

# Mariel Pettee

Physicist, AI researcher, and artist  
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## Positions

UNIVERSITY OF WISCONSIN-MADISON	2025 - Now
Assistant Professor of Physics & Bernice Durand Faculty Fellow	
FLATIRON INSTITUTE & POLYMATHIC AI	2022 - Now
Guest Researcher	
LAWRENCE BERKELEY NATIONAL LABORATORY	2022 - 2025
Chamberlain Postdoctoral Fellow	

## Education

YALE UNIVERSITY	2021
PhD in Physics	
UNIVERSITY OF CAMBRIDGE (TRINITY COLLEGE)	2015
MASt in Physics; Lt. Charles H. Fiske III Harvard-Cambridge Scholar	
HARVARD UNIVERSITY	2014
AB in Physics & Mathematics ( <i>Cum Laude, High Honors</i> ); Minor in Dramatic Arts	

## Selected Publications

[Full list](#) of papers on my Google scholar page. (**Note:** ▷ indicates alphabetical author ordering.)

### 2025

Multimodal Datasets with Controllable Mutual Information R. Hashmani, G. Merz, H. Qu, <b>M. Pettee</b> , K. Cranmer.	<a href="https://arxiv.org/abs/2510.21686">arXiv:2510.21686</a>
A Practical Guide to Unbinned Unfolding ▷ F. Canelli, K. Cormier, A. Cudd, D. Gillberg, R. G. Huang, W. Jin, S. Lee, V. Mikuni, L. Miller, B. Nachman, J. Pan, T. Pani, <b>M. Pettee (editor)</b> , Y. Song, F. Torales Acosta.	<a href="#">EPJC</a> <a href="https://arxiv.org/abs/2507.09582">arXiv:2507.09582</a>
What's In Your Field? Mapping Scientific Research with Knowledge Graphs A. Das, N. Lourie, S. Golkar, <b>M. Pettee</b> .	<a href="https://arxiv.org/abs/2503.09894">arXiv:2503.09894</a>
Invisible Strings: Revealing Latent Dancer-to-Dancer Interactions with GNNs L. Zerkowski, Z. Wang, I. Vidrin, <b>M. Pettee</b> .	<a href="#">ICCC</a> <a href="https://arxiv.org/abs/2503.04816">arXiv:2503.04816</a>
Dyads: Artist-Centric, AI-Generated Dance Duets Z. Wang, L. Zerkowski, I. Vidrin, <b>M. Pettee</b> .	<a href="https://arxiv.org/abs/2503.03954">arXiv:2503.03954</a>

### 2024

A Simultaneous Unbinned Differential Cross Section Measurement of 24 Z+jets Kinematic Observables with the ATLAS Detector ATLAS Collaboration ( <a href="#">Contact Editor</a> ).	<a href="#">Phys.Rev.Lett.</a> <a href="https://arxiv.org/abs/2405.20041">arXiv:2405.20041</a>
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## 2023

Evidence of the VH,  $H \rightarrow \tau\tau$  process with the ATLAS detector in Run 2  
ATLAS Collaboration ([Contact Editor](#)).

Phys.Lett.B  
[arXiv:2312.02394](#)

xVal: A Continuous Number Encoding for Large Language Models  
S. Golkar & **M. Pettee**, M. Eickenberg, A. Bietti, M. Cranmer, G. Krawezik, F. Lanusse, M. McCabe, R. Ohana, L. Parker, B. Régalo-Saint Blancard, T. Tesileanu, K. Cho, S. Ho.

NeurIPS AI4Sci.  
[arXiv:2310.02989](#)

Weakly-Supervised Anomaly Detection in the Milky Way  
**M. Pettee**, S. Thanvantri, B. Nachman, D. Shih, M. R. Buckley, J. H. Collins.

MNRAS  
[arXiv:2305.03761](#)

Learning Likelihood Ratios with Neural Network Classifiers  
S. Rizvi, **M. Pettee**, B. Nachman.

JHEP  
[arXiv:2305.10500](#)

Fast Point Cloud Generation with Diffusion Models in High Energy Physics  
V. Mikuni, **M. Pettee**, B. Nachman.

