

Matt LeBlanc, Ph.D.

Curriculum vitae

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Contact Info

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Research in Experimental High-Energy Physics

Member of the **CMS Collaboration** since 2024.

Member of the **ATLAS Collaboration** from 2010-2023 (signing author, 2015-2024).

- Differential jet and jet substructure measurements.
- Hadronic object reconstruction & calibration; boosted object tagging.
- Searches for new particles, particularly in hadronic final states.
- (*prev.*) Characterization of prototype, radiation-hard CMOS pixel sensors.

Positions

Brown University

January 2024 — Present

Providence, Rhode Island, USA

Assistant Professor of Physics (Research)

- **Affiliate:** [The NSF AI Institute for Artificial Intelligence and Fundamental Interactions \(IAIFI\)](#)
- **Affiliate:** [Brown University Data Science Institute \(DSI\)](#)
- **Affiliate:** [Brown Centre for Fundamental Physics of the Universe \(CFPU\)](#)

University of Manchester

April 2023 — December 2023*

Manchester, Greater Manchester, England, UK

Postdoctoral Research Associate

- *Resigned to begin faculty position at Brown University.*

CERN

January 2021 — March 2023

Meyrin, Geneva, Switzerland

Senior Research Fellow

University of Arizona

July 2017 — December 2020

Tucson, Arizona, USA

Postdoctoral Research Associate

Education

University of Victoria

Fall 2011 — Spring 2017

Victoria, British Columbia, Canada

Ph.D., Experimental Particle Physics

Advisor: Rob McPherson (Victoria / IPP)

Acadia University

Fall 2007 — Spring 2011

Wolfville, Nova Scotia, Canada

B.Sc.(H.), Physics & Mathematics

J. L. Ilsley High School

Fall 2004 — Spring 2007

Halifax, Nova Scotia, Canada

French Immersion

Appointments in International Collaborations

ATLAS Collaboration

- **Physics Coordination**, *ex officio* member (Jet/EtMiss Convenership), 2022-2023.
- **Jet/EtMiss Combined Performance Group Convener**, 2022-2023.
 - **Coordination of work from ~200 contributing physicists**, across five subgroups on topics related to jet and missing transverse momentum reconstruction, calibration, software and R&D for new approaches.
 - **Oversight of ~30 'Authorship Qualification Projects'** (work typically performed by new graduate students, postdocs and faculty when joining the collaboration).
 - **Led the collaboration-internal review of public results**, including 6 peer-reviewed publications, 12 other preliminary results and ~25 presentations at international conferences that were prepared by members of the group.
- **Subgroup Convener**, Standard Model Jet & Photon Physics, 2020-2022.
 - *Management and review of ~15 ongoing physics measurements and associated publications.*
- **Subgroup Convener**, Jet/EtMiss Definitions & MC Calibrations, 2019-2020.
 - *Coordination of research activities for ~30 researchers working in the area of hadronic object reconstruction and calibration using simulation-based techniques.*
- **Subgroup Convener**, Jet/EtMiss Jet Energy Scale & Resolution, 2018-2019.
 - *Coordination of research activities for ~80 scientists working in this the area of jet reconstruction and calibration using both in situ and simulation-based techniques.*
- Other roles
 - **Shift Leader**, ATLAS Control Room. *Run 2, 3 pp and Pb+Pb data-taking & pilot-beam operations between 2018-2022.*
 - **Coordinator**, core software ('Athena') code review shifts. 2017-2021.
 - **Liaison**, between Jet/EtMiss and Supersymmetry Groups. 2017-2020.
 - **Calo/Forward Detector Shifter**, ATLAS Control Room. *Run 2 pp data-taking in 2015.*

Awards

CTEQ Collaboration **Wu-Ki Tung Award for Early-Career Research in QCD**, 2022.

Citation: "For important contributions to the measurements of QCD dynamics using jets and jet substructure, as well as for long standing contributions and leadership in jet reconstruction and calibration."

NSERC	Postgraduate Scholarship - Doctoral , 2014-2017.
University of Victoria	President's Research Scholarship , 2012-2013, 2014-2017.
NSERC	Alexander Graham Bell Canada Graduate Scholarship , 2012-2013.
University of Victoria	Fellowship , 2011-2012.
Acadia University	'University Scholar' Designation , 2011.
AUPAC 2011	NSERC Representative's Honourable Mention (Presentation Prize).
TRIUMF	Summer Student Award - Atlantic Region , 2010.
NSERC	Undergraduate Summer Research Award , 2010, <i>Declined</i> .
Acadia University	Kenneth A. Killam Award , 2010.
Acadia University	Dr. Lalia B. Chase Scholarship , 2008, 2009, 2010.
Acadia University	Honours Research Summer Award , 2009.
Acadia University	Acadia Physics Departmental Scholarship , 2009.
Acadia University	Edgar Delap Bent Memorial Scholarship in Physics , 2008.
Acadia University	Alfred D. Arthurs Scholarship in Chemistry , 2007.
Acadia University	Acadia Excellence Scholarship , 2007.

Publications and preliminary results

I am an author of over 828 peer-reviewed results since 2015, as a member of the ATLAS Collaboration. Listed below are selected results where I have made a personal contribution.

In experimental high-energy physics, a **Contact Editor** is a leadership role on an analysis team, acting as a point of contact to the larger experimental collaboration. They are responsible for coordinating analysis efforts, preparing the manuscript, and for ensuring that the physics results are produced in a timely and accurate manner.

