Matthew R. Heffernan — Curriculum Vitae

Contact Information

3600 rue University
Montréal, QC, Canada H3A 2T8

physics.mcgill.ca/∼heffernan/
heffernan@physics.mcgill.ca

Education

McGill University, Montréal, Quebec
Ph.D. Candidate Theoretical Physics, Nuclear Theory Group — *Expected* 2022
M.Sc. Theoretical Physics, Nuclear Theory Group — November 2018

The College of William & Mary, Williamsburg, Virginia
B.Sc. Physics (Hon.), Minor in German Studies, Cum Laude — May 2016

The University of St Andrews, St Andrews, Scotland
Visiting Undergraduate Student (Science) — September 2014 - May 2015

Awards

NSERC Postgraduate Scholarship - Doctoral — May 2019 - May 2022
Dean's List (William & Mary) — Spring 2013, Fall 2015, Spring 2016
Timothy J Sullivan Scholar, The Worshipful Company of Drapers — 2014 - 2015
Eagle Scout — December 2011

Research Experience

Graduate Research Assistant — September 2016 - Present
Physics Department, McGill University
Supervisor: Charles Gale
Ph.D. Project Title: *Differentiating initial state models using Bayesian analysis in the JETSCAPE framework*
Project description: *Searching for the impact of different initial state models on final state observables via Bayesian analysis within the JETSCAPE framework*

M.Sc. Project Title: *Toward a consistent calculation of the QCD transport coefficients*
Project Description: *Calculating microscopically-correct shear and bulk viscosities of Quark-Gluon Plasma in the relaxation time approximation*

Senior Honors Thesis — August 2015 - May 2016
Physics Department, College of William & Mary
Supervisor: André Walker-Loud
Project Title: *Quantifying the sensitivity of big bang nucleosynthesis to isospin breaking*
Project Description: *Testing for signs of beyond-Standard Model physics at Big Bang time through variation of Standard Model constants*

LERCIP Student — June 2015-August 2015
Thermal Energy Conversion Branch (LET), NASA Glenn Research Center
Supervisor: Maxwell Briggs
Project Title: *Stirling cycle analysis for nuclear space power applications*
Project Description: *Performing measurements and model optimization for new thermoelectric power generating systems in development for deep space exploration*

NSF REU Student — June 2014 - August 2014
Cyclotron Institute, Texas A&M University
Supervisors: Ralf Rapp and Paul Hohler
Project Title: *Universal parametrization of thermal photon rates in hadronic matter*
Project Description: *Parametrization of thermal photon rates in hot and dense hadronic matter, extending to nonzero baryochemical potential and increasing accuracy*

Publications

Matthew Heffernan, Paul Hohler, and Ralf Rapp
"Universal parametrization of thermal photon rates in hadronic matter"
Phys. Rev. C **91** (2015) 027902.

Matthew Heffernan, Projjwal Banerjee, and André Walker-Loud
"Quantifying the sensitivity of Big Bang Nucleosynthesis to isospin breaking with input from lattice QCD" [arXiv:1706.04991]

Posters & Presentations

APS Division of Nuclear Physics Fall Meeting, Crystal City, VA (Talk)	Oct 2019
NASA Glenn Research Center Summer Poster Session, Cleveland, OH	Aug 2015
The University of St Andrews Physics Burn Conference, Glenesk, Scotland	Feb 2015
The University of St Andrews School of Physics, St Andrews, Scotland	Oct 2014
Texas A&M University Summer Symposium, College Station, TX	Aug 2014

Teaching Experience

STEM Teaching Development Fellow, *McGill University* — Summer 2018 - Present

Teaching Assistant (Course development), *McGill University Physics Department*

Wrote a semester of questions and mentored students with in-class problem solving. Delivered a lecture when the professor was traveling.

Physics 102: Introductory Physics - Electromagnetism — Winter 2019

Teaching Assistant (Grading), *McGill University Physics Department*

Physics 203: Dynamics of Simple Systems	Fall 2017
Physics 102: Introductory Physics - Electromagnetism	Winter 2017, 2018
Physics 101: Introductory Physics - Mechanics	Fall 2016

Departmental Activities

Organizing Committee Member, *McGill Physics Hackathon*	May 2018 - Present
Co-Organizer, *McGill Nuclear Theory Graduate Student Seminar*	November 2017 - April 2018
Vice President - Communications, *McGill Graduate Association of Physics Students (MGAPS)*	September 2017 - June 2019
Participant, *McGill Nuclear Theory Journal Club*	Oct 2016 – Present
Panelist, *"How to get into Graduate School for Physics"*	Oct 2016
Outreach, *William & Mary Society of Physics Students*	Sep 2015 – May 2016

Society Memberships

Canadian Association of Physicists, Graduate Student Member
American Physical Society, Graduate Student Member

Skills

Programming
- Python 2 and 3
  - Packages include: Pandas, numpy, scipy, matplotlib, joblib, docopt, vegas, uncertainties, openCV, flask, sqlalchemy, selenium
  - Additional certifications: Udemy Python Course
- Version control: GitHub/mrhheffernan and Atlassian Bitbucket
- LaTeX
- Wolfram Mathematica
- Experience with Linux/Unix operating systems, clusters, and job submission (slurm, PBS)
- Doxygen documentation
- Markdown
- Code optimization and parallelization
- MATLAB

Teaching

Pedagogical development for flipping a premier introductory physics course at McGill
Lab report and exam marking
Preparing tutorials and leading student help sessions

Languages

English (Bilingual/Native Fluency)
Farsi (Near-Bilingual/Native Fluency)
German (Elementary Working Fluency)