

Mariel Pettee

Particle physicist, AI researcher, and artist

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Education

2021	YALE UNIVERSITY PhD in Physics	<i>New Haven, CT</i>
2015	UNIVERSITY OF CAMBRIDGE • Trinity College MASt in Physics, Commendable Performance Lt. Charles H. Fiske III Harvard-Cambridge Scholar	<i>Cambridge, UK</i>
2014	HARVARD UNIVERSITY AB in Physics and Mathematics (Cum Laude, High Honors in Field) Dramatic Arts Secondary	<i>Cambridge, MA</i>

Research

2021 - Now	MACHINE LEARNING FOR FUNDAMENTAL PHYSICS Chamberlain Postdoctoral Fellow. Developing generic ML techniques in likelihood-free and label-free learning for applications across particle physics, astrophysics, and more. Dr. Ben Nachman	<i>Lawrence Berkeley National Lab</i>
2020	LEARNING LATENT GRAPH REPRESENTATIONS OF THE DANCING BODY Internship developing Graph Neural Networks to analyze choreography	<i>Intel AI Lab</i>
2017 - 2021	GENERATIVE CHOREOGRAPHY WITH MACHINE LEARNING I led an independent research group of 5 artists and scientists in generating and performing novel choreography based on 3D motion capture of my own movements. Sponsor: Yale Center for Collaborative Arts & Media	<i>Yale</i>
2016 - 2021	ATLAS EXPERIMENT Search for $V \rightarrow$ leptons, $H \rightarrow \tau\tau$ in Run 2 with the ATLAS Experiment Prof. Sarah Demers	<i>CERN</i>
2016 - 2018	ATLAS EXPERIMENT Tau Identification with Recurrent Neural Networks in the ATLAS Trigger Prof. Sarah Demers	<i>CERN</i>

Publications

[Full list](#) of papers with the ATLAS collaboration.

2022	A. Bogatskiy, S. Ganguly, T. Kipf, R. Kondor, D. W. Miller, D. Murnane, J. T. Offermann, M. Pettee (co-editor) , P. Shanahan, C. Shimmin, and S. Thais. Symmetry Group Equivariant Architectures for Physics . <i>Snowmass 2021 White Paper</i> . [arXiv:2203.06153].
	G. Kasieczka, R. Mastandrea, V. Mikuni, B. Nachman, M. Pettee , D. Shih. Anomaly Detection Under Coordinate Transformations . [arXiv:2209.06225] [hep-ph].
2021	M. Pettee . Interdisciplinary Machine Learning for Particle Physics . <i>PhD Thesis, Yale University</i> .

- 2020 **M. Pettee**, S. Miret, S. Majumdar, and M. Nassar. [Choreo-Graph: Learning Latent Graph Representations of the Dancing Body](#). *NeurIPS 2020 Workshop on Machine Learning for Creativity and Design*.
- 2019 **M. Pettee**, C. Shimmin, D. Duhaime, and I. Vidrin. [Beyond Imitation: Generative and Variational Choreography via Machine Learning](#). *Proceedings of the 10th International Conference on Computational Creativity*. [arXiv:1907.05297] [cs.LG].
- The ATLAS Collaboration (Co-writer & editor). [Expected Performance of the ATLAS Detector at the High-Luminosity LHC](#). [ATL-PHYS-PUB-2019-005].

Awards

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|------|--|---|
| 2021 | Owen Chamberlain Postdoctoral Fellowship | <i>Lawrence Berkeley National Laboratory</i> |
| 2018 | Lightning Round Talk Winner | <i>US LHC Users Association</i> |
| | Women's Faculty Forum Seed Grant | <i>Yale University</i> |
| 2016 | Winner, Windy City Physics Slam | <i>ICHEP</i> |
| | <ul style="list-style-type: none"> • PBS Chicago Interview Clip | |
| | Poster Award for <i>Trigger Studies for the Muze Experiment</i> | <i>ICHEP</i> |
| 2015 | Leigh Page Prize | <i>Yale University</i> |
| | <ul style="list-style-type: none"> • For potential contributions to the field of physics | |
| | Honorable Mention | <i>NSF Graduate Research Fellowship Program</i> |
| 2014 | Harvard-Cambridge Scholarship | <i>Harvard University</i> |
| | <ul style="list-style-type: none"> • Full tuition for a master's program at the University of Cambridge | |
| | Julia Shaffner Memorial Prize | <i>Harvard University</i> |
| | <ul style="list-style-type: none"> • Honoring an outstanding woman in science | |
| 2013 | President's Challenge Finalist | <i>The Harvard Innovation Lab</i> |
| | 15 Most Interesting Seniors | <i>The Harvard Crimson</i> |
| 2012 | Judges' Award for Acting | <i>The International Student Drama Festival</i> |
| | Certificate of Distinction in Teaching | <i>Harvard University</i> |
| | The Caroline Isenberg and Elizabeth Cary Agassiz Fellowships | <i>Harvard University</i> |
| 2011 | Best Lead Actress in a Play | <i>Harvard Theater Award</i> |

