Primary Publications

I am an author on more than 800 publications, listed here on ORCID. Below is a list of significant papers where I have made substantial contributions. Some are preliminary results released by ATLAS, referred to as Conference or Public Notes, and not published in a journal. Papers which I either wrote or organized are indicated as *Editor*.

ATLAS Collaboration, "Search for resonant pair production of Higgs bosons in the $b\bar{b}b\bar{b}$ final state using pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", ATLAS-CONF-2021-035 (*Editor*)
- We presented a new search for resonant production of Higgs pairs in the all hadronic $b\bar{b}b\bar{b}$ final state
- An entirely new neural-network based technique was deployed for background estimation, leading to substantially reduced systematics
- New improvements to b-tagging at high momentum lead to significantly improved sensitivity
- We set the strongest limits in the world on scalars decaying to Higgs pairs at masses above ≈ 700 GeV
- Submission to journal imminent

ATLAS Collaboration, "Combination of searches for non-resonant and resonant Higgs boson pair production in the $b\bar{b}\gamma\gamma$, $b\bar{b}\tau^+\tau^-$, and $b\bar{b}b\bar{b}$ decay channels using pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", ATLAS-CONF-2021-052
- We presented a combination of the main search channels for both resonant and non-resonant Higgs pair production
- The resonant limits, dominated above 700 GeV by the $b\bar{b}b\bar{b}$ channel I led, provide the strongest limits to date from 251 to 3 TeV on scalars decaying to Higgs pairs
- The non-resonant limits provide the best limits to date on SM Higgs pair production, and on the Higgs self-coupling

ATLAS Collaboration, "Deep Learning for Pion Identification and Energy Calibration with the ATLAS Detector", ATL-PHYS-PUB-2020-018 (*Editor*)
- Using deep learning techniques, we classified and calibrated electromagnetic and hadronic showers in the ATLAS detector
- The performance compared to traditional feature-based methods was significantly improved in classification performance and energy resolution
- This is the first result utilizing deep learning to improve the reconstruction of low-level signal in the ATLAS experiment

ATLAS Collaboration, "Search for the $HH \to b\bar{b}b\bar{b}$ process via vector-boson fusion production using proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", JHEP 2020, 108 (2020), arXiv:2001.05178, Erratum: JHEP 2021, 145 (2021) (*Editor*)
- We searched for pair production of new resonances and non-resonant processes decaying to pairs of Higgs bosons
- We were the first search for Higgs pair production utilizing the entire run 2 dataset
- We set the first limits (and amongst the strongest to date) on the coupling of pairs of Higgs bosons to pairs of vector bosons

ATLAS Collaboration, "The ATLAS Fast TracKer System", JINST 16 (2021) P07006, arXiv:2101.05078 (*Editor*)
- The hardware-based track finding of the FTK system, developed using custom ASICs and FPGA algorithms, is presented
- The FTK system was partially commissioned using pp collisions during Run 2, and was able to produce tracks with the expected properties

MilliQan Collaboration, "Search for millicharged particles in proton-proton collisions at $\sqrt{s} = 13$ TeV", Phys. Rev. D 102, 032002, arXiv:2005.06518
- We built a prototype milli-charged particle detector and operated it during 2018 collisions at the LHC
- We were able to set new limits on milli-charged particles at high masses
- We demonstrated that it was possible to build and commission a new detector in the LHC service tunnels

ATLAS Collaboration, "Jet energy scale and resolution measured in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", Eur. Phys. J. C 81 (2021) 689, arXiv:2007.02645

- The performance of jet reconstruction, scale measurements, and resolution measurements in the high-pileup run 2 data is presented, including the first full performance of particle flow jets in ATLAS
- I was the Jet/E_T^{miss} convener when this paper was published, and I performed the high-p_T uncertainty measurements

ATLAS Collaboration, "Search for pair production of higgsinos in final states with at least 3 b-tagged jets using the ATLAS detector in $\sqrt{s} = 13$ TeV pp collisions", Phys. Rev. D 98 (2018) 092002, arXiv:1806.04030 (*Editor*)
- We searched for production of higgsinos decaying to higgs bosons and gravitinos in gauge mediated supersymmetry models.
- We employed a novel strategy to maximize signal acceptance at low- and high-mass by utilizing both b-jet and E_T^{miss} based triggers.
- We set the strongest limits on higgsinos in GGM models, extending previous limits both lower and higher in mass.

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", ATLAS-CONF-2018-041 (*Editor*)
- We updated our 36 fb^{-1} search (listed below) to 80 fb^{-1} to quickly follow up on an excess in the previous dataset. No excess was seen in the larger dataset.
- Led the analysis of one of the first searches released using the full 2015-2017 dataset and new ATLAS reconstruction software.
- We provided several unique new signal interpretations of the result, demonstrating the sensitivity of our results to branching ratio choices in signal models.

