

# Jesse Diaz Thaler

*Curriculum Vitae*  
(Updated June 13, 2023)

## Contact Information

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## Research in Theoretical Particle Physics

- Data Science and AI/ML
- Collider Physics and QCD
- Beyond the Standard Model

## Degrees

*Fall 2002–Spring 2006*    **Harvard University**  
Ph.D., Physics, *June 2006*  
A.M., Physics, *June 2004*  
Thesis: “Symmetry Breaking at the Energy Frontier”  
Advisor: Nima Arkani-Hamed

*Fall 1998–Spring 2002*    **Brown University**  
Sc.B., Math/Physics, *May 2002*  
Advisor: Antal Jevicki

## Employment

*January 2010–Present*    **Massachusetts Institute of Technology**  
*MIT Center for Theoretical Physics*  
Professor of Physics, *2021–Present*  
Associate Professor of Physics with Tenure, *2017–2021*  
Associate Professor of Physics, *2015–2017*  
Assistant Professor of Physics, *2010–2015*

*July 2009–December 2009*    **Lawrence Berkeley National Laboratory**  
*Theoretical Physics Group*  
Physicist Postdoctoral Fellow

*July 2006–June 2009*    **University of California, Berkeley**  
*Miller Institute for Basic Research in Science*  
Miller Research Fellow

## Leadership

- Director, *NSF Institute for Artificial Intelligence and Fundamental Interactions*, 2020–Present

## Affiliations

- MIT Center for Theoretical Physics; Laboratory for Nuclear Science, *Jan. 2010–Present*
- MIT Statistics & Data Science Center; Institute for Data, Systems & Society, *Jan. 2020–Present*
- Harvard Center for the Fundamental Laws of Nature, *Sep. 2018–Aug. 2019 sabbatical*

## Honors

- APS Fellow, *American Physical Society*, 2022
- Simons Investigator in Physics, *Simons Foundation*, 2022
- Fermilab Distinguished Scholar, *Fermi National Accelerator Laboratory*, 2018–2020
- Simons Fellowship in Theoretical Physics, *Simons Foundation*, 2018
- Frank E. Perkins Award for Excellence in Graduate Advising, *MIT*, 2017
- Harold E. Edgerton Faculty Achievement Award, *MIT*, 2016
- Buechner Faculty Award for Teaching, *MIT Physics Department*, 2014
- Buechner Faculty Award for Undergraduate Advising, *MIT Physics Department*, 2013
- Sloan Research Fellowship, *Alfred P. Sloan Foundation*, 2013
- Kavli Frontiers Fellow, *Kavli Foundation*, 2012
- Presidential Early Career Award for Scientists and Engineers, *White House*, 2012
- Class of 1943 Career Development Professorship, *MIT*, 2012–2015
- Early Career Research Award, *U.S. Department of Energy, Office of Science*, 2011–2016
- Miller Research Fellowship, *University of California, Berkeley*, 2006 – 2009
- Giorgio Gamberini Dissertation Prize, *Scuola Normale Superiore di Pisa*, 2007
- Merit Fellowship, *Harvard Faculty of Arts and Sciences*, 2006
- Goldhaber Prize, *Harvard Physics Department*, 2005
- Graduate Research Fellowship, *National Science Foundation*, 2002–2005

## UROP Students Supervised

*Undergraduate Research Opportunities Program, MIT*

- Max Tan '25: *Spring 2023, Summer 2023*
- Fayad Ammar '24: *Summer 2023*
- Mohit Dighamber '23: *Fall 2022, Spring 2023*
- Octavio Vega '22: *Spring 2021, Summer 2021, Fall 2021*  
After MIT: Research Assistant, *University of Hamburg*
- Nishat Protyasha '23: *Summer 2020, Fall 2020, Spring 2021, Summer 2021*  
FUTURE of Physics Participant, *Caltech*, 2020

- Serhii Kryhin '22: *Spring 2020, Summer 2020, Spring 2021, Summer 2021* (see below)
- Christopher Miller '21: *Fall 2020*  
After MIT: Technical Instructor, *MIT*
- Debaditya Pramanik '21: *Spring 2020, Summer 2020, Fall 2020* (see below)
- Ziqi Zhou '20: *Fall 2018*
- Talya Klinger '20: *Spring 2017*  
After MIT: Marshall Scholar, *University of Cambridge and Cardiff University*  
Currently: Physics Ph.D. Candidate, *Caltech*
- Radha Mastandrea '19: *Spring 2017, Fall 2017, Spring 2018, Summer 2018* (see below)
- Eleanor Hall '18: *Spring 2017, Summer 2017, Fall 2017* (see below)
- Matthew Burns '18: *Fall 2014, Spring 2015*
- Kevin Zhou '17: *IAP 2016, Spring 2016, Summer 2016, Fall 2016, Spring 2017*  
After MIT: Marshall Scholarship, *U. Cambridge and U. Oxford*  
Currently: Physics Ph.D Candidate, *Stanford*  
Joel Matthew Orloff Award for Outstanding Research, *MIT Physics Department, 2017*
- Aashish Tripathi '17: *Spring 2015, Summer 2015, Fall 2015, IAP 2016, Spring 2016, Summer 2016, Fall 2016* (see below)
- Trung Phan '15: *Spring 2014, Summer 2014* (see below)
- T.J. Wilkason '15: *Fall 2013, Spring 2014, Summer 2014* (see below)
- Mobolaji Williams '13: *Fall 2010, Spring 2011, Summer 2012* (see below)
- Dustin Katzin '12: *Fall 2011, IAP 2012* (see below)
- Tucker Chan '12: *Summer 2011, Fall 2011, Spring 2012* (deceased)  
After MIT: Physics Ph.D. Candidate, *Stanford*
- Ken Van Tilburg '11: *Summer 2010, Fall 2010* (see below)