Precision jet and jet substructure measurements

Papers

- ATLAS Collaboration, *Measurement of Jet Track Functions in ATLAS Run 2 Data*.
 - * Theory associate for analysis (STA): Ian Moult (Yale)
 - * **Preliminary public result** for BOOST 2024: [ATLAS-CONF-2024-012](#)
- ATLAS Collaboration, *Measurements of jet cross-section ratios in 13 TeV proton--proton collisions with ATLAS*. Phys. Rev. D 110 (2024) 7, 072019. [ATLAS-STDm-2020-04](#), [arXiv:2405.20206 \[hep-ex\]](#).
 - * *Contact editor*
- ATLAS Collaboration, *Measurements of Lund subjet multiplicities in 13 TeV proton-proton collisions with the ATLAS detector*. Phys. Lett. B 859 (2024) 139090. [ATLAS-STDm-2023-07](#), [arXiv:2402.13052 \[hep-ex\]](#).
 - * Contact editor
- ATLAS Collaboration, *Measurements of multijet event isotropies using optimal transport with ATLAS*. J. High Energ. Phys. 10 (2023) 060. [doi:10.1007/JHEP10\(2023\)060](#). [arXiv:2305.16930 \[hep-ex\]](#).
 - * Contact editor
 - * Theory associate for analysis (STA): Cari Cesarotti (MIT)
 - * ATLAS physics briefing: [Giving collisions a new shape: New ATLAS result measures isotropy of LHC events](#).
- ATLAS Collaboration, *Measurement of the Lund Jet Plane with charged particles in 13 TeV pp collisions with the ATLAS detector*. Phys. Rev. Lett. 124 (2020) 222002. [ATLAS-STDm-2018-57](#), [arXiv:2004.03540 \[hep-ex\]](#).
 - * Contact editor
 - * ATLAS physics briefing: [Novel probes of the strong force: precision jet substructure and the Lund jet plane](#)
- ATLAS Collaboration, *A measurement of soft-drop jet observables in pp collisions with the ATLAS detector at $\sqrt{s}=13$ TeV*. Phys. Rev. D 101, 052007 (2020). [ATLAS-STDm-2017-33](#), [arXiv:1912.09837 \[hep-ex\]](#).
 - * ATLAS physics briefing: [Novel probes of the strong force: precision jet substructure and the Lund jet plane](#)

Hadronic object reconstruction and calibration

Papers

- ATLAS Collaboration, *A precise measurement of the jet energy scale derived from single-particle measurements and in situ techniques in proton-proton collisions at $\sqrt{s}=13$ TeV with the ATLAS detector*. Submitted to Eur. Phys. J. C. [ATLAS-JETM-2022-06](#), [arXiv:2407.15627 \[hep-ex\]](#).
- ATLAS Collaboration, *New techniques for jet calibration with the ATLAS detector*. Eur. Phys. J. C 83 (2023) 761. [ATLAS-JETM-2022-01](#), [arXiv:2303.17312 \[hep-ex\]](#).
- ATLAS Collaboration, *Optimisation of large-radius jet reconstruction for the ATLAS detector in 13 TeV proton-proton collisions*. Eur. Phys. J. C 81 (2021) 4, 334. [ATLAS-JETM-2018-06](#), [arXiv:2009.04986 \[hep-ex\]](#).
 - * Contact editor
- ATLAS Collaboration, *Jet energy scale and resolution measured in pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector*. Eur. Phys. J. C 81 (2021) 8, 689. [ATLAS-JETM-2018-05](#), [arXiv:2007.02645 \[hep-ex\]](#).
- ATLAS Collaboration, *In situ calibration of large-radius jet energy and mass in 13 TeV proton-proton collisions with the ATLAS detector*. Eur. Phys. J. C 79 (2019) 135. [ATLAS-JETM-2018-02](#), [arXiv:1807.09477 \[hep-ex\]](#).
 - * Contact editor
 - * CERN Courier Article. [A decade of advances in jet substructure](#). 28 September, 2018.
- ATLAS Collaboration, *Identification of high transverse momentum top quarks in pp collisions at $\sqrt{s}=8$ TeV with the ATLAS detector*. Journal of High Energy Physics, 06, 093 (2016). [ATLAS-PERF-2015-04](#), [arXiv:1603.03127 \[hep-ex\]](#).
 - * ATLAS Physics Briefing: [ATLAS ready to “boost” Run 2 physics](#).

Preliminary results

- ATLAS Collaboration, *Constituent-based W-boson tagging with the ATLAS Detector*. [ATL-PHYS-PUB-2023-020](#), Public note (Preliminary result). July 2023.
 - * ATLAS Physics Briefing: [\[ML\] is revolutionising our understanding of particle “jets”](#)
- ATLAS Collaboration, *Identification of hadronically-decaying top quarks using UFO jets with ATLAS in Run 2*. [ATL-PHYS-PUB-2021-028](#), Public note (Preliminary result). July 2021.
- ATLAS Collaboration, *Impact of Alternative Inputs and Jet Grooming on Large-R Jet Performance*. [ATL-PHYS-PUB-2019-027](#), Public note (Preliminary result). July 2019.
 - * Contact editor
- ATLAS Collaboration, *Impact of Pile-up on Jet Constituent Multiplicity in ATLAS*. [ATL-PHYS-PUB-2018-011](#), Public note (Preliminary result). July 2018.
- ATLAS Collaboration, *Impact of Alternative Inputs and Grooming Methods on Large-R Jet Reconstruction in ATLAS*. [ATL-PHYS-PUB-2017-020](#), Public note (Preliminary result). December 2017.
- ATLAS Collaboration, *Jet reclustering and close-by effects in ATLAS Run 2*. [ATLAS-CONF-2017-062](#), Preliminary conference result for [BOOST 2017](#), Buffalo, New York, USA. 17-21 July, 2017.
 - * Contact editor

