Giordon Stark

CONTACT INFORMATION

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RESEARCH INTERESTS

High Energy Particle Physics, Supersymmetry and Physics Beyond the Standard Model, Electroweak Supersymmetry, Boosted Object Reconstruction, Hadronic Final States, Jet Substructure, Machine Learning, Embedded Hardware, Trigger.

EDUCATION

University of Chicago, Chicago, Illinois — **September 2012 – July 2018**
Ph.D. Physics, David Miller

California Institute of Technology, Pasadena, California — **Sep 2008 – June 2012**
B.S. Physics, Kenneth Libbrecht and Harvey Newman

DISSERTATION

Ph.D. *The search for supersymmetry in hadronic final states using boosted object reconstruction*
ISBN: 978-3-030-34548-8

B.S. *Optical Coating Brownian Thermal Noise in Gravitational Wave Detectors*

PROFESSIONAL EXPERIENCE

SCIPP, Santa Cruz, California — **August 2018 – July 2025**
Post-doctoral Researcher (2018-2024), Project Scientist (2024-2025) ATLAS Experiment at CERN

- Analysis Contact (Aug 2024-present): ATLAS analysis focusing on new physics with radiative decays
- Analysis Contact (Aug 2019-Dec 2024): ATLAS cross-section measurement of collinear W-boson radiation [1]
- Division of Particles and Fields Executive Committee (Jan-April 2024): Formation Task Force for the Coordinating Panel for Software and Computing
- Editorial Board member (Sept. 2023-April 2024): VBF diHiggs to four b-quarks
- Referee for JHEP (four papers), SciPost Physics (three papers)
- Early Career Scientist Board committee member (Feb 2021-Dec 2022): assist and foster an inclusive environment for the young scientists in the ATLAS collaboration. This work is also coordinated with other ECS groups in ALICE, CMS, and LHCb. The efforts include hosting "ATLAS Induction Day", software tutorials, Career Q&A with CERN alumni, organizing social events, and raising awareness of issues specifically impacting the young scientists to Management.
- Supersymmetry (SUSY) Run-2 Summaries Subconvener (2020-2022): identify, advise, and lead the publication of combinations across SUSY Physics subgroups, and define recommendations, standards, and validation procedures for analyses to use as part of a harmonization effort. Topics include: simplified model combinations of Electroweak and 3rd Generation physics, pMSSM scans, RPC-to-RPV reinterpretations, incorporating Dark Matter constraints into searches for new physics, and Higgs to SUSY.
- Common Dark Matter ASG-RECAST Contact (2019-2021): identify, advise, and implement improvements to the analysis preservation effort and liaison between the ATLAS Software Group and the analyses in the Common Dark Matter group
- US ATLAS Diversity and Inclusion Committee (2018-2022): advise the US ATLAS organization on how to implement recommendations in the Diversity and Inclusion report, which recommendations to implement, and modify practices and procedures to improve the collaboration environment for everyone
- SUSY Combinations Team Contact (2018-2020): providing recommendations for object identification and selection criteria, developing the toolchains necessary to combine analyses, and performing the statistical combinations
- SUSY Monte Carlo Production Contact (2018-2020): usher all Monte Carlo simulation production requests through to the production system, provide support for defining generator configurations for physics, and identify/resolve any bugs - both physics and technical.
- Core Developer for `pyhf` (Ref. [25]) allowing for preservation and statistical reproduction of likelihoods for searches in ATLAS

- Overseeing module testing and organizing cabling assembly for the ATLAS Detector Inner Tracker (ITk) instrumentation upgrades at SCIPP
- Coordinated the dedicated software efforts and developed a python library to interface with the ATLAS Detector ITk upgrade database: itkdb
- Supporting analyzer for new physics search in SUSY with multiple heavy-flavor and large radius jets [26, 27, 31, 32, 33]
- Instructor for various bootcamps and workshops to help develop software expertise in High Energy Physics (HEP) Analysis Preservation [36, 37]