## B.S. Student Theses Supervised

- Serhii Kryhin, *B.S. 2022*  
Thesis: “Application of Unsupervised Machine Learning for Event Classification”  
After MIT: Physics Ph.D. Candidate, *Harvard*  
Morse/Orloff Research Award, *MIT Physics Department, 2022*
- Debaditya Pramanik, *B.S. 2021*  
Thesis: “Collinear Supergravity at Linear Order”  
After MIT: Physics Ph.D. Candidate, *Princeton*
- Radha Mastandrea, *B.S. 2019*  
Thesis: “Analyzing CMS Open Collider Data through Topic Modeling”  
After MIT: Marshall Scholarship, *U. Cambridge*  
Currently: Physics Ph.D Candidate, *U.C. Berkeley*  
Joel Matthew Orloff Award for Outstanding Service, *MIT Physics Department, 2019*  
Physics Research Fellowship, *Heising-Simons Foundation, 2018*  
FUTURE of Physics Participant, *Caltech, 2018*

- Eleanor Hall, *B.S. 2018*  
Thesis: “Photon Isolation and Jet Substructure”  
After MIT: Physics Ph.D. Candidate, *U.C. Berkeley*  
Joel Matthew Orloff Award for Outstanding Service, *MIT Physics Department, 2017*
- Aashish Tripathy, *B.S. 2017*  
Thesis: “Jet Substructure at the Large Hadron Collider”  
After MIT: Physics Ph.D., *U. Michigan*  
Currently: Postdoctoral Researcher, *U. Michigan*  
Philip Morse Memorial Award, *MIT Physics Department, 2017*
- Trung Phan, *B.S. 2015*  
Thesis: “Relativistic Quantum Fields in Theoretical Physics”  
After MIT: Physics Ph.D. Candidate, *Princeton*
- T.J. Wilkason, *B.S. 2015*  
Thesis: “Exclusive Cone Jet Algorithms for High Energy Particle Colliders”  
After MIT: Physics Ph.D. Candidate, *Stanford*  
Joel Matthew Orloff Award for Outstanding Service, *MIT Physics Department, 2015*
- Mobolaji Williams, *B.S. 2013*  
Thesis: “Pseudo-Goldstino to Gravitino Decay: An Implication of Multiple Supersymmetry Breaking”  
After MIT: Physics Ph.D., *Harvard*  
Currently: Data Scientist, *Jellyfish*
- Dustin Katzin, *B.S. 2012*  
Thesis: “The DarkLight Experiment: Searching for the Dark Photon”  
After MIT: Part III, *University of Cambridge*  
Currently: Analyst, *American International Group*
- Lin Fei, *B.S. 2011*  
Thesis: “Dark Matter Dynamics in the Early Universe”  
After MIT: Physics Ph.D. Candidate, *Princeton*
- Ken Van Tilburg, *B.S. 2011*  
Thesis: “Identifying Boosted Objects with N-subjettiness and Linear k-means Clustering”  
After MIT: Physics Ph.D., *Stanford*  
Currently: Assistant Professor, *NYU*  
Apker Award Finalist, *American Physical Society, 2011*  
Joel Matthew Orloff Award for Outstanding Research in Physics, *MIT Physics Department, 2011*

## M.Eng. Student Theses Supervised

- Raymond Wynne, *anticipated M.Eng. 2023*  
After MIT: Physics Ph.D. Candidate, *Caltech*
- Nilai Sarda, *M.Eng. 2020*  
Thesis: “On Anomaly Detection in Particle Accelerators” (*jointly advised with Justin Solomon*)  
After MIT: Researcher, *D.E. Shaw Group*  
Johnson Artificial Intelligence and Decision Making Thesis Award, *MIT EECS Department, 2020*
- Preksha Naik, *M.Eng. 2019*  
Thesis: “Exploring the Space of Jets with CMS Open Data”  
After MIT: Physics Ph.D. Candidate, *Caltech*

## Ph.D. Students Supervised

- Pamela Pajarillo, *anticipated Ph.D. 2027*
- Sean Benevedes, *anticipated Ph.D. 2026*
- Rikab Gambhir, *anticipated Ph.D. 2025*  
MIT Prize for Open Data (Honorable Mention), *MIT Libraries and School of Science, 2022*
- Samuel Alipour-fard, *anticipated Ph.D. 2025*
- Patrick Komiske, *Ph.D. 2021*  
Thesis: “Machine Learning for High-Energy Collider Physics”  
After MIT: Researcher, *PDT Partners*  
Currently: Researcher, *River Run Trading*
- Eric Metodiev, *Ph.D. 2020*  
Thesis: “Energy Flow in Particle Collisions”  
After MIT: Research Scientist, *Renaissance Technologies*
- Benjamin Elder, *Ph.D. 2018*  
Thesis: “Jet Fragmentation at the LHC”  
After MIT: Cognitive Software Developer, *IBM*  
Currently: Research Scientist, *IBM*
- Lina Necib, *Ph.D. 2017*  
Thesis: “Boosting (In)direct Detection of Dark Matter”  
After MIT: Fairchild Postdoctoral Scholar, *Caltech*  
Currently: Assistant Professor, *MIT*  
Vazquez Award for Outstanding Research, *MIT Physics Department, 2016*
- Yonatan Kahn, *Ph.D. 2015*  
Thesis: “Forces and Gauge Groups Beyond the Standard Model”  
After MIT: Postdoctoral Researcher, *Princeton*  
Currently: Assistant Professor, *U. Illinois, Urbana-Champaign*  
Andrew M. Lockett III Memorial Fund Award, *MIT Physics Department, 2014*  
J.J. and Noriko Sakurai Dissertation Award, *American Physical Society, 2016*
- Daniele Bertolini, *Ph.D. 2014*  
Thesis: “Electroweak Symmetry Breaking in the Era of the Higgs Boson Discovery”  
After MIT: Postdoctoral Researcher, *U.C. Berkeley*  
Currently: Data Scientist, *Unlearn*  
LHC-TI Graduate Fellowship, *LHC Theory Initiative, 2013*
- Zoe Thomas, *Ph.D. 2014*  
Thesis: “Supersymmetry at the Dawn of the LHC Era”  
After MIT: Postdoctoral Researcher, *U. Minnesota*  
Currently: Applied Research Mathematician, *Department of Defense*
- Francesco D’Eramo, *Ph.D. 2012*  
Thesis: “Hot and Dark Matter” (*jointly advised with Krishna Rajagopal and Hong Liu*)  
After MIT: Miller Research Fellow, *U.C. Berkeley*  
Currently: Associate Professor, *U. Padova*  
Vazquez Award for Outstanding Research, *MIT Physics Department, 2011*

