15 Summit Ave
Somerville, MA 02143

Patrick T. Komiske III

pkomiske@mit.edu
(443) 690-3299

EDUCATION

Ph.D. Candidate in Physics, Massachusetts Institute of Technology — **Cambridge, MA**
Graduate Student in the Center for Theoretical Physics, Advised by Prof. Jesse Thaler — *September 2016 – May 2021 (expected)*

A.M. Harvard University — **Cambridge, MA**
Master of Arts – Physics — *May 2016*

A.B. Harvard University – *summa cum laude* — **Cambridge, MA**
Bachelor of Arts – Physics (highest honors) and Mathematics, secondary field in Computer Science — *May 2016*

RESEARCH/WORK EXPERIENCE

Massachusetts Institute of Technology — **Cambridge, MA**
Graduate Student in the Center for Theoretical Physics — *September 2016 - Present*

- Developing and applying novel machine learning strategies on high-energy particle physics data
- Processing TBs of open collider data into usable datasets with a simple, custom interface
- Large Hadron Collider phenomena, jet physics, new observables and methods, beyond the Standard Model physics

Harvard University — **Cambridge, MA**
Fellow – Program for Research in Science and Engineering — *Summer 2015*

- Computed the normal modes of an exponential block-spring system allowing for the definition of a family of Fourier-like discrete transformations from position space to mode space, worked with Profs. Howard Georgi and Matthew Schwartz
- Explored the quantum-to-classical transition through decoherence to a pointer basis, worked with Prof. Matthew Reece

Jane Street Capital — **New York, NY**
Winter Intern – Trading — *January 2015, 2016*

- Studied financial markets, wrote bash program to analyze novel type of options trade, participated in mock trading

Northrop Grumman Electronic Systems — **Baltimore, MD**
Summer Intern – Superconducting Electronics Group, Quantum Computing Collaboration — *Summer 2014*

- Wrote MATLAB program to interface with existing experimental code base to improve the fidelity of high-speed, precision microwave pulses used for qubit control via calculation of a transfer function and deconvolution methods

Johns Hopkins University Applied Physics Laboratory — **Laurel, MD**
Summer Intern – Asymmetric Operations and Research and Exploratory Development Departments — *Summer 2012, 2013*

- Investigated electromagnetic properties of high-impedance Sievenpiper metamaterial structures for low-profile RF antenna applications, characterized material properties of magnetic nanoparticle polymers
- Catalogued dielectric properties of explosive simulant materials for transportation security purposes

TEACHING EXPERIENCE

Massachusetts Institute of Technology
Teaching Assistant

- 8.09/8.309 Advanced Classical Mechanics with Prof. Iain Stewart — *Fall 2017, 2018, 2019*

Harvard University
Teaching Fellow – Physics Department

- Quantum Mechanics I with Prof. Matthew Reece — *Fall 2015*
- Honors Introductory Mechanics and Special Relativity with Prof. Howard Georgi — *Fall 2014*
- Taught weekly hour and a half sections, reviewed material from lecture, prepared practice problems, held weekly office hours, organized special sessions reviewing LaTeX and Mathematica, graded homework

Calculus Course Assistant – Mathematics Department — *Fall 2013*

- Ran weekly problem sessions, worked one-on-one with students in class and the math question center, graded homework

HONORS

- *Summa cum laude*, Harvard College — *2016*
- Highest Honors, Harvard Physics Department — *2016*
- John Harvard Scholarship (GPA in top 5% of class) — *2014-2015*
- Derek C. Bok Award for Distinction in Teaching — *2014*
- University Physics Competition Silver Medal — *2014*
- Harvard College Scholarship, 2013-2014 (GPA in top 10% of class) — *2013-2014*
- National AP Scholar — *2011*

SOFTWARE

Languages
- Python, Cython, C/C++, Bash, Mathematica, MATLAB

Cloud
- Microsoft Azure, Google Cloud Platform

Libraries
- Python: NumPy/Scipy, Matplotlib, scikit-learn, pandas, Keras, TensorFlow, h5py, mkdocs
- C++: BOOST, PYTHIA 8, FASTJET 3, HDF5

Presentation
- PowerPoint, Keynote, LATEX, Beamer

Custom
- Developer of the EnergyFlow and OmniFold Python packages

RELATED EXPERIENCE

MIT Physics Graduate Student Council
Colloquium Representative and Lunch Organizer — *Spring 2017 – Fall 2018*
- Organized biweekly lunches with department colloquium speaker
- Hosted PGSC colloquium speaker once a semester

Harvard-Radcliffe Society of Physics Students — *2012 – 2016*
Event Coordinator — *2015 – 2016*
- Helped organize the first Harvard-MIT SPS Research Conference for undergraduates to present their summer research
- Facilitated movie nights and liquid nitrogen ice cream events, coordinated freshman and pre-frosh outreach

PUBLICATIONS

1. A. Andreassen, **Patrick T. Komiske**, E. M. Metodiev, B. Nachman, J. Thaler
OmniFold: A Method to Simultaneously Unfold All Observables
Submitted to Phys. Rev. Lett. [1911.09107]

2. **Patrick T. Komiske**, E. M. Metodiev, J. Thaler
Cutting Multiparticle Correlators Down to Size
To be published in Phys. Rev. D [1911.04491]

3. **Patrick T. Komiske**, R. Mastandrea, E. M. Metodiev, P. Naik, J. Thaler
Exploring the Space of Jets with CMS Open Data
To be published in Phys. Rev. D [1908.08542]

4. **Patrick T. Komiske**, E. M. Metodiev, J. Thaler
The Metric Space of Collider Events
Phys. Rev. Lett. **123** (2019) 041801 [1902.02346]

5. **Patrick T. Komiske**, E. M. Metodiev, J. Thaler
Energy Flow Networks: Deep Sets for Particle Jets
JHEP **01** (2019) 121 [1810.05165]

6. **Patrick T. Komiske**, E. M. Metodiev, B. Nachman, M. D. Schwartz
An operational definition of quark and gluon jets
JHEP **11** (2018) 059 [1809.01140]

7. **Patrick T. Komiske**, E. M. Metodiev, B. Nachman, M. D. Schwartz
Learning to classify from impure samples with high-dimensional data
Phys. Rev. **D98** (2018) 011502 [1801.10158]

8. **Patrick T. Komiske**, E. M. Metodiev, J. Thaler
Energy flow polynomials: A complete linear basis for jet substructure
JHEP **04** (2018) 013 [1712.07124]

9. **Patrick T. Komiske**, E. M. Metodiev, B. Nachman, M. D. Schwartz

Pileup Mitigation with Machine Learning (PUMML)
JHEP **12** (2017) 051 [1707.08600]

10. **Patrick T. Komiske**, E. M. Metodiev, M. D. Schwartz
Deep learning in color: towards automated quark/gluon jet discrimination
JHEP **01** (2017) 110 [1612.01551]