

Richard A. Galvez, Ph.D.

CONTACT INFORMATION	<i>Mailing Address:</i> 2100 Acklen Avenue, Unit 306 Nashville, TN 37212 USA	<i>Phone:</i> (305) 342-2106 <i>E-mail:</i> Richardagalvez@gmail.com <i>Web:</i> richardagalvez.github.io/
EDUCATION	Ph.D., Physics , Syracuse University • Dissertation title: “Topics in Supersymmetry: Implications for Cosmology and Non-Perturbative Studies on a Spacetime Lattice.” M.Sc., Computational Physics , Florida International University • Thesis title: “The t’Hooft Limit of Two Dimensional $SU(N_c)$ Quantum Field Theories.” B.Sc., Physics , Florida International University	February 2015 May 2009 May 2007
ACADEMIC POSITIONS	Fisk-Vanderbilt Bridge Postdoctoral Fellow Vanderbilt University • Current research program includes investigating physics beyond the standard model of particle physics and cosmology, as well as methods in machine learning and deep learning frameworks as applied to astrophysical and cosmological observations. • As a postdoctoral fellow in the Bridge program, mentorship and support of Ph.D. and Master’s students in all STEM fields is a large part of my job, one which I approach with passion and take on whole-heartedly. • Teach and tutor graduate courses; I designed and carried out a curriculum for a graduate course on Mathematical Methods for Physicists, and formally assisted in Quantum Mechanics, Electromagnetism, Classical Dynamics and Statistical Mechanics. • Tutor Bridge students in all courses within the computer science, mathematics and physics curriculums. Aerospace Research Scientist Syracuse University • Carried out a short term postdoctoral research position between completion of Ph.D. dissertation and beginning of current position. • Developed a computational fluid dynamics model that produced a 10x speedup leveraging GPUs and the CUDA library. • Served as a mentor, advised on engineering projects and contributed a presentation at the American Physical Society’s Fluids Division yearly conference. Research Assistant Syracuse University • Carried out a research program focusing on cosmological aspects of supersymmetric quantum field theories and wrote software to simulate supersymmetric lattice field theory. • Wrote and ran particle physics simulations on the distributed computing resources at FermiLab National Laboratory. • Sped up matrix inversions by 10x using GPUs and the CUDA library implementing a conjugate gradient algorithm. • This work led to 15+ appearances in national and international conferences, 10+ publications and international fellowship prizes. Teaching Assistant Syracuse University • Taught master’s level course preparing students for their Ph.D. qualification exam covering the entire program of graduate physics at Syracuse University. • Teaching assistant in the laboratory courses and recitations of Scientific Python, General Physics, Astrophysics and Observational Astronomy. Visiting Researcher University of Auckland, <i>Auckland, NZ</i>	September 2015 - Present August 2014 - September 2015 July 2009 - August 2014 September 2010 - August 2013 May 2013 - September 2013

- Awarded the East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI) Fellowship from the National Science Foundation.
- Learned about Bayesian methods in cosmology and analyzed data from the Cosmic Microwave Background (CMB) using a multi-nested sampler called MultiNest.
- Took a course in maximally extended supersymmetric quantum field theory and supersymmetric gravity (SUGRA).
- Collaborated on a paper outlining a possible mechanism in the production of dark matter from the decay of a heavy scalar in the early Universe.

Visiting Researcher

May 2007 - September 2007

CERN, *Geneva, CH*

- Awarded the CHEPREO CERN Summer Research Fellowship from Florida International University.
- Assisted in the design of a power-safety module written in C++.
- Worked with the Monte Carlo simulation software used to calculate the standard model background processes for the CMS experiment.

SKILLS

Computational:

Python (including Numpy, Matplotlib, Scikit-learn, Scipy, Pandas), Machine Learning, C/C++, Tensor Flow, CUDA, Mathematica, Fortran, Matlab, Awk, Perl, Bash, Git, SQL, Deep neural networks, signal processing, data scraping, Monte Carlo methods, Bayesian statistics, compressed sensing, image processing, principal component analysis.

