Sébastien Rettie

Personal Data

Nationality: Canadian
Email: sebastien.rettie@cern.ch
Website: http://srettie.web.cern.ch
Bilingual: French, English
Good Knowledge of: Spanish, German

Academic History

NSERC Postdoctoral Research Fellow, University College London **Sept 2019 - Present**
Advisor: Timothy Scanlon

Ph.D. in Physics, The University of British Columbia **Sept 2014 - Aug 2019**
Advisor: Oliver Stelzer-Chilton, GPA: 92%
Dissertation: *Search for New High-Mass Phenomena in Events with Two Muons using the ATLAS Detector at the Large Hadron Collider* [link]

Honours B.Sc. in Physics, University of Ottawa **Sept 2010 - Apr 2014**
Dean's honour list for all four years, graduated *summa cum laude*
Advisor: Alain Bellerive, GPA: 94%
Honours Thesis: *Characterising small-strip Thin Gap Chambers for the ATLAS Detector at the LHC*

Diplôme d'études collégiales (DEC) in natural sciences, Cégep de l'Outaouais **Sept 2008 - May 2010**
Province-wide R score: 32.2

Diplôme d'études secondaires (DES), Polyvalente Nicolas-Gatineau **Sept 2003 - Jun 2008**
Basketball student-athlete program, GPA: 93%

Research Experience

NSERC Postdoctoral Research Fellow (ATLAS Collaboration) **Sept 2019 - Present**
University College London, London, United Kingdom

- VH, $H \to b\bar{b}$ measurements:
  - Carried out diboson modelling and fit studies
  - Produced statistical model inputs
  - Investigated inclusion of additional measurement bin at low $V\,p_{\mathrm{T}}$
  - Developed continuous integration of the analysis framework
- Tracking improvements for b-tagging:
  - Used idealized tracking to understand where tracking reconstruction reduces b-tagging performance
  - Developed robust working knowledge of the key aspects of tracking
  - Contributed to a multivariate tool used to identify fake tracks
- Convener of the Clustering and Tracking In Dense Environments group:
  - Coordinated ATLAS tracking subgroup of over 15 scientists to deliver optimized performance of track reconstruction in dense environments, in particular within high-p_{T} jets
  - Realized measurements of reconstruction efficiency and impact parameter resolutions for tracks in dense environments
  - Maintained dedicated reconstruction features designed to improve performance within dense jets such as pixel cluster splitting using mixture density networks
- Editorial board member:
  - Search for periodic signals in ee and $\gamma\gamma$ final states
- Supervised group projects through the Centre for Doctoral Training in Data Intensive Science [link]:
  - Unsupervised learning of disease progression models with Babylon Health [link]
  - Detection of malicious Windows binaries with NCC Group [link]

Graduate Student Research Associate and Vanier Scholar (ATLAS Collaboration) **Sept 2014 - Aug 2019**
The University of British Columbia and *TRIUMF, Vancouver, Canada*

- Search for new high-mass phenomena in the dilepton final state:
  - Main muon channel analyzer: developed analysis framework, implemented analysis strategy, evaluated systematic uncertainties and background/signal yields
  - Interpreted search results in the context of a variety of theoretical models such as Z' models and contact interactions
  - Characterized the performance of the ATLAS detector for high-p_{T} muons
- Liaison between the Exotics and Muon Combined Performance groups:
  - Provided support for analysts working on over 30 searches with muons in the final state
  - Used alignment effects on tracks (AEOTs) to improve the muon momentum uncertainty estimation
  - Optimized the high-p_{T} muon selection working point
- Muon Trigger:
  - Calculated trigger efficiencies for high-p_{T} muons
  - Editor: contributed to the writing of publications and addressing of comments during review
  - Provided trigger scale factors for high-p_{T} muons using W+jets events
- Small-strip Thin Gap Chambers (sTGCs):
  - Participated in data-taking for multiple test beam efforts and carried out a 4-month research fellowship at the Weizmann Institute of Science to analyze the data
  - Managed and developed analysis framework for test beam measurements
  - Characterized the efficiency and spatial resolution of sTGCs for the New Small Wheel muon detector

Research Assistant (ATLAS Collaboration) **May - Aug 2014**
Fermilab, Chicago, USA and *Carleton University, Ottawa, Canada*

- Participated in test beam efforts and computed inclusive/exclusive residuals and pad/strip efficiencies for sTGCs