Talks

Invited Talks

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| 2022 | MACHINE LEARNING FOR HIGH-ENERGY PHYSICS | <i>University of Alabama</i> |
| | <ul style="list-style-type: none"> • Departmental Colloquium: Physics & Astronomy | |
| | DANCING WITH MYSELF | <i>University of Alabama</i> |
| | <ul style="list-style-type: none"> • Departmental Colloquium: Theatre & Dance | |
| | PANEL DISCUSSION: CREATIVITY, SCIENCE, AND ETHICS | <i>Ballet Des Moines</i> |

- 2021 - 2022 INTERDISCIPLINARY MACHINE LEARNING FOR CHOREOGRAPHY & PARTICLE PHYSICS *Online*
- Stanford Linear Accelerator (SLAC) AI Seminar
 - UC Irvine Physics & Astronomy Machine Learning Seminar Series
 - Imperial College London, DataLearning Working Group Seminar
 - Amherst College, Artificial Intelligence in the Liberal Arts Seminar Series
 - Cornell Laboratory for Elementary Particle Physics Journal Club
 - Berkeley Institute for Data Science (BIDS) ML + Science Forum
 - Physics Dept. Colloquium at Seattle University
 - HEP Seminar Speaker at University of Tennessee, Knoxville
 - University of Alabama, Machine Learning Graduate Course Guest Seminar

- 2020 CHOREO-GRAPH: LEARNING LATENT GRAPH REPRESENTATIONS OF THE DANCING BODY *Online*
Kinotech Arts (San Francisco, CA)

- BEYOND IMITATION: GENERATIVE CHOREOGRAPHY WITH AI *Brown University*
Conference for Research on Choreographic Interfaces (CRCI)

Contributed Talks

- 2022 POINT CLOUD METHODS FOR PION RECONSTRUCTION IN THE ATLAS DETECTOR *CERN*
 - Inter-experiment Machine Learning Workshop *New York, NY*
 - APS April Meeting
- 2021 **DANCING WITH MYSELF** *St. Louis, MO*
Strange Loop
- 2020 CHOREO-GRAPH: LEARNING LATENT GRAPH REPRESENTATIONS OF THE DANCING BODY *Online*
NeurIPS Workshop on ML for Creativity and Design
- RUN 3 TRIGGERS FOR HLEPTONS ANALYSES *Online*
ATLAS Tau & HLeptons Workshop
- 2019 EXPECTED ATLAS PERFORMANCE AT THE HL-LHC *UMass Amherst*
US ATLAS Workshop
- OVERVIEW OF TAU vs. JET IDENTIFICATION *Prague, Czech Republic*
ATLAS Tau & HLeptons Workshop
- BEYOND IMITATION: GENERATIVE CHOREOGRAPHY VIA MACHINE LEARNING *Charlotte, NC*
International Conference on Computational Creativity (ICCC)
- 2018 RNN TAU IDENTIFICATION WITHIN THE ATLAS HLT *Fermilab*
US LHC Users Association Meeting
- RNN TAU IDENTIFICATION IN THE ATLAS HLT *CERN*
ATLAS Machine Learning Workshop
- THE 2018 ATLAS TAU TRIGGER & COMBINED PERFORMANCE *Pittsburgh, PA*
US ATLAS Workshop
- TAU TRIGGER & CP PERFORMANCE AT HIGH μ *CERN*
ATLAS P&P Physics Plenary
- FTK & THE TAU TRIGGER *CERN*