Seminars and Plenaries

University of Hawaii	*January 2025*
CEA Paris-Saclay	*March 2024*
University of Arizona	*February 2024*
University of Arizona	*January 2024*
University of Notre Dame	*January 2024*
Karlsruhe Institute of Technology	*December 2023*
University of Victoria	*November 2023*
National Labs and Department of Energy (DOEPy)	*August 2023*
Wayne State University	*April 2023*
Southern Methodist University	*March 2023*
Stony Brook University	*February 2023*
Lund University, Sweden	*September 2022*
University of Washington, Bothell	*July 2022*
University of Pennsylvania	*February 2022*
Lepton-Photon 2022	*January 2022*
The University of Cambridge, UK	*January 2022*
The University of Tennessee, Knoxville	*October 2021*
ICPS 2021	*August 2021*
SUSY2019	*May 2019*
The University of Chicago	*November 2018*
Columbia College Chicago	*November 2018*
BOOST2016	*July 2016*

Honours and Awards

Breakthrough Prize - Fundamental Physics - Laureate	Apr 2025
UC Santa Cruz Outstanding Postdoctoral Fellow Award	May 2022
Springer Thesis Award [23]	*August 2019*
CERN Fellowship (turned down)	*April 2018*
Nathan Sugarman Award for Excellence in Graduate Student Research	*May 2017*
US ATLAS Outstanding Graduate Student Award	*June 2016*
Young Researchers' Symposium Award for Best Poster Presentation	*November 2015*
Department of Energy, Office of Science Graduate Student Research	*Oct. 2015 - Jan. 2016*
UChicago Excellence in Graduate Teaching nominee	*April 2015*
US LHC Users Association Lightning Round winner	*November 2014*
UChicago Excellence in Graduate Teaching nominee	*April 2014*
UChicago Excellence in Graduate Teaching nominee	*April 2013*
Caltech Excellent TA Award	*2012*
Edward C. and Alice Stone Fellow	*June 2010*

Past Professional Experience

UChicago HEP, Chicago, Illinois **November 2013 – July 2018**

Ph.D. Student, ATLAS Experiment at CERN

- Lead analyzer for new physics search in SUSY with multiple heavy-flavor and large radius jets [26, 27, 31, 32, 33]
- Worked on electronic instrumentation to improve the ATLAS Trigger system in Run 3 and beyond for boosted objects: gFEX: global feature extraction [29, 43]
- Spearheading the effort for embedded processor design within the ATLAS experiment. This includes developing an OpenEmbedded firmware layer for compiling a linux kernel from scratch to be installed on instrumentation in the ATLAS experiment: meta-l1calo
- Investigating jet-area based pile-up suppression techniques applied to jets in the forward region of the ATLAS detector in high pileup environments at HL-LHC [41]
- Performing physics studies for the hardware instrumentation as part of the ATLAS detector upgrade work. These studies include identifying subjets from trigger tower information, pileup mitigation techniques, parameterizing trigger efficiency and rates for the online trigger objects I defined, and prototyping a convolutional neural network using the ATLAS calorimeter data as a 2D image to study trigger-level observables [43]
- Editor of the gFEX Final Design Report describing the technical requirements and needs of gFEX in the ATLAS Calorimeter ecosystem [28]
- Created and maintain an analysis framework for general physics analyses within ATLAS including

Standard Model searches, SUSY, Exotics, Higgs, Trigger-Level analyses, Jet Calibration efforts, and more: xAODAnaHelpers [52]
- Built a python tool to scan the phase-space of an analysis to identify performant variables to discriminate signal over background: root-optimize
- Developer of a python framework that combines ROOT and NumPy: root_numpy [51]

University of Chicago, Chicago, Illinois **June 2012 – June 2017**
Graduate Student Teaching Assistant
Courses (teaching materials and reviews available on request)
- PHY211 – Advanced Physics Laboratory **Fall Term 2016-2017**
- PHY225 – Advanced Electromagnetism **Winter Term 2014-2015**
- PHY141 – Advanced Mechanics **Fall Term 2013-2014**
- PHY131 – Mechanics **Summer Term 2012-2013**
- PHY132b – Special Relativity and Electromagnetism **Winter Term 2012-2013**
- PHY121 – Introductory Mechanics **Fall Term 2012-2013**

University of Chicago, Chicago, Illinois **June 2014 – June 2016**
Bridge Program Tutor
- Tutored participants in the program upon request in all currently offered graduate-level Physics courses at University of Chicago
- Bridge program helps enhance diversity in the physics graduate education and also provides a bridge to the *Ph.D* effort

University of Chicago, Chicago, Illinois **June 2012 – May 2013**
Graduate Student Research Assistant in Ultracold Atomic Physics, **Supervisor**: Cheng Chin
- Started a project on trapping of water droplets using temperature gradients at room pressure