Honours Student (ATLAS Collaboration) **Sept 2013 - Apr 2014**
Carleton University, Ottawa, Canada

- Constructed a fully functional hodoscope which triggers on cosmic ray muons to characterize sTGCs
- Wrote a RAW to "cooked" data converter for the data coming from the sTGCs

Research Assistant (ATLAS Collaboration) **May - Aug 2013**
CERN, Geneva, Switzerland

- Performed upgrade studies by probing the W-Higgs channel of chargino and neutralino pair production
- Simulated and calculated expected sensitivity to supersymmetry (SUSY) with 3000/fb of data
- Co-op report: "Searching for SUSY at the upgraded LHC"

Research Assistant (Quantum Information Processing with Neutral Atoms) **Sept - Dec 2012**
Technische Universität Darmstadt, Darmstadt, Germany

- Implemented a complete modulation transfer spectroscopy laser system
- Co-op report: "Modulation Transfer Spectroscopy for Quantum Information Processing with Neutral Atoms"

Research Assistant (T2K Collaboration) **Jan - Sept 2012**
TRIUMF, Vancouver, Canada

- Analyzed and simulated DUET and T2K data using the ROOT data analysis framework, custom GEANT4-based software, and Monte Carlo methods
- Quantified the measurement uncertainties of the experiments
- Operated the DUET detector at TRIUMF and took additional calibration data as required
- Contributed to two publications detailing measurements of absorption and charge exchange of π^+ on carbon: Phys. Rev. C 95, 045203 (2017) [link] and Phys. Rev. C 92, 035205 (2015) [link]
- Co-op report: "Momentum Measurements for the Dual Use Experiment at TRIUMF"

Leadership & Service to the Academic Community

Convener of the ATLAS Clustering and Tracking In Dense Environments group	Apr. 2021 - Present
ATLAS Idea Day Organizing Committee Member [link]	Jan. 2021
ATLAS Induction Day Organizer and Presenter [link]	2020 - Present
LHC Early Career Mentoring Program Organizing Committee Member [link]	2020 - Present
ATLAS Early Career Scientist Board Member [link]	2020 - Present
Combined Performance session co-organizer and co-chair, Exotics+HDBS Workshop [link]	Jun. 2019
UBC Graduate Student Association (GSA) VP External Relations [link]	2015 - 2019
UBC Graduate Student Society (GSS) Council Member [link]	2016 - 2019
UBC Graduate Student Society (GSS) Human Resources & Elections Committee Member [link]	2016 - 2018
TRIUMF Graduate Student and Postdoc Society (GAPS) Member [link]	2014 - 2019
TRIUMF High School Fellowship Selection Committee Member [link]	2016
Graduate Student Association (GSA) Member [link]	2014 - 2015

Fellowships, Scholarships, and Awards

NSERC Postdoctoral Fellowship ($90,000)	**2019 - 2021**
Mitacs Globalink Research Award ($6,000) [link]	2018
NSERC Canada Graduate Scholarship - Michael Smith Foreign Study Supplement ($6,000)	2018
Carl H. Westcott Memorial Fellowship ($12,100)	2018
Vanier Canada Graduate Scholarship ($150,000) [link]	**2016 - 2019**
NSERC Alexander Graham Bell Canada Graduate Scholarship Doctoral ($105,000) [declined]	2016 - 2019
FRQNT Doctoral Scholarship ($60,000) [declined]	2016 - 2019
Killam Doctoral Scholarship [accepted in title only]	2016 - 2019
UBC Four Year Doctoral Fellowship [accepted in title only]	2016 - 2019
UBC Graduate Student Travel Award ($500)	2016
UBC Faculty of Science Graduate Award ($2,000)	2015 - 2016
Honourable Mention in the PPD Best Student Oral Presentation Competition at the CAP Congress	2015
NSERC Canada Graduate Scholarship Master's at UBC ($17,500)	2015 - 2016
UBC Faculty of Science Graduate Award ($2,000)	2014 - 2015
FRQNT Master's Scholarship ($35,000)	2014 - 2016
NSERC Canada Graduate Scholarship Master's at Carleton University ($17,500) [declined]	2014 - 2015
NSERC USRA with the ATLAS group at Carleton University ($4,500)	2014
First place award for oral presentation at the Canadian Undergraduate Physics Conference [link]	2013
University of Ottawa scholarship to attend the Canadian Undergraduate Physics Conference ($500)	2013
J. Armand Bombardier Student Mobility Scholarship ($2,000)	2013
Admission Scholarship 3rd renewal ($3,000)	2013
TRIUMF Summer Research Award for the Ontario Region ($2,000) [link]	2013
CERN/IPP Summer Undergraduate Research Experience Fellowship (CHF5,000) [link]	2013
NSERC USRA with the ATLAS group at UBC ($4,500) [declined]	2013
NSERC USRA with the ATLAS group at Carleton University ($4,500) [declined]	2013
Chair's Scholar NSERC USRA with the ATLAS group at the University of Toronto ($5,300) [declined]	2013
International Research Experience Program (IREP) Scholarship (€2,000) [link]	2012
Student Mobility Scholarship from the International Office ($2,000)	2012
Co-op International Mobility Bursary ($500)	2012
International Mobility Bursary ($1,000)	2012
Admission Scholarship 2nd renewal ($3,000)	2011
University of Ottawa Financial Aid Bursary ($3,250)	2010
Renewable Admission Scholarship ($3,000)	2010
Bourse de la francophonie ($1,000)	2010
Bourse de la francophonie / Aide financiere additionnelle ($1,500)	2010