ATLAS TDAQ Week

Press

- 2022 Interviewee on the Cognicast podcast
- A wide-ranging discussion of my research trajectory across AI, physics, and art
 - [Episode webpage](#)
 - [Listen on Apple Podcasts](#)
- 2021 [Mariel Pettee successfully defends PhD thesis, Yale Physics](#)
- 2020 [Advice to Women in STEM: Mariel Pettee, Yale Scientific Magazine](#)
- 2019 [Feature on Yale's Instagram page](#)
- 2016 [Scientists Battle for Physics Slam Crown, PBS Chicago](#)
- 2013 [15 Most Interesting Seniors: Mariel N. Pettee, The Harvard Crimson](#)

Posters

- 2022 POINT CLOUD METHODS FOR PION RECONSTRUCTION IN THE ATLAS DETECTOR *Online*
LHCP 2022
- 2020 CHOREO-GRAPH: LEARNING LATENT GRAPH REPRESENTATIONS OF THE DANCING BODY *Online*
Women in Machine Learning (WiML) at NeurIPS 2020
- RNN TAU IDENTIFICATION IN THE ATLAS HIGH-LEVEL TRIGGER *CERN*
ATLAS Trigger & Data Acquisition Week 2020
- 2019 GENERATIVE & VARIATIONAL CHOREOGRAPHY VIA MACHINE LEARNING *Vancouver, Canada*
Women in Machine Learning (WiML) at NeurIPS 2019
- MACHINE WOMAN: PRESERVATION, MEMORY, FORGETTING, AND AI *New Haven, CT*
Women's Faculty Forum at Yale
- 2017 PERFORMANCE OF THE ATLAS TAU TRIGGER IN RUN 2 *Seattle, WA*
Advanced Computing & Analysis Techniques in Physics Research (ACAT)
- 2016 TRIGGER STUDIES FOR THE MU2E EXPERIMENT *Chicago, IL*
International Conference on High Energy Physics (ICHEP)

Leadership & Service

- 2017 - 2021 HLeptons Trigger Liaison: Trigger Studies for the ATLAS $H \rightarrow \tau\tau$ Analysis Group
- 2019 - 2020 Reviewer for NeurIPS Physical Sciences Workshop
- 2020 Session Co-Convener, PyHEP 2020 (Conference for Python in High-Energy Physics)
- 2019 Reviewer for Women in Machine Learning (WiML) Workshop

Teaching

Training

- 2016 PHYSICS 530: Theory and Practice of Scientific Teaching for Physical Scientists *Yale University*
2014 ASTRO 302: Scientists Teaching Science *Harvard University*

Yale University

- 2018 Physics 115: The Physics of Dance
American Studies 349: Technologies for Movement Research
2017 Physics 171: University Physics for the Life Sciences
Physics 115: The Physics of Dance
2016 Physics 205L: Modern Physical Measurement
Physics 115: The Physics of Dance
2015 Physics 165L: General Physics Laboratory

Harvard University

- 2013 Math 110: Vector Space Methods for Differential Equations
2012 - 2013 Math 121: Linear Algebra and Applications

Inclusion & Outreach Efforts

- 2022 QuarkNet Speaker & Interviewee
- Presented a talk on physics, art, and ML to high school students
 - Answered their questions in a separate hour-long interview
- 2020 Member of the American Physical Society's Inclusion, Diversity, and Equity Alliance (APS-IDEA)
- 2019 - 2021 Member of the Yale Physics Climate & Diversity Committee
- Advocated for a department-wide discussion of discrimination in our community
 - Contributed to the design of our department's Code of Conduct
- 2018 - 2020 US LHC Users Association advocacy trip to Capitol Hill
- Met with the offices of around 15 representatives from Congress each year to ask for their support for high-energy physics research and STEM funding in general
- 2017 - 2018 Speaker, *Science in the News*, delivering scientific talks to the New Haven public
Girls' Science Investigations at Yale
- 2016 Winner, Windy City Physics Slam at ICHEP
Choreographer: *Form Factors*, a dance intervention with physicists at ICHEP
- 2015 - 2020 Yale Women in Physics Mentor