## Postdoctoral Researchers Supervised

- Cari Cesarotti, CTP Postdoctoral Researcher, *Fall 2022–Spring 2025*  
J.J. and Noriko Sakurai Dissertation Award, *American Physical Society*, 2023
- Sokratis Trifinopoulos, Postdoc.Mobility Fellow, *Fall 2022–Spring 2024*
- Siddharth Mishra-Sharma, IAIFI Fellow, *Fall 2021–Spring 2024*
- Lena Funcke, CTP Postdoctoral Researcher, *Fall 2021–Fall 2022*  
After MIT: Assistant Professor, *U. Bonn*
- Katelin Schutz, Pappalardo Fellow, *Fall 2019–Fall 2020*  
NASA Einstein Fellow, *Spring 2021*  
After MIT: Assistant Professor, *McGill*
- Pouya Asadi, CTP Postdoctoral Researcher, *Fall 2019–Spring 2022*  
After MIT: Postdoctoral Researcher, *U. Oregon*
- Bernhard Mistlberger, Pappalardo Fellow, *Fall 2018–Spring 2020*  
After MIT: Associate Staff Scientist, *SLAC*  
Currently: Staff Scientist, *SLAC*
- Frédéric Dreyer, Early Postdoc.Mobility Fellow, *Fall 2016–Spring 2018*  
After MIT: Postdoctoral Researcher, *Oxford*  
Currently: University Research Fellow, *Oxford*
- Yotam Soreq, Rothschild Fellow, *Fall 2015–Spring 2018*  
After MIT: Postdoctoral Researcher, *CERN*  
Currently: Assistant Professor, *Technion*
- Benjamin Safdi, Pappalardo Fellow, *Fall 2014–Spring 2017*  
After MIT: Assistant Professor, *U. Michigan*  
Currently: Assistant Professor, *U.C. Berkeley*
- Wei Xue, CTP Postdoctoral Researcher, *Fall 2014–Spring 2017*  
After MIT: Postdoctoral Fellow, *CERN*  
Currently: Assistant Professor, *U. Florida*
- Simone Marzani, LHC Theory Initiative Postdoctoral Fellow, *Fall 2014–Spring 2015*  
After MIT: Assistant Professor, *U. Buffalo*  
Currently: Associate Professor, *U. Genova*
- Gilly Elor, CTP Postdoctoral Researcher, *Fall 2013–Spring 2016*  
After MIT: Postdoctoral Researcher, *U. Oregon*  
Currently: Postdoctoral Researcher, *JGU Mainz*
- Duff Neill, Pappalardo Fellow, *Fall 2012–Spring 2015*  
CTP Postdoctoral Researcher, *Spring 2015–Spring 2016*  
After MIT: Director’s Fellow, *Los Alamos National Laboratory*  
Currently: Staff Scientist, *Los Alamos National Laboratory*
- Andrew Larkoski, CTP Postdoctoral Researcher, *Fall 2012–Spring 2015*  
After MIT: LHC Theoretical Initiative Postdoctoral Fellow, *Harvard*  
Currently: Assistant Project Scientist, *UCLA*  
Wu-Ki Tung Award for Early Career Research on QCD, *CTEQ Collaboration*, 2017
- Matthew McCullough, Simons Postdoctoral Fellow, *Fall 2011–Spring 2014*  
After MIT: COFUND Fellowship, *CERN*  
Currently: Staff Scientist, *CERN*

- Keith Rehermann, CTP Postdoctoral Researcher, *Fall 2010–Spring 2012*  
After MIT: Consultant, *Ab Initio Software Corporation*

## Visitors Hosted

- Xinyue (Stella) Wu, MIT Summer Research Program, *Summer 2023*  
Home Institution: *U. Rochester*
- Brian Nord, MIT MLK Visiting Professor, *Fall 2022–Spring 2023*  
Home Institution: *Fermilab and U. Chicago*
- Kaća Bradonjić, Visiting Artist, *Fall 2022*  
Home Institution: *Hampshire College*
- Sergio Diaz, MIT Summer Research Program, *Summer 2022*  
Project: “Determination of the W Mass Parameter using Machine Learning”  
Home Institution: *U. Maryland, Baltimore County*
- Pedro Rivera-Cardona, MIT Summer Research Program, *Summer 2021*  
Project: “Implementation of U(1) Group Symmetry on Energy Flow Networks”  
Home Institution: *U. Puerto Rico, Mayaguez*
- Athis Osathapan, Research Internship, *Spring 2021, Summer 2021*  
Home Institution: *Bowdoin College*
- Shira Jackson, MIT Summer Research Program, *Summer 2020*  
Project: “Estimating the Energy Mover’s Distance with Exclusive Jet Clustering”  
Home Institution: *U. Cincinnati*
- Andrew Turner, Tushar Shah and Sara Zion Physics Fellowship, *2018–2019*  
Home Institution: *MIT (Washington Taylor)*
- Maximilian Henderson, International Research Opportunities Programme, *Summer 2018*  
Home Institution: *Imperial College London*
- Edward Hirst, International Research Opportunities Programme, *Summer 2018*  
Home Institution: *Imperial College London*
- Rahim Leung, International Research Opportunities Programme, *Summer 2017*  
Home Institution: *Imperial College London*
- Markus Schulze, Visiting Postdoc, *Fall 2015*  
Home Institution: *CERN*
- Alexis Romero, MIT Summer Research Program, *Summer 2015*  
Project: “Jet Physics Measurements on CMS Open Data”  
Home Institution: *San Diego State University*
- Nayara Fonseca, FAPESP Fellowship, *Spring 2014–Fall 2014*  
Home Institution: *U. Sao Paulo, Brazil (Gustavo Burdman)*

## Teaching Experience

- 8.398 — Selected Topics in Graduate Physics  
Instructor: *Spring 2021, Fall 2021, Spring 2022, Spring 2023*