Public plots

- ATLAS Collaboration, *Summary plots: anti-kt $R=0.4$ precision jet energy scale uncertainty (Rel. 21)*. [JETM-2023-005](#), public plots (November 2023).
- ATLAS Collaboration, *LAr Cells in Clusters with Timing*. [LARG-2023-05](#), public plots (July 2023).
- ATLAS Collaboration, *Comparison of W tagging performance with different ML algorithms*. [JETM-2023-003](#), public plots (July 2023).
- ATLAS Collaboration, *E/p measurements and Geant4 physics list comparisons*. [JETM-2020-03](#), public plots (November 2020).
- ATLAS Collaboration, *In situ large- R jet energy scale calibration and uncertainties in 2015-2017 data*, [JETM-2019-05](#), public plots (July 2019).
- ATLAS Collaboration, *Particle flow jet energy scale in 2015-2017 data and simulation*. [JETM-2019-02](#), public plots (February 2019).
- ATLAS Collaboration, *Particle flow jet energy resolution in 2017 data and simulation*. [JETM-2019-01](#), public plots (February 2019).
- ATLAS Collaboration, *Jet energy scale and uncertainties in 2015-2017 data and simulation*. [JETM-2018-006](#), public plots (November 2018).
- ATLAS Collaboration, *Jet energy resolution in 2017 data and simulation*. [JETM-2018-005](#), public plots (September 2018).
- ATLAS Collaboration, *Stability of jet mass for top, W , and light jets as a function of pile-up*. [JETM-2016-014](#), public plots (December 2016).

Searches for new particles

Papers

- ATLAS Collaboration, *Pursuit of paired dijet resonances in the Run 2 dataset with the ATLAS detector*. Phys. Rev. D 108 (2023) 112005. [ATLAS-EXOT-2022-18](#). [arXiv:2307.14944](#) [[hep-ex](#)].
 - * *Contact editor*
- ATLAS Collaboration, *Constraints on mediator-based dark matter models using $\sqrt{s} = 13$ TeV pp collisions at the LHC with the ATLAS detector*. [ATLAS-EXOT-2017-32](#), J. High Energ. Phys. 05 (2019) 142. [arXiv:1903.01400](#) [[hep-ex](#)].
- ATLAS Collaboration, *Combination of the searches for pair-produced vector-like partners of the third-generation quarks at $\sqrt{s} = 13$ TeV with the ATLAS detector*. Phys. Rev. Lett. 121 (2018) 211801. [ATLAS-EXOT-2017-17](#), [arXiv:1808.02343](#) [[hep-ex](#)].
 - * Physical Review Letters “Editor’s Suggestion”
 - * CERN Press statement. [The incredible lightness of the Higgs \(Français\)](#).
 - * ATLAS Physics Briefing. [Could a new type of quark fix the “unnaturalness” of the Standard Model?](#)
- ATLAS Collaboration, *Search for new phenomena in events with same-charge leptons and b -jets in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*. J. High Energ. Phys. 12 (2018) 039. [ATLAS-EXOT-2016-16](#), [arXiv:1807.11883](#) [[hep-ex](#)].
- ATLAS Collaboration, *Search for Supersymmetry in final states with missing transverse momentum and multiple b -jets in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS*

detector. *J. High Energy Phys.* 06 (2017) 107. [ATLAS-SUSY-2016-10](#), [arXiv:1711.01901 \[hep-ex\]](#).

- ATLAS Collaboration, *Search for pair production of gluinos decaying via stop and sbottom in events with b-jets and large missing transverse momentum in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*. *Physical Review D* 94, 032003 (2016). [ATLAS-SUSY-2015-10](#), [arXiv:1605.09318 \[hep-ex\]](#).
- ATLAS Collaboration, *Search for direct pair production of the top squark in all-hadronic final states in proton-proton collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector*. *Journal of High Energy Physics*, 09, 015 (2014). [ATLAS-SUSY-2013-16](#), [arXiv:1406.1122 \[hep-ex\]](#).

High-energy physics phenomenology

Papers

- **(In-prep.)** S. Dong & M. LeBlanc, *More from Less: Applying Lossy Compression Algorithms to Particle-Level Datasets*.
- **(In-prep.)** R. Gambhir, M. LeBlanc & Y. Zhou, *Resilient Jet Tagging*.
- C. Cesarotti & M. LeBlanc, *A Field Guide to Event-Shape Observables Using Optimal Transport*. Submitted to JHEP. [arXiv:2409.13150 \[hep-ph\]](#).
- M. LeBlanc, B. Nachman & C. Sauer, *Going off topics to demix quarks and gluons in extractions of α_s* . *J. High Energy Phys.* 02 (2023) 150. [arXiv:2206.10642 \[hep-ph\]](#).
- B. Nachman, S. Rappoccio, N. Tran (editors) *et al.* *Jets and Jet Substructure at Future Colliders*. *Front. Phys.* 10, 22 June 2022. [arXiv:2203.07462 \[hep-ph\]](#).