Arts

Exhibitions

- 2021 [Untitled Bird Project](#): a 1 hour pop-up exhibit featuring AI-generated bird calls situated in nature
- 2020 [Mirror Exercise](#): an AI-generated duet with myself
- Featured in [Le Mérite](#), at the Comédie de Caen, Théâtre des Cordes, France.
 - Highlighted in the NeurIPS Workshop on ML for Creativity and Design's [AI Art Gallery](#)
 - Digital exhibition at [Level Up: The Dramaturgy of Digital Performance & Design](#)
 - Selected by the AI Transparency Institute & featured at the 2020 AI Governance Forum
 - Boston Cyberarts Gallery exhibition *Perceptions / Distortions* (cancelled due to COVID-19)
- 2019 [SIGMA](#): a short film of AI-generated choreography
- Featured in the NeurIPS 2019 Workshop on ML for Creativity & Design's [AI Art Gallery](#)

Bay Area

- 2022 Dancer, [Sublimation](#)
- By Kinetech Arts.
 - Supported by the Djerassi Resident Artists Program and Creative Work Fund.
 - Performed at David Ruth Glass Studio, Oakland, CA.
- Dancer, [Detour](#)
- By Kinetech Arts, commissioned by the Berkeley Dance Project.
 - Performed at Zellerbach Playhouse, Berkeley, CA.

Yale University

- 2020 Studio fellow, [Yale Center for Collaborative Arts & Media](#)
- Year-long paid fellowship to develop collaborative work across art & technology
- Dancer & Coordinator, [Transpositions](#)
- Dancer in virtual performances by Brian Seibert and Elm City Dance Collective
- [Women+ Art AI](#): Part of a global collective of women working at the intersection of art & AI
- Choreographer, [Elon Musk and the plan to Blow Up Mars the musical](#)
- Yale Cabaret, dir. Liam Bellman-Sharpe
- Dancer, Coordinator, & Rehearsal Director, [Yale Dance Lab](#)
- New work by choreographer Vicky Shick: "everywhere"
- 2019 Featured performer, [Learning Film \(working title\)](#)
- Interviewed for a documentary by the Derek Jarman Lab, co-produced by Tilda Swinton
- Bill T. Jones/Arnie Zane Dance Company Intensive, [Yale Dance Theater](#)
- Dancer in a restaging of *D-Man in the Waters*
- 2018 Dancer, [Dance Drawings \(For Jock\)](#)
- Choreography by Emily Coates located at the Yale Art Gallery's Sol LeWitt exhibit
- Paul Taylor Dance Company Intensive, [Yale Dance Theater](#)
- Leading role as "The Hostess" in the first restaging of Taylor's *Party Mix* in four decades
- Featured performer, [Machine Woman](#)
- An experiential short film documenting my AI-generated choreography research
- 2017 Choreographer: "La Mort du Chorégraphe", [A Different Drum Dance Company](#)

Urban Bush Women Intensive, *Yale Dance Theater*

- 2016 Gaga Intensive with Saar Harari & Lee Sher, *Yale Dance Theater*
Choreographer: “Rang Cherries”, *A Different Drum Dance Company*

University of Cambridge

- 2015 Actor, *Attempts on Her Life*, dir. Tania Clarke, Corpus Playroom
Dancer, *Evolution*, ADC Theatre

Harvard University

- 2014 Director/Writer/Choreographer: [Symmetry Breaking](#)
• My creative physics thesis: an immersive multimedia performance about the Higgs boson
President, *The Signet Society of Arts & Letters*
Choreographer-in-Residence, *Harvard Dance Center*
Dancer, *Paper Wing*, chor. Jill Johnson, Farkas Hall
- 2013 Arts@CERN Internship
Eurydice, *Antigonick*, dir. Ianthe Demos, American Repertory Theater Mainstage
Isabelle & Executive Producer, *The Edge of the Map*, dir. Calla Videt (Sightline Theater Company)
Dancer, *At Last*, Loeb Experimental Theater
Dancer, *On The Run*, Harvard Dance Center
- 2012 Vice-President & Mainstage Coordinator, *The Harvard-Radcliffe Dramatic Club*
• 35+ productions as a performer, director, producer, designer, & choreographer
Lucy, *CryHurtFood*, Loeb Experimental Theater & Crucible Mainstage (Sheffield, UK)
Director: *for the purpose of catching ourselves in the act of being the most*
• Set the Guinness World Record for the longest telephone conversation between two people
- 2011 Co-founder and collaborator, *The Harvard Generalist* artistic collective
Drama & Dance Proctor, *Freshman Arts Program* (2011-2014)

Writing

- 2018 [Theories of Everything](#), *Sightline Arts*
[Now or Never: The Case for a Larger Hadron Collider](#), *Yale Distilled Magazine*