- 8.03 — Physics III, Waves & Vibrations  
Recitation: *Fall 2020*
- 8.044 — Statistical Physics I  
Recitation: *Spring 2020*
- 8.831 — Supersymmetric Quantum Field Theories  
Lecture: *Spring 2017, Fall 2019*
- 8.051 — Quantum Mechanics II (MITx-based)  
Instructor: *Spring 2018*
- 8.033 — Relativity  
Lecture: *Fall 2017*; Recitation: *Fall 2016*
- 8.02 — Physics II, Electricity & Magnetism (GIR)  
TEAL (studio class): *Spring 2014, Spring 2015, Spring 2016*
- 8.012 — Physics I, Classical Mechanics  
Recitation: *Fall 2014*
- 8.06 — Quantum Mechanics III  
Lecture: *Spring 2011, Spring 2012, Spring 2013*; Recitation: *Spring 2010*
- 8.05 — Quantum Mechanics II  
Recitation: *Fall 2010, Fall 2012*

## Internal Service

- MIT Faculty Committee on Curricula, *Fall 2017–Spring 2020*
- MIT Physics CTP Junior Faculty Search Committee, *Fall 2017, Fall 2019, Fall 2021*  
Chair: *Fall 2019*
- MIT Physics Promotion Committee, *Fall 2019, Fall 2020, Fall 2021, Fall 2022*  
Chair: *Fall 2020, Fall 2021, Fall 2022*
- MIT Physics, Statistics, and Data Science (PhysSDS) Committee, *Fall 2020–Present*  
Co-Chair: *Fall 2020–Present*
- MIT Physics Graduate Admissions Committee, *Spring 2021*
- MIT Physics Pappalardo Fellowships Executive Committee, *Fall 2016–Fall 2017*
- MIT Physics Colloquium Committee, *Spring 2010–Spring 2014*  
Chair: *Fall 2012–Spring 2014*
- MIT Physics Ph.D. Thesis Committees:  
Cristian Zanolini (*Mikhail Lukin & Aram W. Harrow, in progress*)  
Patrick Fitzpatrick (*Tracy Slatyer & David Kaiser, Jul. 2021*)  
Joseph Johnston (*Lindley Winslow & Joseph Formaggio, May 2021*)  
Chih-Liang Wu (*Tracy Slatyer, Apr. 2021*)  
Constantin Weissner (*Mike Williams, Mar. 2021*)  
J. Owen Andrews (*Ibrahim Cissé, Nov. 2020*)  
Gherardo Vita (*Iain Stewart, Aug. 2020*)  
Jasmine Brewer (*Krishna Rajagopal, Jul. 2020*)  
Hongwan Liu (*Tracy Slatyer, May 2019*)  
Charles Epstein (*Richard Milner, Aug. 2018*)



Nicholas Rodd (*Tracy Slatyer, Apr. 2018*)  
 David Hernandez (*Edmund Bertschinger, Apr. 2018*)  
 Aram Apyan (*Markus Klute, Nov. 2016*)  
 Daniel Roberts (*Allan Adams, Apr. 2016*)  
 Ian Moulton (*Iain Stewart, Apr. 2016*)  
 Daniel Kolodrubetz (*Iain Stewart, Apr. 2016*)  
 Mingming Yang (*Christoph Paus, Jan. 2015*)  
 Shawn Henderson (*Peter Fisher, Jul. 2013*)  
 Teng Ma (*Boleslaw Wyslouch, May 2013*)  
 Kevin Sung (*Steven Nahn, Mar. 2013*)  
 Christopher Jones (*Janet Conrad, Jun. 2012*)  
 Riccardo Abbate (*Iain Stewart, May 2012*)  
 Abolhassan Vaezi (*Xiao-Gang Wen, Jan. 2011*)  
 Georgia Karagiorgi (*Janet Conrad, Jul. 2010*)

- MIT Physics Graduate Academic Advisor, *Fall 2017–Present*  
 Anticipated Ph.D. 2025: Ryan Abbott  
 Anticipated Ph.D. 2024: Bruno Scheihing Hitschfeld, Stella Schindler  
 Anticipated Ph.D. 2022: Eric Anschuetz, Samuel Leutheusser, Gregory Ridgway,  
 Annie Wei, Ryan Weller  
 Ph.D. 2020: Jasmine Brewer
- MIT Physics Academic Advisor, *Fall 2011–Present*  
 Class of 2024: Omar Abdelghani, Chirag Falor, Lily Moseni, Dylan Raphael, David Suarez,  
 Chris Viets  
 Class of 2018–20: Robert Arnott, Zachary Bogorad, Hannah Field, Rodmy Paredes Alfaro,  
 Saranesh Prembabu, Joshua Rhodes, Kevin Tang, Michael Winer  
 Class of 2014–15: Allison Christian, Jay Lawhorn, Joseph Perricone, Jeffrey Prouty,  
 Melih Ucer, Pranjal Vachaspati, Prashanth Venkataram
- MIT First-Year Advisor, *Fall 2019–Spring 2020*  
 Class of 2023: Richter Brzeski, Megha Maran, Catalina Monsalve Rodriguez, Dylan Weber
- MIT Physics Qualifying Exam, Written Exam Grading Committee, *Jan. 2020*
- MIT Physics Qualifying Exam, Part III Committee, *Spring 2015–Spring 2017*
- MIT Physics Qualifying Exam, Part II Committee, *Spring 2012–Spring 2014*  
 Chair: *Fall 2013–Spring 2014*
- MIT Physics Qualifying Exam, Part II Grading Committee, *Sept. 2010, Jan. 2020*
- MIT LNS Advisory Group Member, *Fall 2017, Spring 2020–Present*
- MIT LNS Colloquium Committee, *Fall 2015–Spring 2018*  
 Chair: *Fall 2017–Spring 2018*
- MIT CTP Oral Qualifying Exam Committee, *Fall 2022, Spring 2023*
- MIT CTP Faculty Mentor, *Apr. 2021–Present*
- MIT CTP Deputy Group Leader in High-Energy Theory, *Spring 2020–Present*
- MIT CTP Visitor Coordinator, *Fall 2016–Present*
- MIT CTP Nuclear/Particle Seminar Committee, *Fall 2010–Fall 2016*
- MIT CTP Postdoc Selection Committee, *Fall 2009–Present*
- MISTI Global Seed Funds Evaluation Committee, *Fall 2012–Fall 2014*