Preliminary results

- ATLAS Collaboration, *Towards a precise interpretation of the top quark mass parameter in ATLAS Monte Carlo samples*. [ATL-PHYS-PUB-2021-034](#), Public Note (Preliminary result). July 2021.
 - * Contact editor
 - * This work was a phenomenological study performed within the ATLAS Collaboration, involving several associated theoretical physicists : Andre Hoang (Vienna), Sonny Mantry (Georgia Tech), Adithya Pathak (Vienna), Iain Stewart (MIT)

Conference and workshop proceedings

- M. Donegà, S. Jones, K. Köneke, R. Röntsch, P. Azure, A. Hinzmann, A. Huss, J. Huston, S. Marzani, M. Pellen, S. Höche, J. McFayden, V. Mikuni, S. Plätzer *et al.* *Les Houches 2023: Physics at TeV Colliders: Standard Model Working Group Report*. [arXiv:2406.00708 \[hep-ph\]](#). Proceedings of the 2023 Les Houches Workshop on Physics at TeV Colliders, Les Houches, France. 12-30 June 2023.
 - * Contributor to Standard Model Phenomenology subgroup (Jet Substructure) and Monte Carlo Generators, Tools & Machine Learning subgroup (MC modeling uncertainties).

- M. LeBlanc, on behalf of the ATLAS and CMS Collaborations, *Jet and photon physics in ATLAS and CMS*. Proceedings of the 56th Rencontres de Moriond on QCD and High Energy Interactions, La Thuile, It, 19 - 26 Mar 2022. [ATL-PHYS-PROC-2022-049](#).
- M. LeBlanc, on behalf of the ATLAS Collaboration. Measurements of event shapes and jet substructure with ATLAS Run 2 data. Proceedings of the Eighth annual conference on Large Hadron Collider Physics (LHCP 2020) — [PoS\(LHCP2020\)144](#). Online. [ATL-PHYS-PROC-2020-047](#).
- D. De Florian, M. Donegà, M. Dührssen-Debling, S. Jones, J. Bendavid, A. Huss, J. Huston, S. Kallweit, D. Maître, S. Marzani, B. Nachman, V. Ciulli, S. Prestel, E. Re, *et al.* *Les Houches 2019: Physics at TeV Colliders: Standard Model Working Group Report*. [arXiv:2003.01700 \[hep-ph\]](#). Proceedings of the 2019 Les Houches Workshop on Physics at TeV Colliders, Les Houches, France. 10-28 June 2019.
 - * Contributor to jet working group, jet substructure studies.
- M. LeBlanc, on behalf of the ATLAS Collaboration. *Inclusive searches for squarks and gluinos with the ATLAS detector*. Proceedings of XXVI International Workshop on Deep-Inelastic Scattering and Related Subjects — [PoS\(DIS2018\)078](#). 16-20 April 2018. Kobe, Hyogo, Japan. [ATL-PHYS-PROC-2018-080](#).
- R. P. Taylor *et al.* *The evolution of cloud computing in ATLAS*. Journal of Physics: Conference Series, Volume 664, Clouds and Virtualization (CHEP 2015, Okinawa, Japan).

Silicon detector research & development

- D. V. Berlea *et al.* *Depletion depth studies with the MALTA2 sensor, a depleted monolithic active pixel sensor*. *Nucl.Instrum.Meth.A* 1063 (2024) 169262. Proceedings of the 13th international ‘Hiroshima’ Symposium on the Development and Application of Semiconductor Tracking Detectors ([HSTD13](#)).
- D. V. Berlea *et al.* *Radiation Hardness of MALTA2, a Monolithic Active Pixel Sensor for Tracking Applications*. *IEEE Trans.Nucl.Sci.* 70 (2023) 10, 2303-2309.
- C. Solans Sánchez *et al.* MALTA monolithic pixel sensors in TowerJazz 180 nm technology. *Nucl.Instrum.Meth.A* 1057 (2023) 168787. Proceedings of the 30th International Workshop on Vertex Detectors ([VERTEX2021](#)).
- M. van Rijnbach *et al.* *Performance of the MALTA telescope*. *EPJC* 83 (2023) 7, 581. [2304.01104 \[hep-ex\]](#).
- D. Dobrijević *et al.*, *Future developments of radiation tolerant sensors based on the MALTA architecture*. *JINST* 18 (2023) 03, C03013. Proceedings of the 2022 Topical Workshop on Electronics for Particle Physics ([TWEPP-22](#)).
- F. Dachs *et al.* *Development of a large-area, light-weight module using the MALTA monolithic pixel detector*. *NIM A* 1047 (2023) 167809. Proceedings of the 15th Pisa Meeting on Advanced Detectors ([PM2021](#)).
- H. Pernegger *et al.* *MALTA-Cz: A radiation hard full-size monolithic CMOS sensor with small electrodes on high-resistivity Czochralski substrate*. *JINST* 18 (2023) 09, P09018. [arXiv:2301.03912 \[physics.ins-det\]](#).

- G. Gustavino *et al.* *Timing performance of radiation-hard MALTA monolithic pixel sensors*, JINST 18 (2022) 03, C0301. [arXiv:14676 \[physics.ins-det\]](#). Proceedings of the 23rd international workshop on Radiation Imaging Detectors ([IWORID 2022](#)).
- D. Dobrijević *et al.* *MALTA3: Concepts for a new radiation tolerant sensor in the TowerJazz 180 nm technology*. NIM A 1040 (2022) 167226. Proceedings of Vienna Conference on Instrumentation 2022 ([VCI2022](#)).
- M. van Rijnbach *et al.*, *Radiation hardness and timing performance in MALTA monolithic pixel sensors in TowerJazz 180 nm*. [JINST 17 \(2022\) 04, C04034](#). Proceedings of [TWEPP21](#).
- M. LeBlanc *et al.* *Recent results with radiation-tolerant TowerJazz 180 nm MALTA Sensors*. Nucl.Instrum.Meth.A 1041 (2022) 167390. [arXiv:2209.04459 \[physics.ins-det\]](#). Proceedings of Vienna Conference on Instrumentation 2022 ([VCI2022](#)).
- F. Piro *et al.* *A 1 μ W radiation-hard front-end in a 0.18 μ m CMOS process for the MALTA2 monolithic sensor*. [IEEE Trans. Nucl. Sci. 69 6 1299-1309](#), June 2022.