Phys.Rev.D  
[arXiv:2304.01266](#)

Heterogeneous GNN for Identifying Hadronically Decayed Taus at the HL-LHC  
▷ A. Huang, X. Ju, J. Lyons, D. Murnane, **M. Pettee**, L. Reed.

JINST  
[arXiv:2301.00501](#)

## 2022

Symmetry Group Equivariant Architectures for Physics  
▷ A. Bogatskiy, S. Ganguly, T. Kipf, R. Kondor, D. W. Miller, D. Murnane, J. T. Offermann, **M. Pettee (co-editor)**, P. Shanahan, C. Shimmin, S. Thais.

Snowmass  
[arXiv:2203.06153](#)

Point Cloud Deep Learning Methods for Pion Reconstruction in ATLAS  
ATLAS Collaboration (**co-editor**).

ATLAS PUB Note

PirouNet: Creating Dance through Artist-Centric Deep Learning  
M. Papillon, **M. Pettee**, N. Miolane. (**Best Paper Award**)

EAI ArtsIT  
[arXiv:2207.12126](#)

Intentional Choreography with Semi-Supervised Recurrent VAEs  
M. Papillon, **M. Pettee**, N. Miolane.

NeurIPS ML4CD  
[arXiv:2209.10010](#)

Anomaly Detection Under Coordinate Transformations  
▷ G. Kasieczka, R. Mastandrea, V. Mikuni, B. Nachman, **M. Pettee**, D. Shih.

arXiv:2209.06225

## 2021

Interdisciplinary Machine Learning for Particle Physics  
**M. Pettee**. Yale University.

PhD Thesis

## 2020

Choreo-Graph: Learning Latent Graph Representations of the Dancing Body  
**M. Pettee**, S. Miret, S. Majumdar, M. Nassar.

NeurIPS ML4CD

## 2019

Beyond Imitation: Generative and Variational Choreography via ML  
**M. Pettee**, C. Shimmin, D. Duhaime, I. Vidrin.

ICCC  
[arXiv:1907.05297](#)

Expected Performance of the ATLAS Detector at the HL-LHC  
The ATLAS Collaboration (**co-editor**).

ATLAS PUB Note

## Invited Talks

### Department Colloquia

ARGONNE NATIONAL LABORATORY, Physics Division	2025
UNIVERSITY OF WISCONSIN-MADISON, Physics Department	2025
GEORGIA TECH, Physics Department	2025
SANTA CLARA UNIVERSITY, Physics Department	2025
CARLETON UNIVERSITY, Physics Department	2024
SMITH COLLEGE, Physics Department	2024
BARD COLLEGE, Physics Department	2024
UNIVERSITY OF ALABAMA, Physics Department	2022
UNIVERSITY OF ALABAMA, Theatre & Dance Department	2022
SEATTLE UNIVERSITY, Physics Department	2021

### Research Seminars

YALE UNIVERSITY, Physics x Data Science Seminar	2025
FIRSTPRINCIPLES, Research Seminar	2025
ARGONNE NATIONAL LABORATORY, HEP Theory Seminar	2024
SLAC, AI Seminar	2024
UC BERKELEY, Bakar Inst. of Digital Materials for the Planet Seminar	2024
LAWRENCE BERKELEY NATIONAL LAB, Physics Research Progress Meeting	2024
IBM RESEARCH, Zurich	2023
UNIVERSITY OF CHICAGO, Data Science Institute & James Franck Institute Seminar	2023
RUTGERS UNIVERSITY, High-Energy Physics Theory Seminar	2023
SLAC, AI Seminar	2022
UC IRVINE, Physics & Astronomy Machine Learning Seminar	2022
IMPERIAL COLLEGE LONDON, DataLearning Working Group Seminar	2022
AMHERST COLLEGE, AI in the Liberal Arts Seminar	2022
CORNELL UNIVERSITY, Laboratory for Elementary Particle Physics Journal Club	2022
UC BERKELEY, Berkeley Institute for Data Science ML + Science Forum	2021
UNIVERSITY OF TENNESSEE, HEP Seminar	2021
FLATIRON INSTITUTE, Center for Computational Astrophysics ML Forum	2021