Presentations

* indicates poster presentations

Invited Conference Presentations

Higgs cross-section and properties at ATLAS and CMS [link]
55th Rencontres de Moriond, Online, March 2021 [proceedings]

Searches for new phenomena with the ATLAS detector
11th High-Energy Physics International Conference, Antananarivo, Madagascar, October 2019

*Search for high-mass dimuon resonances using proton-proton collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector** [link]
39th International Conference on High Energy Physics, Seoul, South Korea, July 2018 [proceedings]

Searches for new phenomena in leptonic final states using the ATLAS detector [link]
13th Conference on the Intersections of Particle and Nuclear Physics, Palm Springs, CA, May 2018 [proceedings]

Muon identification and performance in the ATLAS experiment [link]
XXVI International Workshop on Deep Inelastic Scattering, Kobe, Japan, April 2018 [proceedings]

*Searching for New High Mass Phenomena Decaying to Muon Pairs using Proton-Proton Collisions at $\sqrt{s}$ = 13 TeV with the ATLAS Detector at the LHC** [link]
The Fifth Annual Conference on Large Hadron Collider Physics, Shanghai, China, May 2017 [proceedings]

National and Regional Conference Presentations

Searching for High Mass Resonances Decaying to Lepton Pairs using Proton-Proton Collisions at $\sqrt{s}$ = 13 TeV with the ATLAS Detector at the LHC [link]
American Physical Society Northwest Section Meeting, Penticton, Canada, May 2016

Search for New Phenomena in the Dimuon Final State using Proton-Proton Collisions at $\sqrt{s}$ = 13 TeV with the ATLAS Detector [link]
Winter Nuclear & Particle Physics Conference, Banff, Canada, February 2016

Test Beam Performance Measurements of Novel Thin Gap Detectors for the ATLAS Experiment Upgrade [link]
Canadian Association of Physicists Congress, Edmonton, Canada, June 2015

Upgrading the ATLAS Muon Small Wheel with Novel sTGC Detectors [link]
Winter Nuclear & Particle Physics Conference, Mont Tremblant, Canada, February 2015

*Test Beam Results with a Full Size sTGC** *(presented with D. Mori)* [link]
IEEE Nuclear Science Symposium, Seattle, USA, November 2014

*Testing of New ATLAS sTGC Muon Detectors at Fermilab's Test Beam Facility** *(presented with S. Weber)*
Canadian Association of Physicists Congress, Sudbury, Canada, June 2014

Searching for SUSY at the upgraded LHC
Canadian Undergraduate Physics Conference, Hamilton, Canada, October 2013

Modulation Transfer Spectroscopy for Laser Frequency Stabilization
TU Darmstadt Student Conference, Darmstadt, Germany, August 2013

Presentations to the General Public

Introduction to Particle Physics
ATLAS Masterclass, Vancouver, Canada, April 2017

Particle Physics at the Large Hadron Collider
TRIUMF High School Teachers' Professional Development Day, Vancouver, Canada, October 2016

La Physique des Particules au Grand Collisionneur de Hadrons (LHC)
École Polyvalente de l'Érablière, Gatineau, Canada, December 2015

Other Presentations

How to do an ATLAS analysis [link]
ATLAS Induction Day (online), November 2020, February 2021, and July 2021

sTGC QL1 Test Beam Results [link]
Muon & NSW Week, Geneva, Switzerland, October 2018

