Benjamin W. Walker

Richardson, TX 75080 · Ben.Walker2@utdallas.edu · (985) 264-1836 · linkedin.com/in/benjaminwwalker

Education

Politecino di Torino May 2025
M.S. in Micro and Nanotechnologies for Integrated Systems

The University of Texas at Dallas May 2023
B.S. in Physics and B.S. Electrical Engineering, Minor in Nanotechnology *GPA: 3.93*

Northwestern State University May 2019
Associate's of General Studies *GPA: 3.85*

Louisiana School for Math, Science, and the Arts (LSMSA) May 2019
High School Diploma *GPA: 3.93*

Fellowships

National Science Foundation Graduate Research Fellowship Program March 2023
- Three years of full PhD funding with a $37,000 annual stipend

Barry Goldwater Scholarship March 2022
- Most prestigious award for an undergraduate researcher from my work in skyrmion logic devices.

National Merit Scholarship March 2019
- Received full-ride scholarship at UT Dallas plus housing and $28,000 in stipends

Patents

1. **B. W. Walker**, A. E. Edwards, X. Hu, and J. S. Friedman, Near-Landauer Reversible Skyrmion Logic with Voltage-Based Propagation, *U.S. Patent Application No. 63/480,374* (Filed: 01-18-2023)

Professional Experience

Undergraduate Research Assistant Oct 2019 – Present
University of Texas at Dallas - NeuroSpinCompute Laboratory *Richardson, TX*
- Invented a novel skyrmion logic device that uses voltage-controlled magnetic anisotropy (VCMA) to control skyrmion propagation and synchronization
- Led a team of undergraduate researchers to design and optimize skyrmion circuits, achieving a 100× reduction in energy consumption

Hardware Engineering Intern May 2022 – July 2022
Microsoft - Physical Design Team *Raleigh, NC*
- Helped develop a custom floorplanning step by pre-placing standard cells and buffers and pre-routing trunks on high-speed critical buses to achieve flop to flop reach in several millimeters
- Created an interpreter between Innovus and Fusion Compiler (FC) for our TCL Physical Design scripts, aiding my team's translation effort and improved its efficiency by 50%

Visiting Researcher Jan 2022 – April 2022
Universidad de Salamanca - Simulación de Nanoestructuras Magnéticas (SINAMAG) *Salamanca, Spain*
- Designed voltage-driven reversible skyrmion logic circuits to reduce energy consumption with Mumax3
- Parametrically modelled and optimized micromagnetic devices in COMSOL to increase electrical efficiency by 70%

MRSEC Research Experience for Undergraduates May 2021 – Aug 2021
University of Texas at Austin - Integrated Nano Computing Lab *Austin, TX*
- Fabricated and validated WSe2-based devices via electron beam lithography (EBL), atomic force microscopy (AFM), and magneto-optic Kerr effect (MOKE) imaging

Electrical Engineering Intern Jan 2021 – Aug 2021
University of Texas at Dallas - Texas Analog Center for Excellence *Richardson, TX*
- Helped design a spin transfer torque (STT) memristor-based neuromorphic chip, collaborating with graduate students
- Verified aspects of device's logical operation via Verilog to prepare tapeout for foundry

Journal Publications

1. X. Hu, C. Cui, S. Liu, F. Garcia-Sanchez, W. H. Brigner, **B. W. Walker**, A. J. Edwards, T. P. Xiao, C. H. Bennett, N. Hassan, M. P. Frank, J. A. C. Incorvia, and J. S. Friedma, Magnetic Skyrmions and Domain Walls for Logical and Neuromorphic Computing, *Neuromorphic Computing and Engineering*, Mar 2023, *doi*: 10.1088/2634-4386/acc6e8

2. **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, X. Hu, M. P. Frank, F. Garcia-Sanchez, J. S. Friedman, Near-Landauer Reversible Skyrmion Logic with Voltage-Based Propagation, *ArXiv Condensed Matter*, Jan 2023, *doi*: 10.48550/arXiv.2301.10700