### Conference & Workshop Talks

Science at the Convergence of AI and Exascale Computing ( <b>Keynote</b> ), <i>Paris, France</i>	2026
Lepton-Photon ( <b>Keynote</b> ), <i>Madison, WI</i>	2025
AI for Science Summit, <i>Lawrence Berkeley National Laboratory</i>	2024
Foundation Models for Science Mini-Workshop, <i>CERN</i>	2024

NASA Science Mission Directorate AI Workshop, <i>Huntsville, AL</i>	2024
1st Large Language Models in Physics Symposium, <i>DESY, Hamburg</i>	2024
AI-Driven Discovery in Physics & Astrophysics ( <b>Keynote</b> ), <i>U. of Tokyo</i>	2024
ML for HEP Workshop, <i>KEK, Japan</i>	2024
IAIFI Summer Workshop, <i>MIT</i>	2024
ATLAS Standard Model Workshop, <i>Ljubljana</i>	2024
APS April Meeting, <i>Minneapolis, MN</i>	2023
Hammers & Nails, <i>Ascona, Switzerland</i>	2023
KITP Workshop on Data-Driven Galaxy Evolution, <i>Flatiron CCA</i>	2023

### Arts & Interdisciplinary Talks

Munich Conservatory, Germany	2025
School of the Art Inst. of Chicago	2024
Pratt Institute, Brooklyn, NY	2024
Creativity in the Age of AI Symposium, Foothill College	2024
DanceHack Workshop, Mills College	2023
Ballet Des Moines, IA	2022
Kinetech Arts, San Francisco, CA	2022
Kinetech Arts Open Lab Talk, San Francisco, CA	2020
Conference for Research on Choreographic Interfaces, Brown U.	2020

### Contributed Talks

ML4Jets, Caltech, Pasadena, CA	2025
France-Berkeley PHYSTAT Conference on Unfolding, Sorbonne Université, Paris	2024
<a href="#">Flatiron-Wide Machine Learning Meeting</a> , Flatiron Institute, New York, NY	2023
Inter-experiment Machine Learning Workshop, CERN, Geneva	2022
APS April Meeting, New York, NY	2022
<a href="#">Strange Loop Conference</a> , St. Louis, MO	2021
NeurIPS Workshop on ML for Creativity and Design, Vancouver, Canada	2020
ATLAS Tau & HLeptons Workshop, Online	2020
US ATLAS Workshop, UMass Amherst, MA	2019
ATLAS Tau & HLeptons Workshop, Prague, Czech Republic	2019
International Conference on Computational Creativity, UNC Charlotte, NC	2019
US LHC Users Association Meeting, Fermilab, Batavia, IL	2018
ATLAS Machine Learning Workshop, CERN, Geneva	2018
US ATLAS Workshop, U. of Pittsburgh, PA	2018
ATLAS P&P Physics Plenary, CERN, Geneva	2018
ATLAS TDAQ Week, CERN, Geneva	2018

## Awards

Bernice Durand Faculty Fellowship, <i>University of Wisconsin–Madison</i>	2025
DOE Mission Science Allocation Award, <i>NERSC</i>	2023
• 120,000 GPU hours	
• Title: “Multidisciplinary AI Models for Science”	
Owen Chamberlain Postdoctoral Fellowship, <i>Lawrence Berkeley National Lab</i>	2021
Lightning Round Talk Winner, <i>US LHC Users Association</i>	2018
Women’s Faculty Forum Seed Grant, <i>Yale University</i>	2018
Winner, Windy City Physics Slam, <i>ICHEP</i>	2016
Distinguished Poster Award (Top 20 out of 500), <i>ICHEP</i>	2016
Leigh Page Prize, <i>Yale University</i>	2015
Honorable Mention, <i>NSF Graduate Research Fellowship</i>	2015
Harvard-Cambridge Scholarship, <i>Harvard University</i>	2014
• Full tuition for a master’s program at Cambridge	
Julia Shaffner Memorial Prize, <i>Harvard University</i>	2014
• Outstanding woman in science	
President’s Challenge Finalist, <i>The Harvard Innovation Lab</i>	2013
15 Most Interesting Seniors, <i>The Harvard Crimson</i>	2013
Judges’ Award for Acting, <i>International Student Drama Festival</i>	2012
Certificate of Distinction in Teaching, <i>Harvard University</i>	2012
Caroline Isenberg Fellowship, <i>Harvard University</i>	2012
Elizabeth Cary Agassiz Fellowship, <i>Harvard University</i>	2012
Best Lead Actress in a Play, <i>Harvard Theater Award</i>	2011

