densities," *JHEP* 10, (2021) 194, https://arxiv.org/abs/2106.05993.

In Progress:

- Paper in drafting stage with C. Keeler and J. Pollack providing a geometric classification of entanglement structure and entanglement modification by state evolution using graph theory.

HONORS & AFFILIATIONS

Vice-Chair (Incoming Chair 2022) and Founding Member of *American Physical Society Chapter at ASU*
Member *American Physical Society*
Member *American Mathematical Society*
Member *Physicists Coalition for Nuclear Threat Reduction*
Researcher *Quantum Engineered Sensors and Technology (QuEST)*
Inducted Member *Sigma Pi Sigma Honors Society*
Member *Mathematics Association of America*

PUBLIC TALKS

Arizona State University Cosmology Seminar: *"A Geometric Analysis of Stabilizer States."* October 2021

Presentation of original methods for classifying entanglement structure in multipartite quantum systems using graph theory.

Arizona State University Grad 2 Grad Colloquium: *"Stabilizer Code and Quantum Error Correction."* September 2021

Overview of theoretical framework and implementation status of physically-realizable quantum error correction, specifically focused on geometric analyses and topological error-correcting codes.

Quantum Engineered Sensors and Technologies Research Seminar: *"Classifying Stabilizer States."* August 2021

Demonstration of original work using geometric properties of stabilizer state evolution to classify quantum states and their entanglement structure for generic qubit number.

TASI Student Talk *"Asymptotics in Two-Dimensional Conformal Field Theories."* July 2021

Brief analysis and overview of two-dimensional conformal field theory asymptotics, derived from recently published work.

Southwest Strings Conference *"Vacuum Corrections in Two-Dimensional Conformal Field Theories."* April 2021

Presentation of recently published work extending the lightcone bootstrap method in the large-dimension vacuum limit. Further demonstration of a novel method for generalizing this analysis beyond the large-dimension limit.

Quantum Engineered Sensors and Technologies Research Seminar: *"An Introduction to Quantum Information."* February 2021

Review seminar targeting physicists outside the quantum information subfield. Subject matter largely consisting of an overview of the mathematical framework and error-correcting techniques present in quantum information research.

Arizona State University Cosmology Seminar: *"Universal Asymptotics in Two-Dimensional Conformal Field Theory."* December 2020

Presentation of contemporary conformal bootstrap techniques, including original contribution in extending the lightcone bootstrap analysis beyond the large-dimension limit. Seminar presented with reference to, and in anticipation of, upcoming published work.

Quantum Engineered Sensors and Technologies Research Seminar: *"Quantum Error Correction Through the Entropy Cone."* April 2020

Overview of current techniques and contemporary research in utilizing AdS/CFT correspondence and holography for quantum error correction.

Arizona State University Cosmology Seminar: *"A Geometric Analysis of Entropy Inequalities."* December 2019

Review of holographic entanglement analysis using the holographic entropy cone formalism. Presentation of original work in establishing auxiliary bit-addressing structure and associated graph formalism for multipartite, entangled states.

AWARDS & RECOGNITION

Arizona State University

Kavli Asian Winter School (KAWS) Attendee	Winter 2022
Theoretical Advanced Study Institute (TASI) Attendee	Summer 2021
Simons Bootstrap Collaboration School Attendee	Summer 2021
Michael McCallister Scholarship	Fall 2020, Spring 2021
Summer University Research Fellowship	Summer 2019

Grand Valley State University

Outstanding Physics Academic Achievement Award	Spring 2017
Outstanding Physics Outreach Award	Spring 2017

TEACHING EXPERIENCE

Graduate Teaching Assistant, Arizona State University
Department of Physics

PHY 334: "Advanced Laboratory I"	Fall 2021
PHY 131: "University Physics II, Electricity/Magnetism"	Spring 2021
PHY 111: "General Physics I"	Fall 2020
PHY 121: "University Physics I, Mechanics"	Summer 2020
PHY 122: "University Physics Lab I"	Spring 2020
PHY 441: "Statistical/Thermal Physics"	Spring 2020
PHY 112: "General Physics II"	Fall 2019
PHY 111: "General Physics I"	Fall 2019
PHY 121: "University Physics I, Mechanics"	Summer 2019
PHY 121: "University Physics I, Mechanics"	Spring 2019
PHY 132: "University Physics Lab II"	Fall 2018
Private Tutor for Physics and Mathematics	Fall 2018 - Fall 2021

Undergraduate Teaching Assistant, Grand Valley State University
Department of Physics

Teaching Assistant and Lab Instructor	Fall 2015-Fall 2017
Physics Tutor	Spring 2014-Fall 2017

Department of Mathematics

Mathematics Tutor	Spring 2014-Fall 2017

OUTREACH

-Active Member of APS Public Engagement program, participating in the following outreach endeavors. *PhysicsQuest*: a program dedicated to developing and distributing accessible physics experiments and activities to underrepresented school districts. *Physicists To-Go*: a program developed to bring physicists to local elementary and secondary school classrooms in an effort to increase scientific literacy and inspire the next generation of scientists. *Wiki Scientists Course*: a program designed to augment minority representation in scientific literature by contributing entries to Wikipedia that highlight women and minority contributions to the sciences.

-Collaboration with Cornell University to design experiments illustrating wave mechanics, to adapt to the updated Science Standards from the Arizona Department of Education. Individual development of a new physics kit that has since been adopted to the Cornell Lending Library of Experiments, accessible at https://www.ccmr.cornell.edu/education/educational-resources/lending-library-of-experiments/physics-kits/. Conducted a Teaching Workshop for the Arizona Education Association, providing instruction to local educators on effective methods for implementing wave mechanics into the current scientific curriculum.

-Four consecutive years served as a graduate mentor, in all available capacities, for the *Sundial Mentorship Program*: an organization providing advising and research opportunities to underrepresented undergraduate students pursuing a degree in the sciences.

- Four years of undergraduate outreach and volunteer efforts organizing and participating in department-hosted events including: Student Scholars Day, Super-Science Saturday, and Department of Physics open house.

COMPUTATIONAL EXPERIENCE

Programming: Python, Mathematica (including package development), Java, MATLab, Maple, Sage, LabView, LaTex.

Other Computational Skills: Qiskit, QuTip, Visual Molecular Dynamics (VMD), HPC cluster experience, SPSS.

ADDITIONAL SKILLS

Foreign Languages: German (Working Proficiency),French (Working Proficiency), Italian (Elementary Proficiency), American Sign Language (Elementary Proficiency).