Other

M. LeBlanc & M. D. Robertson, *Imaging of Electron Trajectories in Crystals*. Bulletin Société de Microscopie du Canada, 37(2), 20 (2009).

Research Presentations

Plenary and invited talks

- *Working Group 1 Summary: Minimum Bias, Underlying Event & Monte Carlo Generators.* 14th International Workshop on Multi-Parton Interactions at the LHC (MPI@LHC 2023). University of Manchester, Manchester, England. 20-24 November 2023. Plenary.
- *Studies of hadronisation and the Underlying Event / Multi-Parton Interactions with ATLAS Run 2 Data.* 14th International Workshop on Multi-Parton Interactions at the LHC (MPI@LHC 2023). University of Manchester, Manchester, England. 20-24 November 2023. Plenary, on behalf of the ATLAS Collaboration.
- *Testing the Strong Force with Photons and Jets.* Standard Model at the LHC (SM@LHC 2023). Fermilab National Laboratory, Batavia, Illinois, USA. 10-14 July 2023. Plenary, on behalf of the ATLAS and CMS Collaborations.
- *Overview (Experimental).* 14th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP (BOOST 2022). Universität Hamburg, Hamburg, Germany. 15-19 August, 2022. Plenary.
- *Jet Reconstruction in ATLAS.* Semi-Visible Jets Workshop 2022, ETH Hönggerberg, Zürich, Switzerland. 5-7 July, 2022. Plenary, on behalf of the ATLAS Collaboration.
- *Jet and photon physics in ATLAS and CMS.* 56th Rencontres de Moriond: QCD and High-Energy Interactions Session. La Thuile, Aosta, Italy. 19-26 March, 2022. Plenary, on behalf of the ATLAS and CMS Collaborations.
- *Jet substructure and event shapes with ATLAS.* 8th annual Conference on Large Hadron Collider Physics (LHCP 2020). Online. 25-30 May, 2020. Parallel, on behalf of the ATLAS Collaboration.
- *Standard Model Highlights & Prospects.* 2019 Brookhaven Forum: Particle Physics & Cosmology in the 2020's. Brookhaven National Laboratory, Upton, New York, USA. 25-27 September, 2019. Plenary, On behalf of the ATLAS and CMS collaborations.
- *Hadronic final state reconstruction in ATLAS SUSY searches.* 11th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP (BOOST 2019). Cambridge, Massachusetts, USA. 21-27 July, 2019. Plenary, on behalf of the ATLAS Collaboration.
- *Inclusive searches for squarks and gluinos with the ATLAS detector.* 26th International Workshop on Deep-Inelastic Scattering and Related Topics (DIS 2018). Kobe, Hyogo, Japan. 16-20 April, 2018. Parallel, on behalf to the ATLAS Collaboration.
- *Tagging boosted top quarks and Higgs bosons in ATLAS.* 7th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP (BOOST 2015), Chicago, IL, USA. 10-14 August, 2015. Plenary, on behalf of the ATLAS Collaboration.

Parallel and contributed talks

- *Giving events a new shape : measurements of multijet event isotropy at ATLAS using optimal transport.* [ML4Jets 2023](#). DESY, Hamburg, Germany. 6-10 November 2023. Plenary, on behalf of the ATLAS Collaboration.
- *Breaking q/g degeneracies when extracting the strong coupling from jet substructure.* [First Lund Jet Plane Institute](#), CERN Theory Department. 3-7 July 2023. Plenary.
- *Going off topics to demix quarks and gluons when extracting α_s .* [14th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP \(BOOST 2022\)](#). Universität Hamburg, Hamburg, Germany. 15-19 August, 2022. Plenary.
- *Recent results with radiation-tolerant TowerJazz 180 nm MALTA Sensors.* [The 16th Vienna Conference on Instrumentation \(VCI2022\)](#). Online. 21-25 February, 2022. Plenary.
- *Precision jet substructure measurements with ATLAS Run 2 data.* [APS Virtual Meeting](#), online, 18-21 April, 2020. Parallel, on behalf of the ATLAS Collaboration.
- *Novel Probes of QCD: Jet Substructure Measurements at the LHC.* [2019 Meeting of the Department of Particles & Fields of the American Physical Society](#). Boston, Massachusetts, USA. 29 July - 2 August, 2019. Parallel, on behalf of the ATLAS, CMS, ALICE and LHCb collaborations.
- *Direct stop production in boosted hadronic final states.* [50th Winter Nuclear and Particle Physics Conference](#). Banff, AB, Canada. February 16, 2013.
- *Top-antitop cross section measurement with the ATLAS detector at the LHC.* [Atlantic Universities Physics and Astronomy Conference \(AUPAC\)](#). St. Francis-Xavier University, Antigonish, NS, Canada. February 4-6, 2011.
- *Top-antitop cross section measurement with the ATLAS detector at the LHC.* [52nd Canadian Undergraduate Physics Conference \(CUPC\)](#). Dalhousie University, Halifax, NS, Canada. October 13-16, 2010.
- *Simulation and interpretation of HA-ADF images in scanning transmission electron microscopy.* [Atlantic Universities Physics and Astronomy Conference \(AUPAC\)](#). Acadia University, Wolfville, NS, Canada. February 5-7, 2010.