## External Service

- Member, Particle Physics Project Prioritization Panel (P5), *Dec. 2022–Present*
- External Ph.D. Examiner:
  - Pedro Cal (*Wouter Waalewijn, U. Amsterdam, Sep. 2021*)
  - Thea Aarrestad (*Ben Kilminster, U. Zurich, Mar. 2017*)
  - Ignacio Garcia Garcia (*Eduardo Ros & Marcel Vos, U. Valencia, Dec. 2016*)
  - Brian Walsh (*Tobias Golling, Yale, Feb. 2013*)
  - Travis Martin (*Thomas Gregoire & Stephen Godfrey, Carleton U., Aug. 2012*)
- External Mentoring:
  - Ilias Cholis, PI Academy for Research and Engagement, *Oakland U., Fall 2018–Fall 2019*
- Member, High Energy Physics Advisory Panel (HEPAP), *Aug. 2021–Mar. 2024*
- Topical Convener in Collider Phenomenology, Snowmass Theory Frontier, *Jul. 2022*
- General Member, Aspen Center for Physics, *Summer 2020–Summer 2025*
  - Nominations Committee, *Summer 2021, Summer 2022; Chair: Summer 2022*
  - Summer Program Committee, *Summer 2020*
- Advisory Committee, Mainz Machine Learning Workshop, *Jun. 2021*
- International Advisory Committee, Boost Workshops, *Jun. 2010, Jul. 2012, Aug. 2013, Aug. 2014, Aug. 2015, Jul. 2016, Jul. 2017, Jul. 2018, Jul. 2019, Jul. 2020, Aug. 2021*
  - Ombuds Team: *since Jul. 2020*
  - Local Organizing Committee: Boost 2019, MIT, *Jul. 2019*
- Organizer, Fermilab Remote CMS Open Data Workshop, *Sep. 2020*
- Advisory Committee, ML4Jets Workshop, *Jan. 2020*
- Local Organizing Committee, Rising Stars in Physics, *Apr. 2018*
- Jet Convenor, Les Houches Workshops, *Jun. 2015, Jun. 2017*
- Advisory Committee, BLV Workshop, *May 2017*
- Organizing Committee, Lattice for BSM Workshop, *Apr. 2017*
- Organizer, Aspen Center for Physics Workshops, *Feb. 2011, Jul. 2011, Aug. 2016*
- Organizer, Galileo Galilei Institute Workshop, *Sep. 2015*
- Organizer, Boston Jet Physics Workshop, *Jan. 2011, Jan. 2014*
- Program Committee, PANIC 2011, *Jul. 2011*
- Organizer, MIT/Berkeley Workshop, *Aug. 2010*
- Science Advisory Board, *USQCD Collaboration, Spring 2013–Fall 2016*
- Sakurai Dissertation Award Selection Committee, *American Physical Society, Fall 2016*
- Fellowship Selection Committee, *LHC Theory Initiative, Fall 2013–Fall 2014*
  - Chair: *Fall 2014*
- Editorial Board, *Journal of High Energy Physics, Fall 2019–Present*
- Fellow of the Editorial College, *SciPost, Fall 2019–Present*
- Peer Review: *Physical Review Letters, Journal of High Energy Physics, Physical Review D, Journal of Cosmology and Astroparticle Physics, Physics of the Dark Universe, Nuclear Physics B, Physics Letters B, European Physical Journal C, Journal of Physics G, Physics Reports, Annals of Physics, Particle Data Group*

- Funding Agency Review: *U.S. Department of Energy, National Science Foundation, Heising-Simons Foundation, The Royal Society, Swiss National Science Foundation, Natural Sciences & Engineering Research Council of Canada, Israel Science Foundation, Netherlands Organisation for Scientific Research, German Academic Exchange Service, Hungarian National Research Office*
- High School Outreach: TheoryNet, *Northeastern U.*  
 Scott Goelzer, *Coe-Brown Northwood Academy, Spring 2021*  
 Michael Wadness, *Medford H.S., Fall 2012–Spring 2015, Spring 2018*  
 Elaine Picard, *Concord-Carlisle H.S., Fall 2015–Spring 2016, Spring 2017, Spring 2020*  
 Michael Hirsh, *Needham H.S., Spring 2010–Spring 2012*
- Open Data Advocacy  
 “Slow and Steady” (with Matthew Strassler), *Nature Physics* 15:725 (2019)  
 “Particle Collisions”, in Felice Frankel, *Picturing Science and Engineering, MIT Press, 2018*  
 “The Future of Particle Physics is ‘Open’”, Guest Blog Post, *CMS Experiment, Dec. 2017*
- Artificial Intelligence Advocacy  
 “Designing an AI Physicist”, Opinion Viewpoint, *CERN Courier, Sept.-Oct. 2021*

## Publications and Preprints

See <http://www.jthaler.net/research> for these publications organized by topic. Following the convention in particle physics, all authors are listed alphabetically, except for [83], [93], and [100].

\* = Paper arising from a supervised Ph.D. thesis

† = Paper arising from a supervised B.S. thesis

- [124] Andrew J. Larkoski and Jesse Thaler, *A Spectral Metric for Collider Geometry* [arXiv:2305.03751].
- [123] \* Samuel Alipour-fard, Patrick T. Komiske, Eric M. Metodiev, and Jesse Thaler, *Pileup and Infrared Radiation Annihilation (PIRANHA): A Paradigm for Continuous Jet Grooming* [arXiv:2305.00989].
- [122] \* Demba Ba, Akshunna S. Dogra, Rikab Gambhir, Abiy Tasissa, and Jesse Thaler, *SHAPER: Can You Hear the Shape of a Jet?* [arXiv:2302.12266].
- [121] Erik Buhmann, Gregor Kasieczka, and Jesse Thaler, *EPiC-GAN: Equivariant Point Cloud Generation for Particle Jets* [arXiv:2301.08128].
- [120] Peter Onyisi, Delon Shen, and Jesse Thaler, *Comparing Point Cloud Strategies for Collider Event Classification* [arXiv:2212.10659].
- [119] † Eric R. Anschuetz, Lena Funcke, Patrick T. Komiske, Serhii Kryhin, and Jesse Thaler, *Degeneracy Engineering for Classical and Quantum Annealing: A Case Study of Sparse Linear Regression in Collider Physics*, Phys. Rev. D106:056008 (2022) [arXiv:2205.10375].
- [118] Pedro Cal, Jesse Thaler, and Wouter J. Waalewijn, *Power Counting Energy Flow Polynomials*, JHEP 2209:021 (2022) [arXiv:2205.06818].
- [117] \* Rikab Gambhir, Benjamin Nachman, and Jesse Thaler, *Bias and Priors in Machine Learning Calibrations for High Energy Physics*, Phys. Rev. D106:036011 (2022) [arXiv:2205.05084].