Muons in Run 2 [link]
DBL-HBSM Workshop, Annecy, France, November 2017

Searching for new physics using high-p_T muons
ATLAS Canada NSERC Review, Toronto, Canada, November 2017

Dilepton Selection Improvements & Exclusive Searches [link]
Exotic Dilepton Search Workshop, Geneva, Switzerland, August 2017

Searching for New High Mass Phenomena Decaying to Muon Pairs using Proton-Proton Collisions at $\sqrt{s}$ = 13 TeV with the ATLAS Detector at the LHC
TRIUMF Science Week 2017, Vancouver, Canada, July 2017

High-p_T Muons in Run 2 [link]
ATLAS Exotics and SUSY Joint Workshop, Bucharest, Romania, May 2017

Z' Dilepton Search Results
Advisory Committee On TRIUMF Meeting, Vancouver, Canada, October 2016

W' & Z' Searches with the ATLAS Detector at the LHC
Physics Plenary, ATLAS Jamboree, Geneva, Switzerland, July 2016

Run 2 Dilepton Searches with the ATLAS Detector at the LHC
CERN Physics and Performance Week Exotics Plenary, Geneva, Switzerland, July 2015

Test Beam Performance Measurements of Novel Thin Gap Detectors for the ATLAS Experiment Upgrade
TRIUMF Junior Research Symposium, Canada, June 2015

Characterizing New sTGC Muon Detectors for the ATLAS Detector at the LHC
ATLAS Canada Summer Student Symposium, Canada, August 2014

Characterizing Small Thin Gap Chambers for the ATLAS Detector at the LHC
Carleton University Honours Project Symposium, Ottawa, Canada, April 2014

Semiconductor Qubits and Quantum Computing
University of Ottawa, Ottawa, Canada, March 2014

Microfibre Nanowire Hybrid Structure for Energy Scavenging
University of Ottawa, Ottawa, Canada, February 2014

II-VI Semiconductors
University of Ottawa, Ottawa, Canada, January 2014

Multiwire Proportional Chambers for Subatomic Particle Detection
University of Ottawa, Ottawa, Canada, November 2013

International Co-op Placements
University of Ottawa International Co-op Workshop, Ottawa, Canada, September 2013

Searching for SUSY at the upgraded LHC
TRIUMF Summer Student Symposium, Vancouver, Canada, August 2013

Searching for SUSY at the upgraded LHC
ATLAS Canada Summer Student Symposium, Vancouver, Canada, August 2013

PUBLICATIONS

Over 406 publications as an author on the ATLAS collaboration (Oct. 2016 - present). Below are the publications for which a significant contribution to data analysis and/or writing was made.

Journal Publications

ATLAS Collaboration *Muon reconstruction and identification efficiency in ATLAS using the full Run 2 pp collision data set at $\sqrt{s}$ = 13 TeV*, Eur. Phys. J. C 81 (2021) 578 [link]

ATLAS Collaboration *Measurements of WH and ZH production in the $H \to b\bar{b}$ decay channel in pp collisions at 13 TeV with the ATLAS detector*, Eur. Phys. J. C 81 (2021) 178 [link]

ATLAS Collaboration *Search for new non-resonant phenomena in high-mass dilepton final states with the ATLAS detector*, JHEP 11 (2020) 005 [link]

ATLAS Collaboration *Performance of the ATLAS muon triggers in Run 2*, JINST 15 (2020) P09015 [link]

ATLAS Collaboration *Search for high-mass dilepton resonances using 139 fb^{-1} of pp collision data collected at $\sqrt{s}$ = 13 TeV with the ATLAS detector*, Phys. Lett. B 796 (2019) 68 [link]

ATLAS Collaboration *Search for new high-mass phenomena in the dilepton final state using 36 fb^{-1} of proton-proton collision data at $\sqrt{s}$ = 13 TeV with the ATLAS detector*, JHEP 10 (2017) 182 [link]

DUET Collaboration *Measurement of σ_{ABS} and σ_{CX} of π^+ on carbon by the Dual Use Experiment at TRIUMF (DUET)*, Phys. Rev. C 95 (2017) 045203 [link]

ATLAS Collaboration *Search for high-mass new phenomena in the dilepton final state using proton-proton collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector*, Phys. Lett. B 761 (2016) 372-392 [link]

sTGC Collaboration *Performance of a Full-Size Small-Strip Thin Gap Chamber Prototype for the ATLAS New Small Wheel Muon Upgrade*, Nuclear Instruments and Methods in Physics Research A 817 (2016) 85-92 [link]