## Press

<a href="#">Viewing the Standard Model with unprecedented detail through the lens of AI</a> , <i>Berkeley Lab Physical Sciences News</i>	2024
<a href="#">ATLAS measures rare Higgs boson interaction with tau leptons</a> , <i>ATLAS Briefing</i>	2023
“Scientists Begin Building AI for Scientific Discovery Using Tech Behind ChatGPT”	2023
• <a href="#">Simons Foundation Press Release</a>	
• <a href="#">Berkeley Lab Article</a>	
Interviewee on the Cognicast podcast	2022
• A discussion of my research trajectory across AI, physics, and art	
• <a href="#">Episode webpage</a>	
• <a href="#">Listen on Apple Podcasts</a>	
<a href="#">Mariel Pettee successfully defends PhD thesis</a> , <i>Yale Physics</i>	2021
<a href="#">Advice to Women in STEM: Mariel Pettee</a> , <i>Yale Scientific Magazine</i>	2020
<a href="#">Feature on Yale University’s Instagram page</a>	2019

Featured on Women+ Art AI	2019
Scientists Battle for Physics Slam Crown, <i>PBS Chicago</i>	2016
15 Most Interesting Seniors: Mariel N. Pettee, <i>The Harvard Crimson</i>	2013

## Teaching Experience

### Graduate Courses

PHYSICS 805: Research Methods for Machine Learning & Physics, <i>UW-Madison</i>	2025
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### Guest Lectures

CS 839: THEORETICAL FOUNDATIONS OF DEEP LEARNING, <i>UW-Madison</i>	2026
THE LANGUAGE OF MOVEMENT, <i>Amherst College</i>	2023
GRADUATE-LEVEL MACHINE LEARNING FOR PHYSICS, <i>U. of Alabama</i>	2021

### Teaching Assistant Experience

**Note:** ▷ indicates courses for which I was the sole TA.

▷ PHYSICS 115: The Physics of Dance, <i>Yale University</i>	2016 - 2018
▷ AMERICAN STUDIES 349: Technologies for Movement Research, <i>Yale University</i>	2018
PHYSICS 171: University Physics for the Life Sciences, <i>Yale University</i>	2017
PHYSICS 205L: Modern Physical Measurement, <i>Yale University</i>	2016
PHYSICS 165L: General Physics Laboratory, <i>Yale University</i>	2015
▷ MATH 121: Linear Algebra and Applications, <i>Harvard University</i>	2012 - 2013
MATH 110: Vector Space Methods for Differential Equations, <i>Harvard University</i>	2013

### Graduate-level Training on Scientific Teaching

PHYSICS 530: Theory and Practice of Scientific Teaching for Physical Scientists, <i>Yale</i>	2016
ASTRO 302: Scientists Teaching Science, <i>Harvard</i>	2014

## Mentorship

Aneek Jana, graduate student in physics, UW-Madison	Fall 2025 - Now
Jianhao Wu, graduate student in physics, UW-Madison	Fall 2025 - Now
Radha Mastandrea, postdoc in physics, UChicago	Summer 2025
Malika Golshan, post-graduate in physics, UC Berkeley	Fall 2024
Abhipsha Das, graduate student in CS, NYU Courant Institute	Summer 2024
Luis Zerkowski, graduate student in AI at University of Amsterdam	Summer 2024
Zixuan Wang, graduate student in CS at Georgia Tech	Summer 2024
Shahzar Rizvi, undergraduate & then graduate student in Statistics at UC Berkeley	2022 - 2024
Sowmya Thanvantri, undergraduate in Physics at UC Berkeley	2022 - 2024
Jason Wong, undergraduate in Physics at UC Berkeley	2022