- [116] † Patrick T. Komiske, Serhii Kryhin, and Jesse Thaler, *Disentangling Quarks and Gluons with CMS Open Data*, Phys. Rev. D106:094021 (2022) [arXiv:2205.04459].
- [115] \* Rikab Gambhir, Benjamin Nachman, and Jesse Thaler, *Learning Uncertainties the Frequentist Way: Calibration and Correlation in High Energy Physics*, Phys. Rev. Lett. 129:082001 (2022) [arXiv:2205.03413].
- [114] Hao Chen, Ian Moulton, Jesse Thaler, and Hua Xing Zhu, *Non-Gaussianities in Collider Energy Flux*, JHEP 2207:146 (2022) [arXiv:2205.02857].
- [113] Andrea Delgado and Jesse Thaler, *Quantum Annealing for Jet Clustering with Thrust*, Phys. Rev. D106:094016 (2022) [arXiv:2205.02814].
- [112] Patrick T. Komiske, Ian Moulton, Jesse Thaler, and Hua Xing Zhu, *Analyzing N-point Energy Correlators Inside Jets with CMS Open Data*, Phys. Rev. Lett. 130:051901 [arXiv:2201.07800].
- [111] Krish Desai, Benjamin Nachman, and Jesse Thaler, *SymmetryGAN: Symmetry Discovery with Deep Learning*, Phys. Rev. D105:096031 (2022) [arXiv:2112.05722].
- [110] Benjamin Nachman and Jesse Thaler, *Neural Conditional Reweighting*, Phys. Rev. D105:076015 (2022) [arXiv:2107.08979].
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## Invited Presentations

See <http://www.jthaler.net/cv> for a complete list of talks, including invited seminars and additional workshop and conference talks.

## Colloquia

- “Particle Physics through the Lens of Machine Learning”
  - Physics and Astronomy Colloquium, *Northwestern*, Mar 2023
  - Physics Colloquium, *Technion*, Jan. 2023
  - Physics Colloquium, *Tel Aviv*, Jan. 2023
  - Physics Colloquium, *Brown*, Nov. 2022
- “The Geometry of Particle Collisions: Hidden in Plain Sight”
  - Physics Colloquium, *Brandeis U.*, Feb. 2022
- “Collision Course: Particle Physics meets Machine Learning”
  - Physics Colloquium (Virtual), *U.C. San Diego*, May 2021
  - Physics and Astronomy Colloquium (Virtual), *U. New Mexico*, Apr. 2021
  - Physics Colloquium (Virtual), *U.C. Santa Barbara*, Apr. 2021
  - Physics Colloquium (Virtual), *Northern Illinois U.*, Feb. 2021
  - AlbaNova/Nordita Colloquium (Virtual), *Stockholm University*, Feb. 2021
  - Physics Colloquium (Virtual), *U. Chicago*, Feb. 2021
  - Physics Colloquium (Virtual), *All Israel*, Nov. 2020
  - Physics Colloquium (Virtual), *Harvard*, Nov. 2020
  - Physics Colloquium (Virtual), *U. Maryland*, Oct. 2020
  - Physics Colloquium, *Case Western Reserve U.*, Nov. 2019

Physics and Astronomy Colloquium, *Rice U.*, Oct. 2019

Physics Colloquium, *Oakland U.*, Oct. 2019

Physics Colloquium, *Tufts U.*, Sep 2019

- “The Hidden Geometry of Particle Collisions”  
Particle Physics Colloquium (Virtual), *KIT Karlsruhe*, Nov. 2020  
Theory Colloquium (Virtual), *CERN*, May 2020
- “The Future is Open: Adventures with Public Collider Data”  
Colloquium (Virtual), *Fermilab*, Sep. 2020
- “Jet Substructure at the Frontiers of Particle Physics”  
Physics Colloquium, *U. Milan*, Mar. 2018  
Physics Colloquium, *U. Illinois*, Oct. 2017
- “New Physics Gets a Boost: Jet Substructure at the Large Hadron Collider”  
Colloquium, *Perimeter I.*, May 2017  
Physics Colloquium, *U.C. Berkeley*, Apr. 2017  
Physics Colloquium, *U. Texas*, Mar. 2017  
Physics Colloquium, *MIT*, Oct. 2016  
Physics and Astronomy Colloquium, *U.C. Riverside*, Oct. 2016  
Physics Colloquium, *U. Buffalo*, Sep. 2016
- “Jet Substructure: Boosting the Search for New Physics at the LHC”  
Physics Colloquium, *U. Chicago*, May 2016  
Physics Colloquium, *Michigan State*, Jan. 2016
- “The Rise of Jet Substructure: Boosting the Search for New Physics at the LHC”  
Physics Colloquium, *U.C. Santa Cruz*, Nov. 2015  
Physics Colloquium, *Brandeis*, Sep. 2015
- “The Case for Jet Substructure”  
Physics Colloquium, *Caltech*, Nov. 2014  
Colloquium, *MIT Laboratory for Nuclear Science*, Apr. 2014
- “(Non)perturbative QCD and Jet Substructure”  
Triangle Nuclear Theory Colloquium, *Duke U.*, Mar. 2014  
Theory Colloquium, *U. Maryland*, Oct. 2013
- “The Shape of Jets to Come: Boosting the Search for New Physics at the LHC”  
Physics Colloquium, *U. Oregon*, May 2013  
Physics Colloquium, *Cornell U.*, Feb. 2013
- “The Higgs Boson: Triumph of the Standard Model”, *MIT Lecture Series Committee*, Oct. 2012
- “Anticipating New Data from the Energy Frontier”, Physics Colloquium, *Brown U.*, Feb. 2011
- “The Large Hadron Collider”, Physics Colloquium, *Wellesley C.*, Oct. 2010
- “The Shape of Jets to Come”, Colloquium, *MIT Laboratory for Nuclear Science*, Feb. 2010