Poster presentations

- *Comparative performance of ATLAS boosted W taggers using different AI/ML algorithms.* [15th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP \(BOOST 2023\)](#). Lawrence Berkeley National Laboratory, Berkeley, California, USA. 31 July - 4 August, 2023. Poster, on behalf of the ATLAS Collaboration.
- *Measurements and Applications of Jet Substructure with the ATLAS Detector.* [2019 Meeting of the Department of Particles & Fields of the American Physical Society](#). Boston, Massachusetts, USA. 29 July - 2 August, 2019. Poster, on behalf of the ATLAS Collaboration.
- *Impact of Alternative Inputs and Grooming Methods on Large- R Jet Reconstruction in ATLAS.* [133rd LHCC Meeting Open Session](#). CERN, Geneva, Switzerland. 26 February - 2 March, 2018. Poster, on behalf of the ATLAS Collaboration.
- *Jet reclustering and close-by effects in ATLAS Run 2.* [8th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP \(BOOST 2017\)](#). Buffalo, NY, USA. 16-21 July, 2017. Poster, on behalf of the ATLAS Collaboration.

Invited Seminars and Colloquia

- *Jet Propulsion: Advancing the performance and understanding of hadronic objects for Run 3.*
 - * November 17, 2023. **University of Manchester**, Bohr high-energy physics seminar.
 - * November 16, 2023. **University of Warwick**, high-energy physics seminar.
 - * November 14, 2023. **Cambridge University**, high-energy physics seminar.
- *Perspectives on hadronic final states, from up close & far away.*
 - * May 24, 2023. **Università di Genova**, seminar on phenomenology of particle physics.
- *Advances in Jet Physics: Insights into Hadronic Final States & the Strong Force (...)*
 - * March 27, 2023. **Brookhaven National Laboratory**, invited seminar.
 - * March 23, 2023. **Southern Methodist University**, invited seminar.
- *MAPS to Discoveries.*
 - * October 21, 2021. **Argonne National Laboratory (online)**, invited seminar.
- *Inside and Out: Precision Jet Physics in ATLAS Run 2.*
 - * July 5, 2019. **Georg-August-Universität Göttingen**, summer seminar series.

Other presentations (local, internal workshops, etc.)

- *Closing Summary. ATLAS Hadronic Calibration Workshop 2023.* Instituto de Física Corpuscular (IFIC). Valencia, Spain. September 8, 2023.
- *Summary of BOOST 2021. Snowmass Energy Frontier Workshop — Restart,* online, 30 August - 3 September, 2021. Parallel.
- *Highlights of LHCP 2020.* ATLAS Weekly Meeting. CERN (virtual). 9 June, 2020.
- *Jets and missing transverse energy in Run 3. ATLAS Physics & Performance Week.* CERN. January 27-31, 2020.
- *Post-mortem: hadronic object reconstruction in Run 2. ATLAS Run 2 Physics — Reaching New Heights Workshop.* CERN. December 9-13, 2019.
- *ATLAS jet substructure measurements. ATLAS Standard Model Physics Workshop.* University of Belgrade, Belgrade, Serbia. September 17-20, 2019.
- *Status and Challenges of Jet Reconstruction, Substructure and Missing Transverse Energy. US ATLAS Hadronic Final State Forum XIII.* Lawrence Berkeley National Laboratory, Berkeley, California, USA. December 10-14, 2018.
- *Novel Probes of QCD.* ATLAS End-of-Year Jamboree 2018. CERN. December 7, 2018.
- *Jet substructure — beyond tagging. ATLAS Hadronic Calibration Workshop XIII.* Toronto, Canada. 28 August - 1 September, 2017.
- *Tagging boosted objects. ATLAS Hadronic Calibration Workshop XII.* Corfu Summer Institute, Corfu, Greece. September 22, 2016.
- *Searching for stops with boosted tops.* NSERC funding agency review of ATLAS Canada. TRIUMF, Vancouver, BC, Canada. December 11, 2014.
- *Direct stop production in boosted hadronic final states. ATLAS Canada Workshop.* Simon Fraser University, Vancouver, BC, Canada. May 8, 2013.

Supervision and mentoring

External mentees, e.g. summer students with a primary supervisor from a different institution, or PhD students from another institution whose dissertation analysis I directed, are indicated with an asterisk (*).

Ph.D. students

- **Rishabh Jain**, Brown University, Providence, Rhode Island, USA. *Research supervisor*. Anticipated graduation: 2027.
- ***Jingjing Pan**, Yale University, New Haven, Connecticut, USA. *Thesis analysis mentor*. Primary Supervisor: Keith Hamilton. PhD defended 7 August 2024.
 - * **Thesis:** *Exploring the Standard Model and Beyond Through the Lens of Jet Substructure and Deep Learning with the ATLAS Experiment*
- ***Emily Smith**, University of Chicago, Chicago, Illinois, USA. *Thesis analysis mentor*. Primary Supervisor: David Miller. PhD defended 30 October 2023.
 - * **Thesis:** *A Global View of Jets With the ATLAS Detector: From Hardware Triggers to Precision Measurements and Beyond* ([online](#))
 - * **Afterward:** Lederman Fellow, Fermi National Accelerator Laboratory (Fermilab).
- ***Christof Sauer**, Kirchoff-Institut für Physik, Physikalisches Institute, Heidelberg, Germany. *Thesis analysis mentor*. Primary Supervisor: Andre Schöning. PhD defended 24 October 2023.
 - * **Thesis:** *Measurement of the Triple-Differential Cross-Section for the Production of Multijet Events using 139 fb⁻¹ of Proton-Proton Collision Data at $\sqrt{s} = 13$ TeV with the ATLAS Detector to Disentangle Quarks and Gluons at the Large Hadron Collider* ([online](#))
 - * **Afterward:** Postdoctoral Associate, Kirchoff-Institut für Physik, Physikalisches Institute, Heidelberg, Germany.