## Leadership & Service

**Referee:** Physical Review D, NeurIPS ML for the Physical Sciences Workshop, Women in ML Workshop at NeurIPS

Associate Editor, <i>Physical Review X Intelligence</i>	2026
Lead Organizer, <i>NeurIPS ML for the Physical Sciences Workshop</i>	2025
Organizer, <i>NeurIPS ML for the Physical Sciences Workshop</i>	2024
Mentor, <i>Google Summer of Code</i>	2024
• Supervised two open-source 12-week research projects with students	
Trigger Studies Liaison, <i>ATLAS H → ττ Analysis Group</i>	2017 - 2021
Session Co-Convener, <i>PyHEP (Conference for Python in High-Energy Physics)</i>	2020
President, <i>The Signet Society of Arts &amp; Letters</i> , Harvard University	2014

## Inclusion & Outreach

QuarkNet Speaker	2022 - 2024
• Presented a talk on physics, art, and ML to high school students	
• Answered their questions in a separate hour-long interview	
Member of the APS Inclusion, Diversity, and Equity Alliance	2020
Member of the Yale Physics Climate & Diversity Committee	2019 - 2021
• Contributed to the design of our department's Code of Conduct	
US LHC Users Association advocacy trip to Capitol Hill	2018 - 2020
• Met with the offices of around 15 representatives from Congress each year	
• Garnered support for high-energy physics research through DOE & NSF	
Speaker, <i>Science in the News</i> , delivering scientific talks to the New Haven public	2017 - 2018
Girls' Science Investigations at Yale	2017 - 2018
• Volunteer & "ask-a-scientist" Q&A speaker	
Winner, Windy City Physics Slam at ICHEP	2016
Choreographer of <i>Form Factors</i> , a dance intervention with physicists at ICHEP	2016
Yale Women in Physics Mentor	2015 - 2020

## Scientific Essays

How to Unfold with AI	2025
• <i>CERN Courier</i> , Cover Feature, Jan/Feb 2025 Edition	
A high-dimensional jet-powered measurement of the strong force	2024
• <i>CERN Experimental Physics Newsletter</i>	
LLMs and the Language of Science	2023

<i>APS Topical Group on Data Science Newsletter</i>	
<a href="#">xVal: A Continuous Number Encoding for LLMs</a>	2023
<i>Polymathic AI Collaboration Blog Post</i>	
<a href="#">Theories of Everything</a>	2018
<i>Sightline Arts</i>	
Now or Never: The Case for a Larger Hadron Collider	2018
<i>Yale Distilled Magazine</i>	

## Arts

### AI & Art

<a href="#">mememormee</a> : an evening-length work featuring AI-generated choreography set on six dancers, following a residency at Amherst College	2023
<ul style="list-style-type: none"> <li>• Spotlight, 2023 NeurIPS Workshop on ML for Creativity &amp; Design</li> </ul>	
<a href="#">Untitled Bird Project</a> : a pop-up exhibit of AI-generated bird calls situated in nature	2021
<a href="#">Mirror Exercise</a> : an AI-generated duet with myself	2020
<ul style="list-style-type: none"> <li>• Featured in <a href="#">Le Mérite</a>, at the Comédie de Caen, Théâtre des Cordes, France</li> <li>• <a href="#">Highlight</a>, NeurIPS Workshop on ML for Creativity &amp; Design</li> <li>• Shown at <a href="#">Level Up: The Dramaturgy of Digital Performance &amp; Design</a></li> <li>• Featured by the AI Transparency Institute &amp; the 2020 AI Governance Forum</li> <li>• Boston Cyberarts Gallery exhibition <i>Perceptions / Distortions</i></li> </ul>	
Studio fellow, <i>Yale Center for Collaborative Arts &amp; Media</i>	2020
<ul style="list-style-type: none"> <li>• Year-long paid fellowship to develop work across art &amp; technology</li> </ul>	
<a href="#">SIGMA</a> : a short film of AI-generated choreography	2019
<ul style="list-style-type: none"> <li>• NeurIPS Workshop on ML for Creativity &amp; Design's <a href="#">AI Art Gallery</a></li> </ul>	