Operating Systems: Linux, OS X, any Unix variant.

Communication Skills:

Gave over 40 national and international research presentations in front of small (10 people), medium (20), and large (100) audiences and selected for TedX talk (available online at youtu.be/A_EKQrKYyrM). Have taught multiple college level (graduate and undergraduate courses).

Writing: Published 10 first-authored papers in leading scientific journals.

Languages: Spanish: native proficiency, French and Italian: intermediate proficiency.

HONORS

Inaugural Vanderbilt University Pre-Flight Entrepreneurship program selectee	2016
Vanderbilt University Federal STEM Policy and Advocacy, awarded	2016
TedxVanderbilt, contributed talk	11/2016
University of Michigan <i>NextProf Science</i> , awarded	2016
Fisk-Vanderbilt Bridge Postdoctoral Fellowship	2015-2018
Harvard Society of Fellows, nominee	2015-2017
Data Incubator Data Science Fellowship, finalist	2015
Syracuse University Levinstein Fellowship	2014-2015
East Asia and Pacific Summer Institutes National Science Foundation (NSF) Fellowship – University of Auckland, Auckland, NZ	2013
Ford Foundation Dissertation Year Fellowship, Alternate/Honorable Mention	2014-2015
Syracuse University NSF AGEP/STEM Graduate Fellowship	2009 - 2015
Florida International University Outstanding Academic Achievement Award	2009
Florida International University CHEPREO Fellowship	2005-2007

SELECT

PUBLICATIONS

1. R. Galvez and N. Hinkel,
“On the Relationship Between Stellar Metallicity and the Formation of Exoplanets,”
In preparation.
2. R. Galvez, D. Lee and M. Lund,
“Is Intelligent Life Detectable on Earth?”
In preparation.
3. R. Galvez and R. J. Scherrer,
“Cosmology with Independently Varying Neutrino Temperature and Number,”
arXiv:1609.06351 [astro-ph.CO]. Submitted to Phys. Rev. D

4. R. Galvez,
“Kahler Moduli Inflation in Type IIB Compactifications: A random tumble through the Calabi-Yau landscape,” *Phys. Rev. D* **94**, no. 10, 103521 (2016) doi:10.1103/PhysRevD.94.103521 [arXiv:1603.06631 [hep-th]].
5. R. Galvez,
“Topics in Supersymmetry: Implications for Cosmology and Non-Perturbative Studies on a Spacetime Lattice,”
Ph.D. Dissertation
6. R. Easther, R. Galvez, O. Ozsoy and S. Watson,
“Supersymmetry, Nonthermal Dark Matter and Precision Cosmology,”
Phys. Rev. D **89**, 023522 (2014) [arXiv:1307.2453 [hep-ph]].
7. S. Catterall, P. H. Damgaard, T. Degrand, R. Galvez and D. Mehta,
“Phase Structure of Lattice N=4 Super Yang-Mills,”
JHEP **1211**, 072 (2012) [arXiv:1209.5285 [hep-lat]].
8. R. Galvez, S. Catterall, A. Joseph and D. Mehta,
“Investigating the sign problem for two-dimensional $\mathcal{N} = (2, 2)$ and $\mathcal{N} = (8, 8)$ lattice super Yang-Mills theories,” *PoS LATTICE 2011*, 064 (2011) [arXiv:1201.1924 [hep-lat]].
9. D. Mehta, S. Catterall, R. Galvez and A. Joseph,
“Supersymmetric gauge theories on the lattice: Pfaffian phases and the Neuberger 0/0 problem,”
PoS LATTICE 2011, 078 (2011) [arXiv:1112.5413 [hep-lat]].
10. S. Catterall, R. Galvez, A. Joseph and D. Mehta,
“On the sign problem in 2D lattice super Yang-Mills,”
JHEP **1201**, 108 (2012) [arXiv:1112.3588 [hep-lat]].
11. S. Catterall, R. Galvez, J. Hubisz, D. Mehta and A. Veernala,
“Non-abelian gauged NJL models on the lattice,”
Phys. Rev. D **86**, 034502 (2012) [arXiv:1112.1855 [hep-lat]].
12. R. Galvez and S. Catterall,
“Center symmetry restoration with 2 flavor large N Yang-Mills in the adjoint representation,”
PoS LATTICE 2010, 050 (2010).
13. R. Galvez and G. van Anders,
“Accelerating the solution of families of shifted linear systems with CUDA,”
arXiv:1102.2143 [hep-lat].
14. S. Catterall, R. Galvez and M. Unsal,
“Realization of Center Symmetry in Two Adjoint Flavor Large-N Yang-Mills,”
JHEP **1008**, 010 (2010) [arXiv:1006.2469 [hep-lat]].
15. R. Galvez, A. Hietanen and R. Narayanan,
“Large N QCD in two dimensions with a baryonic chemical potential,”
Phys. Lett. B **672**, 376 (2009) [arXiv:0812.3449 [hep-lat]].

