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 — *Providence, Rhode Island, USA*
January 2024 — Present — **Assistant Professor of Physics (Research)**
- **Affiliate:** Brown University Data Science Institute (DSI)
- **Affiliate:** Brown Centre for Fundamental Physics of the Universe (CFPU)

University of Manchester — *Manchester, Greater Manchester, England, UK*
*April 2023 — December 2023** — **Postdoctoral Research Associate**
- *Resigned to begin faculty position at Brown University.*

CERN — *Meyrin, Geneva, Switzerland*
January 2021 — March 2023 — **Senior Research Fellow**

University of Arizona — *Tucson, Arizona, USA*
July 2017 — December 2020 — **Postdoctoral Research Associate**

Education

University of Victoria — *Victoria, British Columbia, Canada*
Fall 2011 — Spring 2017 — **Ph.D.**, Experimental Particle Physics
Advisor: Rob McPherson (Victoria / IPP)

Acadia University — *Wolfville, Nova Scotia, Canada*
Fall 2007 — Spring 2011 — **B.Sc.(H.)**, Physics & Mathematics

J. L. Ilsley High School — *Halifax, Nova Scotia, Canada*
Fall 2004 — Spring 2007 — 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*, *Declined.*
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.* Accepted by Phys. Rev. D. 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.* ATLAS-STDM-2023-07, arXiv:2402.13052 [hep-ex]. Submitted to PLB.
  - ✳ 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 EPJC. 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).
- ALTAS 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 Energ. 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

- 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 Energ. 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 μW radiation-hard front-end in a 0.18 μm 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

- *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

- **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

- **Alex Buzzi,** Brown University, Providence, Rhode Island, USA. *Research co-supervisor.* Anticipated graduation: 2025.
    - **Thesis:** *Staying positive: eliminating negative sample weights using optimal transport. (working title.)*
- **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*. Directrise de thèse: Mélissa Ridel, 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 0040**, ***Basic Physics B****, primary instructor, Fall 2024.*

Summer/Winter Schools & Pedagogical Lectures

- **BOOST Camp 2024,** e*xperimental 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

- 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).