### Live Performance

Dancer, <i>Sublimation</i>	2022
<ul style="list-style-type: none"> <li>• By Kinetech Arts</li> <li>• Supported by the Djerassi Resident Artists Program and Creative Work Fund</li> <li>• Performed at David Ruth Glass Studio, Oakland, CA</li> </ul>	
Dancer, <i>Detour</i>	2022
<ul style="list-style-type: none"> <li>• By Kinetech Arts, commissioned by the Berkeley Dance Project</li> <li>• Performed at Zellerbach Playhouse, Berkeley, CA</li> </ul>	
Dancer & Coordinator, <i>Transpositions</i>	2020
<ul style="list-style-type: none"> <li>• Chor. Brian Seibert, Renee Robinson, &amp; Elm City Dance Collective</li> </ul>	
Choreographer, <i>Elon Musk and the plan to Blow Up Mars the musical</i>	2020
<ul style="list-style-type: none"> <li>• Yale Cabaret, dir. Liam Bellman-Sharpe</li> </ul>	
Dancer, Coordinator, & Rehearsal Director, <i>Yale Dance Lab</i>	2020
<ul style="list-style-type: none"> <li>• New work by choreographer Vicky Shick: "everywhere"</li> </ul>	
Bill T. Jones/Arnie Zane Dance Company Intensive, <i>Yale Dance Theater</i>	2019

• Dancer in a restaging of <i>D-Man in the Waters</i>	
Featured performer, <i>The Hexagonal Hive and a Mouse in a Maze</i>	2019
• Interviewed for a documentary by the Derek Jarman Lab, dir. Tilda Swinton	
Dancer, <i>Dance Drawings (For Jock)</i>	2018
• Choreography by Emily Coates at the Yale Art Gallery's Sol LeWitt exhibit	
Paul Taylor Dance Company Intensive, <i>Yale Dance Theater</i>	2018
• Lead role in the first restaging of Taylor's <i>Party Mix</i> in four decades	
Featured performer, <i>Machine Woman</i> , dir. Anna Hagen & Jeannie Sui Wonders	2018
• A short film documenting my AI-generated choreography research	
Choreographer: "La Mort du Chorégraphe", <i>A Different Drum Dance Company</i>	2017
Urban Bush Women Intensive, <i>Yale Dance Theater</i>	2017
Gaga Intensive with Saar Harari & Lee Sher, <i>Yale Dance Theater</i>	2016
Choreographer: "Rang Cherries", <i>A Different Drum Dance Company</i>	2016
Actor, <i>Attempts on Her Life</i> , dir. Tania Clarke, <i>University of Cambridge</i>	2015
Dancer, <i>Evolution</i> , ADC Theatre, <i>University of Cambridge</i>	2015
Director/Writer/Choreographer: <i>Symmetry Breaking</i> , <i>Harvard University</i>	2014
• Senior thesis & immersive multimedia performance about the Higgs boson	
Choreographer-in-Residence, <i>Harvard Dance Center</i>	2014
Dancer, <i>Paper Wing</i> , chor. Jill Johnson, Farkas Hall	2014
<i>Arts@CERN Internship</i>	2013
Eurydice, <i>Antigonick</i> , dir. Ianthe Demos, American Repertory Theater Mainstage	2013
Isabelle & Executive Producer, <i>The Edge of the Map</i> , dir. Calla Videt (Sightline)	2013
Dancer, <i>At Last</i> , Loeb Experimental Theater, Harvard University	2013
Dancer, <i>On The Run</i> , Harvard Dance Center	2013
Vice-President & Mainstage Coordinator, <i>The Harvard-Radcliffe Dramatic Club</i>	2012
Lucy, <i>CryHurtFood</i> , Loeb Experimental Theater / Crucible Mainstage (Sheffield, UK)	2012
Director: <i>for the purpose of catching ourselves in the act of being the most</i>	2012
• Guinness World Record: longest telephone conversation between two people	
Co-founder and collaborator, <i>The Harvard Generalist</i> artistic collective	2011
Drama & Dance Proctor, <i>Harvard University Freshman Arts Program</i> (2011-2014)	2011