## Public Lectures

- “Collision Course: Artificial Intelligence meets Fundamental Physics”, Distinguished Lecture, *National Science Foundation*, Jan. 2023
- “Artificial Intelligence Meets Fundamental Physics”, MIT Inside Track Master Class (Virtual), *EmTech Digital*, Mar. 2021

- “Collision Course: Artificial Intelligence meets Fundamental Physic”, Keynote Presentation (Virtual), *Tommy Flowers Network Conference*, Oct. 2020
- “Listening to the Invisible Universe”, with A Far Cry (chamber orchestra), Apr. 2019
- “Confronting the Invisible Universe”  
MIT Club of Great Britain Event, *London*, May 2018  
Public Talk, *Aspen Center for Physics*, Mar. 2017
- “The Higgs Boson: Triumph of the Standard Model”  
24th Annual Kavli Frontiers of Science, *National Academy of Sciences, U.C. Irvine*, Nov 2012  
Lecture Series Committee, *MIT*, Oct. 2012

## **Lecture Series & Schools**

- “The Standard Model”, School on Table-Top Experiments for Fundamental Physics, *Perimeter Institute*, Sep. 2022
- “Confronting the Invisible Universe”, Intro to Modern Physics, *MIT Lincoln Labs*, Mar. 2022
- “QCD and Collider Physics”, GGI Winter School, *Florence*, Jan. 2020
- “Collider Physics”, Cargese Summer School, *Corsica*, Jul. 2018
- “Theoretical and Experimental Issues in Jet Substructure”, *Kavli IMPU and KEK*, Jan. 2017
- “Jet Physics”, MITP Summer School, *Mainz*, Jul. 2016
- “The Case for Jet Substructure”, Theorist of the Month, *DESY*, Jun. 2014
- “Jet Substructure”, PiTP Summer School, *Princeton*, Jul. 2013
- “Super-tricks for Superspace”, TASI 2012 Summer School, *C.U. Boulder*, Jun. 2012
- “Little Lessons for a Little Higgs”, ICTP Winter School, *Trieste*, Jan. 2012
- “Goldstini”, “The Shape of Jets to Come”, “Event Topologies for Early LHC”, Topic of the Week Lecture Series, *Fermilab*, Nov. 2010
- “Entering the LHC Era”, MIT-CTP Felix Villars Theoretical Physics Retreat, Jan. 2010

## **Plenary Talks**

- “The Hidden Geometry of Particle Collisions”, Pritzker Conference on AI+Science, *U. Chicago and Caltech*, Mar. 2023
- “Learning Uncertainties the Frequentist Way”, Theoretical Physics for Machine Learning, *Aspen Center for Physics*, Feb. 2023
- “The Frontiers of Phenomenological Theory”, Snowmass Community Summer Study, *U. Washington, Seattle*, Jul. 2022
- “Weak Supervision for the Strong Force”, QUC Summer School, *KIAS*, Jul. 2022
- “Weak Supervision for the Strong Force”, *Virtual*, Jun. 2022
- “Machine Learning in Collider Physics”, Snowmass Energy Frontier Workshop, *Brown U.*, Mar. 2022
- “Optimal Transport for QCD and Jets”, Flowing into the Future, *Simons Center, Stony Brook*, Mar. 2022
- “Machine Learning for the Theory Frontier”, Snowmass Theory Frontier Conference, *KITP*, Feb. 2022
- “Artificial Intelligence and Fundamental Physics”, LISHEP 2021, *Virtual Brazil*, Jul. 2021
- “Artificial Intelligence and High-Energy Physics”, Master Your Physics, *Virtual U. Amsterdam*, Jun. 2021

- “Deep Learning for Collider Physics Simulation”, Deep Learning for Simulation (SimDL), ICLR 2021, *Virtual, May 2021*
- “Artificial Intelligence and High-Energy Physics”, APS April Meeting, *Virtual, Apr. 2021*
- “Artificial Intelligence for Physics Discovery: Theory Perspective”, AAAS Annual Meeting, *Virtual, Feb. 2021*
- “Machine Learning for Fundamental Physics”, HKUST IAS Program on High Energy Physics, *Virtual, Jan. 2021*
- “Collider Physics and Machine Learning”, IFT Christmas Workshop, *Virtual, Dec. 2020*
- “Deep Learning (and Deep Thinking) for QCD”, QCD@LHC 2019, *Buffalo, Jul. 2019*
- “Deep Learning (and Deep Thinking) in Collider Physics”, Pheno 2019, *Pittsburg, May 2019*
- “The High Energy Physics Landscape in 2019”, High Energy Physics Advisory Panel, *Washington D.C., May 2019*
- “Collision Course: Particle Physics as a Machine-Learning Testbed”, Deep Learning in the Natural Sciences, *U. Hamburg, Feb. 2019*
- “Collision Course: Particle Physics as a Machine-Learning Testbed”, Theoretical Physics for Machine Learning, *Aspen Center for Physics, Jan. 2019*
- “A Theorist’s Perspective on Machine Learning for Jets” (Opening Talk), Machine Learning for Jet Physics, *Fermilab, Nov. 2018*
- “New Improvements in Jet Physics”, SUSY 2018, *Barcelona, Jul. 2018*
- “Theory Summary” (Closing Talk), Boost 2018, *Paris, Jul. 2018*
- “The Future is Open: Jet Substructure with CMS Public Data”, CMS Week, *CERN, Jun. 2018*
- “Recent Progress in Jet Physics”, From the LHC to Dark Matter and Beyond, *Aspen Center for Physics, Mar. 2017*
- “New Frontiers in Dark Matter Detection”, APS April Meeting, *Washington, DC, Jan. 2017*
- “Prospects for Cosmic Axion Detection with ABRACADABRA”, GPMFC Workshop on Ultralight Dark Matter, *Washington, DC, Jan. 2017*
- “Using Jets and QCD to Boost the Search for New Physics”, Physics in LHC and Early Universe, *U. Tokyo, Jan. 2017*
- “The Shape of Jets to Come”, Boost 2016, *Zurich, Jul. 2016*
- “Probing the Core of QCD with Jet Substructure”, Stress-testing the Standard Model at the LHC, *KITP, Santa Barbara, May 2016*
- “Jet Substructure: Boosting the Search for New Physics at the LHC”, APS April Meeting, *Salt Lake City, Apr. 2016*
- “Theoretical Advances in Jet Substructure”, Rencontres de Moriond QCD, *La Thuile, Mar. 2016*
- “Theoretical Advances in Jet Substructure”, Particle Physics on the Verge of Another Discovery, *Aspen Center for Physics, Jan. 2016*
- “Probing the Core of QCD”, Boost 2015, *Chicago, Aug. 2015*
- “Unsafe but Calculable: Jets at the Frontier of Perturbative QCD”, PASCOS 2015, *ICTP, Trieste, Jul. 2015*
- “Pushing the Frontiers of Perturbative QCD”, Pheno 2015, *Pittsburg, May 2015*
- “Hidden Sectors and Dark Forces”, BLV 2015, *UMass Amherst, Apr. 2015*

