

Matt Turner

Seattle, WA

<http://guavaduck.com/>

Experimental physicist with a broad background in instrument development, hands-on prototyping, precision metrology, numerical simulation, and data analysis, and a strong interest in interdisciplinary problem solving.

EDUCATION

University of Washington	Seattle, WA
PhD in Physics, pending thesis defense	expected July 2017
Thesis topic: Development of new technologies for modern torsion-balance experiments	
MS in Physics	December 2009
Additional coursework in biomedical imaging	
Brigham Young University	Provo, UT
BS in Physics, minors in Mathematics and Linguistics	August 2007
Thesis: "Simulating laser pulse propagation under optimized conditions for high-harmonic generation"	

SKILLS & EXPERIENCE

- Experimental: Precision sensing & measurement, gravitational sensing, lasers & optics, vacuum systems, control systems
- Fabrication & prototyping: Manual, CNC, & laser machining; CAD (SolidWorks); electronic circuit & PCB design; Cypress PSoC microcontroller; 3D printing
- Data analysis, acquisition, simulation, & processing: MATLAB/GNU Octave, NI LabVIEW, U-SQL/Scope, numerical methods, signal processing, finite-element analysis
- General: Linux, L^AT_EX, Git, Python, C/C++/C#, MS Windows & Office
- Languages: Proficient in Thai, conversant in Lao

EMPLOYMENT

WDG Core Data Science, Microsoft	Redmond, WA
Data scientist	March 2015 – Present
I provide data, data analysis, reports, and operational recommendations to teams throughout the Windows & Devices Group using a variety of data systems and software. My work primarily consists of short-term data-based investigations into issues encountered by teams within the organization.	
Eöt-Wash experimental gravity group, CENPA, University of Washington	Seattle, WA
Research associate	August 2007 – March 2015
Our group performs world-class tests of gravity and possible new forces. I developed and built supporting devices, equipment, and software for our precision measurement experiments (see selected projects below). I also procured and managed high-end rapid-fabrication equipment, mentored graduate and undergraduate students, and performed numerical simulation and analysis.	
High-intensity laser group, Department of Physics, Brigham Young University	Provo, UT
Research assistant	January 2005 – August 2007
Our group studied the interaction of high-intensity laser pulses with a dilute gas. I built experimental hardware and developed a new numerical simulation to aid our understanding of an observed phenomenon. I was a co-lead of a project testing radiometric particle levitation in a microgravity environment on NASA's Vomit Comet.	
Biophotonic scanner program, Pharmanex Division, Nu Skin Enterprises	Provo, UT
Research assistant	August 2005 – June 2007
I was part of a team of physicists developing an LED-based commercial device to measure skin carotenoid levels. I debugged software and electronics, developed test systems, and sourced parts and materials for production.	

SELECTED PROJECTS

(Additional details and projects are posted on my website)

Low-drift gravity gradiometer	2010-2015
I developed a moving-mass torsion balance for low-drift gravitational field measurements. Work on this project included the invention of a wirelessly-powered nonmagnetic rotary actuator.	
Interferometric Quasi-Autocollimator (iQuAC)	2011
I developed, built, and tested an optical instrument for angular measurement with picoradian sensitivity to support future experiments by our group. (See Patents section below.)	

Balancing scooters

2010, 2012

As a personal project, I designed and built a Segway analogue for a final cost of under \$300. I also handled the electronics and powertrain for a power-tool company that hired me to help build one from components of their products.

Low-energy electron gun

2009

I designed and built an LED-based device to controllably deposit electrons on an isolated body in vacuum.

INVITED TALKS AND FIRST-AUTHOR PAPERS

(Complete academic CV available at <http://guavaduck.com/publications>)

"Quantum weak-value amplification for torsion-balance experiments," Brigham Young University Physics Colloquium, Provo, Utah, 30 November 2011.

"Angular deflection measurement using quantum weak-value amplification," Fermilab Particle Astrophysics Seminar, Batavia, Illinois, 13 June 2011.

"Picoradian deflection measurement with an interferometric quasi-autocollimator using weak value amplification," M. D. Turner, C. A. Hagedorn, S. Schlamminger, and J. H. Gundlach, *Opt. Lett.* **36**, 1479-1481 (2011), arXiv:1103.4426.

"Simulated laser-pulse evolution for high-order harmonic generation in a semi-infinite gas cell," M. Turner, N. Brimhall, M. Ware, and J. Peatross, *Opt. Express* **16**, 1571-1576 (2008).

PATENTS

"Interferometric Quasi-Autocollimator," M. D. Turner, J. H. Gundlach, C. A. Hagedorn, and S. Schlamminger, U.S. Patent No. 8,842,291 (issued September 23, 2014).

LEADERSHIP AND PROFESSIONAL INVOLVEMENT

- Managed the weekly meetings and the code repository for our team of 60+ data scientists at Microsoft.
- Initiated, wrote, and managed successful grant proposals for the purchases of a \$200k high-power CNC laser cutter system, a \$230k micromachining laser system, and a 3D printer for our research facility's student shop. Oversaw the purchase and installation of this equipment, developed and conducted training for student users, and managed jobs from on-campus customers.
- Member of the UW Physics Department's exam and graduate program faculty committees for three years.
- Peer reviewer for the journal *Optics Express*.

PERSONAL INTERESTS & HOBBIES

- Southeast Asian languages and writing systems
- Thai and Northeast Thai cooking
- Hardware hacker and maker movement
- Rock climbing