3. X. Hu, **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, P. Zhou, J. A. C. Incorvia, A. Paler, M. P. Frank, J. S. Friedman, Logical and Physical Reversibility of Conservative Skyrmion Logic, *IEEE Magnetics Letters*, May 2022, *doi*: 10.1109/LMAG.2022.3174514

4. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman, "Skyrmion Logic Clocked via Voltage- Controlled Magnetic Anisotropy" *Applied Physics Letters*, May 2021, *doi*: 10.1063/5.0049024

Conference Publications and Presentations

1. **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, X. Hu, M. P. Frank, F. Garcia-Sanchez, J. S. Friedman Near-Landauer Reversible Skyrmion Logic with Voltage-Based Propagation, *Government Microcircuit Applications & Critical Technology Conference*, Mar. 2023.*

2. X. Hu, **B. W. Walker**, F. Garcia-Sanchez, P. Zhou, J. A. C. Incorvia, A. Paler, M. P. Frank, J. S. Friedman, Logical and Physical Reversibility of Conservative Skyrmion Logic, *Government Microcircuit Applications & Critical Technology Conference*, Mar. 2022.

3. **B. W. Walker**, B. W. Walker, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, J. S. Friedman, Conservative Skyrmion Logic with Voltage-Controlled Magnetic Anisotropy Synchronization, *Joint IEEE International Magnetics Conference & Conference on Magnetism and Magnetic Materials*, Jan. 2022.*

4. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman, Skyrmion Logic with Voltage-Controlled Magnetic Anisotropy Clocking *Texas Analog Center for Excellence Symposium*, Oct. 2021*

5. X. Hu, M. Chauwin, F. Garcia-Sanchez, **B. W. Walker**, N. Betrabet, J. A. C. Incorvia, A. Paler, C. Moutafis, J. S. Friedman, Skyrmion Logic System for Large-Scale Reversible Computing, *IEEE International Conference on Nanotechnology*, Jul. 2021 (invited).

6. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman, "Voltage Controlled-Clocked Skyrmion Logic Synchronizers," *International Conference on Nanomagnetism and Spintronics (Solitons and Skyrmion Magnetism)*, Jun. 2021*

*Presented In-Person

Poster Presentations

1. **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, X. Hu, M. P. Frank, F. Garcia-Sanchez, J. S. Friedman, Near-Landauer Reversible Skyrmion Logic with Voltage-Based Propagation, *Undergraduate Research Day at the Texas Capitol*, Apr. 2023

2. **B. W. Walker**, A. J. Edwards, F. Garcia-Sanchez, M. P. Frank, and J. S. Friedman "Low-Dissipation Conservative Skyrmion Logic with Voltage-Based Propagation," *University of Texas at Dallas Undergraduate Research Scholar Awards*, Apr. 2022

3. **B. W. Walker**, X. Li, and J. A. C. Incorvia, "Fabrication and Analysis of WSe2-based Electronic Devices," *MRSEC REU Poster Presentation*, Jul. 2021

4. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman "Skyrmion Logic Clocked via Voltage-Controlled Magnetic Anisotropy," *University of Texas at Dallas Undergraduate Research Scholar Awards*, Apr. 2021

Awards

Undergraduate Research Scholar Award: Accepted for presentation at UT Dallas	April 2021/2022/2023
Patti Henry Pinch Scholarship: UTD Funding for 2023 GOMAC Tech Presentation	March 2023
TxACE Best Poster Award: Presented research and won against 30 graduate students	October 2021
Colorado Trail Thru-Hiker: Hiked 500 miles from Denver to Durango, Colorado	August 2021
First Place CometHack: Our thermostat project won first prize	April 2021
National Youth Science Foundation Delegate: Louisiana's State Representative	May 2019
Hall of Fame: Highest honor for my high school (analogous to valedictorian)	May 2019
Eagle Scout: Boy Scouts of America's highest honor	July 2016