- “Physics Opportunities for Future Circular Colliders”, FCC Week, *Washington, DC, Mar. 2015*
- “Jets in QCD: The Case for Jet Substructure”, Quark Confinement and the Hadron Spectrum XI, *St. Petersburg, Sep. 2014*
- “New Observables for Jet Substructure”, 43rd International Symposium on Multiparticle Dynamics (ISMD13), *Chicago, Sep. 2013*
- “The Case for Jet Substructure”, SEARCH 2013, *Stonybrook, Aug. 2013*
- “Theoretical Progress in Dissecting Jets”, Boost 2013, *Flagstaff, Aug. 2013*
- “Supersymmetry at the Frontiers” (Rapporteur Talk), Snowmass on the Pacific, *KITP, Santa Barbara, May 2013*
- “The Higgs Boson: Triumph of the Standard Model”, 24th Annual Kavli Frontiers of Science, National Academy of Sciences, *U.C. Irvine, Nov. 2012*
- “Jet Substructure and N-subjettiness”, Monte Carlo for Beyond the Standard Model 2012, *Cornell U., Mar. 2012*
- “Big Questions in Particle Physics” (Pedagogical Lecture), PANIC11, *MIT, Jul. 2011*
- “Two Views of the Universe” (Closing Talk), Hadron Collider Physics Symposium, *Toronto, Aug. 2010*
- “Supersymmetry Breaks (Again)”, in honor of Gerry Guralnik’s 2010 Sakurai Prize, *Brown U., May 2010*
- “Goldstini”, Emerging Problems in Particle Phenomenology, *ITS/CUNY, Apr. 2010*
- “The Window to the Terascale” (Opening Talk), Physics in the LHC Era, *Aspen Center for Physics, Feb. 2009*

## Research Contracts and Grants

- AI Research Institute, “Institute for Artificial Intelligence and Fundamental Interactions (IAIFI)”, National Science Foundation, *2020–2025* (\$20,000,000)
- MIT International Science and Technology Initiative, “The Quest for Dark Matter Interactions” (MIT-Israel Zuckerman STEM Fund Award with Tracy Slatyer, Tomer Volansky, and Yotam Soreq), *2020–2021* (\$25,500)
- Partnership for Innovation, Education and Research, “Probing the Standard Model with Jet Substructure” (PIER Hamburg-MIT Seed Project with Gregor Kasieczka, Phil Harris, Andreas Hinzmann, Roman Kogler, and Iain Stewart), *2019–2020* (€17,000)
- U.S. Department of Energy, Office of High Energy Physics, “Quantum Algorithms for Collider Physics” (QuantISED Award with Aram Harrow), *2018–2020* (\$264,000)
- Simons Foundation, “Theoretical Investigations In and Beyond the Standard Model” (Simons Fellowship), *2018–2019* (\$142,783)
- U.S. Department of Energy, Office of High Energy Physics, “Boosting the Search for New Physics at the Frontiers”, *2016–2017* (\$120,000)
- MIT Research Support Committee, “Boosting Jet Physics with Archival Collider Data” (The Charles E. Reed Faculty Initiatives Fund), *2015–2017* (\$75,000)
- MIT International Science and Technology Initiative, “Beyond the Standard Model at the LHC” (MIT-Belgium Seed Fund Award with Fabio Maltoni), *2013–2014* (\$23,100)
- Alfred P. Sloan Foundation, “Sloan Research Fellowship”, *2013–2016* (\$50,000)

- MIT International Science and Technology Initiative, “Probing a New Energy Frontier with Jets at the Large Hadron Collider” (Global Seed Fund Award with Iain Stewart, Andre Hoang, and Gavin Salam), *2012–2013* (\$15,000)
- U.S. Department of Energy, Office of Science, “Interpreting New Data from the Energy Frontier” (Early Career Research Award), *2011–2016* (\$750,000)
- *Cooperative research agreement*: U.S. Department of Energy, Office of Science, “Laboratory for Nuclear Science, High Energy Physics Program: Task C, Center for Theoretical Physics”

## MIT Educational Commons

- Originator of “Flexible P/NR” grading option (*Approved by MIT Faculty, May 2020*)
- Faculty Committees: Committee on Curricula (see above)
- UROP Supervision: 15 students (see above)
- First-Year Advising: 4 students (see above)
- Teaching General Institute Requirements (GIR): 8.02 (*Spring 2014, Spring 2015, Spring 2016*)
- Physics@MIT Journal, “Listening for Dark Matter from the Basement of Building 24” (with Lindley Winslow), *Fall 2019*
- MIT Postdoctoral Association, “Making the Cut - Job Searching During a COVID-19 Economy: A Panel Discussion”, *Jun. 2020*
- MIT Graduate Student Council, “The Nuts and Bolts of Academic Job Search”, *Jul. 2018*
- MIT Lecture Series Committee, Q&A for “Particle Fever”, *Sep. 2014*
- MIT PhysPOP Orientation Lecture, “Implications of the Higgs Boson”, *Aug. 2013*
- MIT MISTI Presentation, “The Higgs Boson: Keystone of the Standard Model”, *Apr. 2013*
- MIT Physics Astronomical Event, “Dark Matter Beyond the Standard Model”, *Oct. 2012*
- MIT Physics Alumni Breakfast, “Hints of New Physics at the Energy Frontier”, *May 2012*
- MIT PhysPOP Orientation Lecture, “Beyond the Standard Model at the Frontiers”, *Aug. 2011*
- MIT Physics IAP Lecture, “The LHC Won’t Destroy the Planet (But Will Spark a Revolution)”, *Jan. 2010*