M.Sc. students

- **Shutong Dong**, Brown University, Providence, Rhode Island, USA. *Research supervisor*. Anticipated graduation: 2025.
 - * **Thesis:** *Studies of the effects of lossy compression on jet reconstruction and classification at the LHC. (working title.)*
- **Yuanchen Zhou**, Brown University, Providence, Rhode Island, USA. *Research supervisor*. Anticipated graduation: 2025.
 - * **Thesis:** *Applications of knowledge distillation in jet classification at the LHC. (working title.)*

B.Sc. Students

- **Austine Zhang**, Brown University, Providence, Rhode Island, USA.
Undergraduate Researcher, Fall 2024. (Departments of Music and Applied Mathematics)
 - * **Undergraduate Teaching and Research Award (UTRA):**
Visualizing jet algorithms at the Large Hadron Collider
- **Samuel Ferraro**, Brown University, Providence, Rhode Island, USA.
Undergraduate Researcher, 2024-25. *Co-supervisor.*
 - * **IRIS-HEP Fellow**, Summer 2024
Supervisor: Dr. Simone Pagan-Griso, Lawrence Berkeley National Laboratory
 - * **Winner:** “Most Enthusiastic Presenter” Poster Prize at the Inaugural US Muon Collider Meeting (7-9 August 2024, Fermi National Accelerator Laboratory).
 - * **Thesis:** *Studies of object reconstruction and beam-induced background mitigation at a future Muon Collider (working title.)*
- ***Jonathan Barrett**, Memorial University of Newfoundland, Corner Brook, Newfoundland, Canada. Institute of Particle Physics CERN Summer Student, 2022. *Co-supervisor.*
 - * **Afterward:** MSc Student, Memorial University of Newfoundland.
- ***Alejandro Reyes**, Cal State University, Fresno, California, USA.
Cal State CERN Summer Student, 2019. *Co-supervisor.*
- ***Hector Delgado**, Cal State University, Los Angeles, California, USA.
Cal State CERN Summer Student, 2019. *Co-supervisor.*
 - * **Afterward:** PhD Candidate (Astrobiology), University of Washington.

Advising

External Ph.D. Examiner

- **Louis Ginabat**, *Étalonnage des jets et mesures précises de sections efficaces de production de jets avec les données de l'expérience ATLAS*. Directrice de thèse: Mélissa Ridet, co-encadrant de thèse: Bogdan Malescu. Laboratoire de Physique Nucléaire et de Hautes Energies (LPNHE), Paris, France. September 25, 2023.

Research Grants

- **Brown University Data Science Initiative Seed Grant** (PI, w/ J. Roloff), *Staying positive: eliminating negative sample weights using optimal transport, 2024-2025* (\$25k).

Teaching

Brown University

- **Physics 0560**, *Experiments in Modern Physics*, primary instructor, Spring 2025.
- **Physics 0040**, *Basic Physics B*, primary instructor, Fall 2024.

Summer/Winter Schools & Pedagogical Lectures

- **BOOST Camp 2024**, *experimental instructor*.
 - Pedagogical module for 16th International Workshop on Boosted Object Phenomenology. Reconstruction and Searches in HEP (BOOST 2024), Genova, Italy. 29 July.
- **Brown University Department of Physics AI Winter Workshop**, 16-19 January 2024. *The evolution of boosted top tagging at the LHC*, co-instructor.
 - Online: <https://indico.physics.brown.edu/event/2/overview>
 - Over 470 participants registered for this workshop.

University of Victoria

- **Physics 112**, *Introductory Physics II*. *Lab Instructor*, Spring 2012.
- **Physics 112**, *Introductory Physics I*. *Lab Instructor*, Fall 2011.

Acadia University

- **Math 2723**, *Intro. Differential Equations*. *Teaching Assistant*, Spring 2010.
- **Physics 1063**, *Gen. Physics II*. *Lab Assistant*: Spring 2010.
- **Math 1023**, *Intro. Calculus II*. *Studio Assistant*: Fall 2010.
- **Physics 1053**, *Gen. Physics I*. *Lab Assistant*: Fall 2009.
- **Physics 1023**, *Intro. Physics II*. *Lab Assistant*: Spring 2009.
- **Physics Department Drop-In Help Centre**. *Tutor*, Fall 2008.

Service

Internal Service

- **Physics Department Outreach & Publications Committee**, 2024-2025.
- **Comprehensive Exam Committees**
 - **Morgan Lee**, Experimental Astrophysics and Cosmology. 2024.
 - **Oliver Carey**, Experimental Astrophysics and Cosmology. 2024.
- **Summer/Semester Projects for Research, Internship, Teaching (SPRINT) LINK Awards Reviewer**, Spring 2024.
 - *These awards provide financial support for students who may not otherwise be able to engage in unpaid and low-paid summer research, teaching, and internship opportunities.*

External Service

- **US LHC Users' Association Executive Committee (USLUEC) Member**, 2024-2026.
 - Outreach/Communications Committee, 2024-Present.
- **NSF AI Institute for Artificial Intelligence and Fundamental Interactions (IAIFI)**
 - Industry Partnership Committee, 2024-Present.
- **Electron-Ion Collider (EIC) User Group**
 - Institutional Board Representative, Brown University, 2023-Present.
- **Snowmass 2021 US HEP Community Planning Exercise**
 - Liaison, Snowmass Early-Career and Energy Frontier, 2020-2021.
 - Contact, Snowmass Early-Career Inreach Group, Fall/Winter 2020
- **American Physical Society Member**, 2019-Present.