ATLAS Collaboration, "Reinterpretation of searches for supersymmetry in models with variable R-parity-violating coupling strength and long-lived R-hadrons", ATLAS-CONF-2018-003 (*Editor*)
- We reinterpreted existing ATLAS searches for R-parity conserving and violating SUSY in the full physical possibility space of the theory.
- We showed the first experimental results at the LHC as a function of the physical RPV coupling, identifying regions where 600 GeV top-partners and 1 TeV gluinos are still experimentally allowed.
- New searches will be designed to fill these holes, and the effort will continue to study other models in the electroweak sector.

ATLAS Collaboration, "A Measurement of the Soft Drop Jet Mass in pp Collisions with the ATLAS detector at $\sqrt{s} = 13$ TeV", Phys. Rev. Lett. 121 (2018) 092001, arXiv:1711.08341
- We measured the soft drop jet mass, and performed the first comparisons of jet substructure to precision QCD calculations.
- We found the parameters where data best agrees with the calculations and QCD monte-carlo, allowing for improved modelling of backgrounds for future analyses.

ATLAS Collaboration, "Search for production of supersymmetric particles in final states with missing transverse momentum and multiple b-jets at $\sqrt{s} = 13$ TeV proton-proton collisions with the ATLAS detector", JHEP 06 (2018) 107, arXiv:1711.01901 (*Editor*)
- Using jet substructure, a combination of hadronic and leptonic searches, and a sophisticated multi-bin exclusion strategy, we set the strongest limits yet on gluinos decaying via top or bottom quarks.
- Led the analysis to one of the first 36 fb^{-1} results at Moriond.
- Mentored several students to their Ph.D. theses on this topic.

ATLAS Collaboration, "Jet energy scale measurements and their systematic uncertainties in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", Phys Rev D 96 072002 2017, arXiv:1703.09665
- I was the Jet Energy Scale group convener for the results documented in this paper.
- I supervised a large team on all aspects of the 13 analyses required to calibrate and measure uncertainties for jets.
- We were able to achieve 1% precision shortly after data taking started in run 2.

ATLAS Collaboration, "Jet reclustering and close-by effects in ATLAS run II", ATLAS-CONF-2017-062 (*Editor*)
- We measured how well jets are modelled in dense environments, an important factor in reconstruction algorithms that utilize jet substructure.
- We demonstrated that there are no significant mismodelings, allowing for new classes of algorithms to be used safely.

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" (3 fb^{-1}), Phys Rev D 94 032003 (2016), arXiv:1605.09318
- We searched for gluinos decaying via 3rd generation squarks in one of the first $\sqrt{s} = 13$ TeV analyses
- We used hadronic top-tagging techniques to improve sensivity at high gluino masses
- We set the strongest observed limits on gluinos

B. Nachman, P. Nef, A. Schwartzman, M. Swiatlowski, C. Wanotayaroj, "Jets from Jets: Re-clustering as a tool for large radius jet reconstruction and grooming at the LHC", JHEP 02 (2015) 075, arXiv:1407.2922
- We demonstrated that jet substructure techniques can be performed also with existing jet collections as inputs.
- The improved uncertainties and strong performance from this technique have led to improvements in many ATLAS and CMS publications.

ATLAS Collaboration, "Search for massive particles decaying into multiple quarks with the ATLAS detector in $\sqrt{s} = 8$ TeV pp collisions", Phys. Rev. D 91, 112016 (2015), arXiv:1502.05686
- We searched for new physics in final states with high jet multiplicity and no missing energy, an area where QCD backgrounds had been previously assumed to be overwhelming.
- We developed new jet substructure techniques (still used in Run 2) both to identify signal and to measure backgrounds.

ATLAS Collaboration, "Measurement of colour flow with the jet pull angle in $t\bar{t}$ events using the ATLAS detector at $\sqrt{s} = 8$ TeV", Physics Letters B (2015) 475-493, arXiv:1506.05629
- We demonstrated the existence of color flow connections in hadronic radiation when color singlets decay to quarks.

ATLAS Collaboration, "Light-quark and gluon jet discrimination in pp collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector", Eur. Phys. J. C (2014) 74, arXiv:1405.6583
- We developed the first quark/gluon tagger at a hadron collider.
- We designed new tagging strategies and data-driven techniques to extract efficiencies and uncertainties.

MilliQan Collaboration, "A Letter of Intent to Install a Milli-charged Particle Detector at LHC P5", arXiv:1607.04669
- We proposed a new detector sensitive with unique sensitivity to milli-charged particles.
- The detector can be built quickly and affordably.