CONTRIBUTED TALKS “What is Dark Matter Anyway?”
TedXVanderbilt – youtu.be/A_EKQrKYyrM

November 2016

“Cosmology with Varying Neutrino Number and Neutrino Temperature”
American Astronomical Society, Texas
Dark Matter Santander, Spain
Statistical Challenges in Modern Astronomy, Carnegie Mellon University
NextProf: Science, University of Michigan
Cosmology on the Beach, Cancun, Mexico
Miami 2016, Miami, Florida

January 2017

July 2016

May 2016

April 2016

January 2016

December 2015

	“Flexing Our Cosmological Muscles: What are the Bicep Results Telling Us?” SACNAS National Conference, Los Angeles, CA	October 2014
	“Calabi-Yau Inflation in Type IIB String Theory: Insights from the Holomorphic Sectional Curvature.” Western Kentucky University Vanderbilt University DESY Hamburg, Germany Syracuse University	March 2016 November 2014 September 2014 August 2014
	“Supersymmetry, Non-Thermal Dark Matter and Precision Cosmology” CP3-Origins Institute, Denmark Pennsylvania State University, US	June 2014 March 2014
	“Spontaneous Symmetry Breaking of Lorentz Symmetry” University of Auckland, NZ	August 2013
	“The Recent Results of the Planck Satellite” Onondaga Community College, Syracuse, NY	May 2013
	“Beyond the Standard Model of Particle Physics and Cosmology” Florida International University, Miami, FL	August 2012
	“Violating the Null Energy Condition via Symmetry Breaking of a Ghost Condensate in Dilaton Gravity” East Coast Gravity Meeting, Syracuse University, NY	May 2012
	“The Twisted Formulation of $\mathcal{N} = 4$ Supersymmetric Gauge Theories.” George Washington University, Washington, DC	March 2012
	“The Fermionic Sign Problem in 2D and 4D Supersymmetric Gauge Theory.” High Energy Physics Seminar, Syracuse University, NY	January 2012
	“The Sign Problem in $\mathcal{N} = 2$ and $\mathcal{N} = 4$ Supersymmetric Gauge Theories.” The XXIX International Symposium on Lattice Field Theory, Lake Tahoe, California	July 2011
	“Center Symmetric Large- N Gauge Theory with Adjoint Fermions.” The XXVIII International Symposium on Lattice Field Theory. Sardinia, Italy	July 2010
	“Two Dimensional Large N QCD at Finite Density.” South Eastern Section of APS (SESAPS). Raleigh, North Carolina.	October 2008

CONTRIBUTED	R. Galvez, N. Hinkel, K. Stassun	
GRANTS	“The Hypatia Catalog of Detailed Stellar Abundances: Understanding Chemical Influences on Stars and Planets in the Solar Neighborhood” <i>Submitted, NSF.</i>	
SUMMER SCHOOLS	Prospects in Theoretical Physics, Institute for Advanced Study, Princeton	2014
OUTREACH	2016 Bridge Research Celebration Day – Organizer Panelist for Minority PhD Student Orientation, Syracuse University Science volunteer work	May June 2016 2012, 2013, 2014