Workshop/Conference Organization

- **Local Organizing Committee**, BOOST 2025, Providence, RI, USA. (Summer 2025)
- **International Advisory Committee**, BOOST 2025, Providence, RI, USA. (Summer 2025)
- **International Advisory Committee**, BOOST 2024, Genoa, Italy. (July 2024)
- **Experimental Convener**, "Minimum Bias, Underlying Event & Monte Carlo Generators" Session, [MPI@LHC 2023](#). Manchester, United Kingdom (November 2023).
- **Organising Committee**, [ATLAS Hadronic Calibration Workshop 2023](#). Instituto de Física Corpuscular (IFIC). Valencia, Spain (September 2023).
- **International Advisory Committee**, [BOOST 2023](#). Lawrence Berkeley National Laboratory, Berkeley, California, USA (July 2023).
- **Organizing Committee**, [First Lund Jet Plane Institute](#). CERN Theory Department (July 2023).
- **International Advisory Committee**, [BOOST 2022](#). Universität Hamburg, Hamburg, Germany (July 2022).
- **Local Organizing Committee**, [BOOST 2021](#). CERN (Online, July 2021).
- **Local Organizing Committee**, [ATLAS Hadronic Calibration Workshop 2019](#). University of Arizona. Tucson, Arizona, USA (October 2019).
- **Organizing Committee**, [ATLAS Hadronic Calibration Workshop 2018](#), Kirchoff-Institut für Physik, Physikalisches Institute. Heidelberg, Germany (September 2018).

Funding Agency Review

- NSF Graduate Research Fellowships Program (GRFP, since 2025)
- European Research Council (ERC, since April 2024)

Peer Review & Editorial Duties

- Peer Referee, *Nuclear Science and Techniques* (NST, since September 2023)
- Associate Editor, *Frontiers in Big Data and AI in High Energy Physics* (since August 2023)
- Review Editor, *Frontiers in Physics: Radiation Detectors and Imaging* (since August 2023)
- Peer Referee, *European Journal of Physics C* (EPJC, since September 2022)
- Peer Referee, *Physical Review Letters* (PRL, since June 2022)
- Peer Referee, *Journal of High-Energy Physics* (JHEP, since March 2021)

Collaboration-Internal Review

- **Analysis Review Committee.** *Jet fragmentation function and groomed substructure of bottom quark jets in proton-proton collisions at 5.02 TeV with the CMS Detector.* CMS-HIN-24-005. (In-prep.)
- **Second reader.** *R=0.4 jets input comparison and Monte Carlo calibration with the ATLAS Detector.* ATL-PHYS-PUB-2022-038. Public note (Preliminary result). August 2022.
- **Second reader.** *Transverse momentum response and reconstruction efficiency for jets from displaced decays in the ATLAS detector.* ATL-PHYS-PUB-2019-025. Public note (Preliminary result). May 2019.
- **Editorial board chair.** *Measurement of the R=0.4 jet mass in Pb+Pb and pp collisions at $\sqrt{s_{NN}}=5.02$ TeV with the ATLAS detector.* ATLAS-CONF-2018-014. Preliminary conference result for Quark Matter 2018, Venice, Italy. 14-19 May.

Open-Source Software

- G. Stark, J. Da, M. Milesi, G. Facini, J. Dandoy, K. Krizka, M. LeBlanc, T. Novak, F. Scutti, B. Tuan, A. Tuna, M. Muskinja, J. Bossio, J. Olsson, T. Lazovich, B. Tong, B. Carlson, C. Doglioni, B. Amadio, R. Zou, M. Frate, P. Bryant, M. Perego, L. Lee, L. McClymont, M. Swiatlowski, C. Nelson, C. Shimmin, A. Cukierman, A. Coccaro. *xAOD AnaHelpers v1.0.0 : ATLAS Run II analysis framework for AnalysisTop and AnalysisBase for proton-proton physics.* (2015-2022). url: <https://github.com/UCATLAS/xAODAnaHelpers>. zenodo: <https://zenodo.org/record/7335128>

Outreach

Public events and interactions

- **US LHC Users' Association Booth**, American Association of Physics Teachers Summer Meeting, Boston, Massachusetts, USA. July 2024.
- **Videoconference Moderator**, IPPOG / QuarkNet Physics Masterclasses, 2020-2023
- **ATLAS Science Cafe & Walking Tour Guide**, CERN Open Days 2019
- **Guide**, TRIUMF + Emily Carr School of Art & Design Artists-In-Residence Visits, 2014, 2015
- **Volunteer Public Tour Guide**, TRIUMF, 2013-2015
- **Local Instructor**, TRIUMF IPPOG / QuarkNet Physics Masterclasses, 2014
- **Photographer**, TRIUMF Open House, 2013
- **Local Instructor**, University of Victoria IPPOG / QuarkNet Physics Masterclasses, 2012

Magazine and online articles

- ATLAS Collaboration, *Machine learning is revolutionising our understanding of particle “jets”*. Online. 3 August 2023.
- ATLAS Collaboration, *Signal and noise: how timing measurements and AI are improving ATLAS event reconstruction*. Online. 1 August 2023.
- ATLAS Collaboration, *Giving collisions a new shape: New ATLAS result measures isotropy of LHC events*. Online. 14 July, 2023.
- ATLAS Collaboration, *A decade of advances in jet substructure*. CERN Courier. Volume 58, Number 8. October, 2018.
- ATLAS Collaboration, *ATLAS Physics Briefing: Novel probes of the strong force: precision jet substructure and the Lund jet plane*. Online. 19 April, 2020.

Graphic Design

- **Logo**, BOOST 2021, CERN (Online).
- **Poster**, ATLAS Hadronic Calibration Workshop 2019, University of Arizona. Tucson, Arizona, USA (October 2018).