DUET Collaboration *Measurement of absorption and charge exchange of π^+ on carbon*, Phys. Rev. C 92 (2015) 035205 [link]

Public Results and Conference Notes

ATLAS Collaboration *Measuring the beauty of the Higgs boson* [link]
ATLAS Physics Briefing (2020)

ATLAS Collaboration *Measurements of WH and ZH production in the $H \to b\bar{b}$ decay channel in pp collisions at 13 TeV with the ATLAS detector* [link]
ATLAS-CONF-2020-006, Public Conference Note (2020)

ATLAS Collaboration *First ATLAS result with full Run 2 dataset: a search for new heavy particles* [link]
ATLAS Physics Briefing (2019)

ATLAS Collaboration *Search for new high-mass resonances in the dilepton final state using proton-proton collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector* [link]
ATLAS-CONF-2016-045, Public Conference Note (2016)

ATLAS Dilepton Group *Analysis Results from the ATLAS Dilepton Search at 13 TeV* [link]
EXOT-2015-001, Public Results (2015)

A. Soha *et al. ATLAS Large Scale Thin Gap Chambers* [link]
FERMILAB-PROPOSAL-1049, Fermilab Proposal (2014)

ATLAS Collaboration *Prospects for benchmark Supersymmetry searches at the high luminosity LHC with the ATLAS Detector* [link]
ATL-PHYS-PUB-2013-011, Public Note (2013)

S. Rettie *Searching for SUSY at the upgraded LHC* [link]
CERN-STUDENTS-Note-2013-097, CERN Student Note (2013)

Teaching, Mentoring, & Supervisory Experience

Qualification task local supervisor — Apr. 2021-Present
ATLAS Flavour Tagging Group, CERN

Co-supervisor of 4 PhD students — 2019-Present
University College London, London, United Kingdom

Co-supervisor of 5 MSc students — 2019-Present
University College London, London, United Kingdom

Supervisor of 2 CDT group project [link] — 2019-Present
University College London, London, United Kingdom

Mentor teaching assistant — 2015F, 2016F, 2017W, 2018W
The University of British Columbia, Vancouver, British Columbia

Teaching assistant for PHYS 101 (Energy and Waves) — 2015W, 2016F, 2018W
The University of British Columbia, Vancouver, British Columbia

Teaching assistant for PHYS 400/506 (Introduction to Elementary Particles) — 2016W
The University of British Columbia, Vancouver, British Columbia

Teaching assistant for PHYS 100 (Introductory Physics) — 2014F, 2015F
The University of British Columbia, Vancouver, British Columbia

Completed the Teaching Assistant Professional Development Workshop — 2014
The University of British Columbia, Vancouver, British Columbia

Teaching assistant for the Physics Help Centre — 2013
University of Ottawa, Ottawa, Canada

Grade-school subsitute teacher in mathematics and science — 2011
Commission scolaire des Draveurs, Gatineau, Canada

Outreach & Extracurricular Involvement

Protaction House Team Member [link] — May 2020
Highlight of the VersusVirus Hackathon

UCL Your Universe Volunteer [link] — Mar. 2020
University College London, London, United Kingdom

Equity & Inclusion Committee Member [link] — 2019
The University of British Columbia, Vancouver, British Columbia

The Fourth Machine Learning in High Energy Physics Summer School Participant [link] — Aug. 2018
Oxford, United Kingdom

The 2017 European School of High-Energy Physics Participant [link] — Sep. 2017
Evora, Portugal

ATLAS Masterclass Volunteer [link] — 2015 - 2019
TRIUMF, Vancouver, British Columbia

UBC Physics Olympics Volunteer [link] — 2015 - 2019
The University of British Columbia, Vancouver, British Columbia

Vancouver Regional Science Fair Head Judge [link] — 2015
The University of British Columbia, Vancouver, British Columbia

Vancouver District Science Fair Judge [link] — 2015
Langara College, Vancouver, British Columbia

Let's Talk Science (LTS) Volunteer [link] — 2014 - 2016
The University of British Columbia, Vancouver, British Columbia

Speaker: ATLAS Representative for the TRIUMF tour — 2014
TRIUMF, Vancouver, British Columbia

International Student Volunteer (ISV) Volunteer [link] — 2011
Banrock Station, Australia