Additional Publications

The following is a further list of publications where I have contributed significantly to the analysis or internal review as a convener of a physics group responsible for supervising the paper.

ATLAS Collaboration, "Measurement of the energy response of the ATLAS calorimeter to charged pions from $W^{\pm} \to \tau^{\pm}(\to \pi^{\pm}\nu_{\tau})\nu_{\tau}$ events in Run 2 data", arXiv:2108.09043 (*Jet/ETMiss group convener*)

ATLAS Collaboration, "Performance of W/Z taggers using UFO jets in ATLAS", ATL-PHYS-PUB-2021-029 (*Jet/ETMiss group convener*)

ATLAS Collaboration, "Digluon Tagging using $\sqrt{s} = 13$ TeV pp Collisions in the ATLAS Detector", ATL-PHYS-PUB-2021-027 (*Jet/ETMiss group convener*)

ATLAS Collaboration, "Identification of hadronically-decaying top quarks using UFO jets with ATLAS in Run 2", ATL-PHYS-PUB-2021-028 (*Jet/ETMiss group convener*)

ATLAS Collaboration, "METNet: A combined p_T^{miss} working point using a neural network with the ATLAS detector", ATL-PHYS-PUB-2021-025 (*Jet/ETMiss group convener*)

ATLAS Collaboration, "Convolutional Neural Networks with Event Images for Pileup Mitigation with the ATLAS Detector", ATL-PHYS-PUB-2019-028 (*Missing Energy group convener*)

ATLAS Collaboration, "Search for new phenomena with large jet multiplicities and missing transverse momentum using large-radius jets and flavour-tagging at ATLAS in 13 TeV pp collisions", JHEP12 (2017) 034, arXiv:1708.02794 (*Strong production group convener*)

ATLAS Collaboration, "Search for squarks and gluinos in events with an isolated lepton, jets and missing transverse momentum at $\sqrt{s} = 13$ TeV with the ATLAS detector", Phys. Rev. D 96 (2017) 112010, arXiv:1708.08232 (*Strong production group convener*)

ATLAS Collaboration, "Search for supersymmetry in final states with two same-sign or three leptons and jets using 36 fb^{-1} of $\sqrt{s}$ = 13 TeV pp collision data with the ATLAS detector", JHEP 09 (2017) 084, arXiv:1706.03731 (*Strong production group convener*)

ATLAS Collaboration, "Search for squarks and gluinos in final states with jets and missing transverse momentum using 36 fb^{-1} of $\sqrt{s}$ = 13 TeV pp collision data with the ATLAS detector", Phys. Rev. D 97 (2018) 112001, arXiv:1712.02332 (*Strong production group convener*)

M. Swiatlowski *et al.*, "Test beam evaluation of newly developed n-in-p planar pixel sensors for use in a high radiation environment", Nuclear Instruments and Methods in Physics Research. Section A, 831, 2016, 140-146 (*Test beam and telescope operation*)

ATLAS Collaboration, "Search for pair production of gluinos decaying via top or bottom squarks in events with b-jets and large missing transverse momentum in pp collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector" (15 fb^{-1}), ATLAS-CONF-2016-052 (*Editor*)

ATLAS Collaboration, "Performance of pile-up mitigation techniques for jets in pp collisions at $\sqrt{s}$=8 TeV using the ATLAS detector", arXiv:1510.03823 (*Analyst*)

ATLAS Collaboration, "Reconstruction and Modeling of Jet Pull with the ATLAS Detector", ATLAS-CONF-2014-048 (*Editor*)

ATLAS Collaboration, "Performance of jet substructure techniques for large-R jets in proton-proton collisions at $\sqrt{s}$ = 7 TeV using the ATLAS detector", JHEP09 (2013) 076, arXiv:1306.4945 (*Analyst*)

ATLAS Collaboration, "Performance and Validation of Q-jets at the ATLAS Detector in pp Collisions at $\sqrt{s}$ = 8 TeV in 2012", ATLAS-CONF-2013-087 (*Editor*)

ATLAS Collaboration, "Jet Charge Studies with the ATLAS Detector Using $\sqrt{s}$ = 8 TeV Proton-Proton Collision Data", ATLAS-CONF-2013-086 (*Analyst*)

ATLAS Collaboration, "Light-quark and gluon jets: calorimeter response, jet energy scale systematics and jet properties", ATLAS-CONF-2012-138 (*Main analyst*)

ATLAS Collaboration, "Identification and Tagging of Double b-hadron jets with the ATLAS Detector", ATLAS-CONF-2012-100 (*Analyst*)

M. Swiatlowski *et al.*, "Estimation of E-cloud and TMCI Driven Vertical Instability Dynamics from SPS MD Measurements – Implications for Feedback Control", IPAC'11, WEP199 (*Analyst*)