Adaptly, New York City, New York **June 2012 – September 2012**
Developer, **Supervisors**: Sean Shillo, Will Highduchek
- https://adaptly.com
- Developed projects and implemented infrastructure for the Adaptly Self-Serve platform
- Worked with "Big Data" for a large portion of my time at Adaptly

Laser Interferometer Gravitational Observatory, Caltech **Sep 2011 – June 2012**
Research Assistant, **Advisor**: Rana Adhikari
- Researching the effects of Brownian Thermal Noise and how it relates to the Quality Factors and Loss Angles of thin-film coated mirrors used in LIGO

Laser Interferometer Gravitational Observatory, MIT **June 2011 – Sep 2011**
Research Assistant, **Advisors**: Sam Waldman, Rai Weiss, Hugo Paris
- Developed control systems for monitoring the state of the LIGO system via multiple physical chassis setups and software collaborations
- Developed software to analyze noise levels in LIGO hardware (capacitative position sensors and various chassis), analyzed noise levels in the hardware to verify its quality before sending it to other LIGO labs in the country
- Worked on the feed-forward systems to minimize mechanical vibrations in the system

Computational Physics Lab, Caltech **March 2011 – June 2011**
Research Assistant and Computational Specialist, **Advisor**: Frank Rice
- Developed a new version of the Caltech's Sophomore Physics Laboratory Mathematica CurveFit program (program is still being developed; **code/demonstration available upon request**)

Information Systems and Technology, Caltech **March 2011 – June 2011**
Teaching Assistant, **Course Instructor**: Shuki Bruck
- Provided 2-hour Office Hour session once a week to assist with homework, answer questions about lectures, and improve students' understanding
- Attended lectures, structured and graded homework assignments for $\sim$ 140 students

Submillimeter Wave Observatory, Caltech **June 2010 – Aug 2010**
Edward C. and Alice Stone Fellow, **Advisors**: Simon Radford and David Miller

- Designed an optical system that couples the beams from a Fourier Transform Spectrometer to a Bolometer, collimated through a sample, to determine the submillimeter transmittivity of optical materials in broadband wavelengths (500 Gigahertz to 3.5 Terahertz)
- Results are employed in the design of more efficient submillimeter instruments around the world

Publications, Talks, and Works

Selected Papers

[1] ATLAS Collaboration, G. Aad et al., *Cross-section measurements for the production of a W-boson in association with high-transverse-momentum jets in pp collisions at $\sqrt{s}$= 13 TeV with the ATLAS detector*, arXiv:2412.11644 [hep-ex].

[2] A. Alshehri et al., *PyHEP.dev 2024 Workshop Summary Report, August 26-30 2024, Aachen, Germany*, 10, 2024. arXiv:2410.02112 [hep-ex].

[3] D. Ciangottini et al., *Analysis Facilities White Paper*, arXiv:2404.02100 [hep-ex].

[4] G. Stark, C. A. Ots, and M. Hance, *Reduce, reuse, reinterpret: An end-to-end pipeline for recycling particle physics results*, SciPost Phys. Codebases (2024) 27, https://scipost.org/10.21468/SciPostPhysCodeb.27.

[5] ATLAS Collaboration Collaboration, G. Aad et al., *Statistical Combination of ATLAS Run 2 Searches for Charginos and Neutralinos at the LHC*, Phys. Rev. Lett. **133** (2024) 031802, https://link.aps.org/doi/10.1103/PhysRevLett.133.031802.

[6] ATLAS Collaboration, G. Aad et al., *ATLAS Run 2 searches for electroweak production of supersymmetric particles interpreted within the pMSSM*, arXiv:2402.01392 [hep-ex], https://doi.org/10.1007/JHEP05(2024)106.

[7] ATLAS Collaboration, G. Aad et al., *Search for pair production of higgsinos in events with two Higgs bosons and missing transverse momentum in $\sqrt{s} = 13$ TeV pp collisions at the ATLAS experiment*, arXiv:2401.14922 [hep-ex].

[8] ATLAS Collaboration Collaboration,, *Search for pair production of higgsinos in events with two Higgs bosons and missing transverse momentum in $\sqrt{s} = 13$ TeV pp collisions at the ATLAS experiment*, Phys. Rev. D **109** (2024) 112011, arXiv:2401.14922 [hep-ex], https://link.aps.org/doi/10.1103/PhysRevD.109.112011.

[9] G. H. Stark et al., *Towards a muon collider*, The European Physical Journal C **83** (2023) 864, https://doi.org/10.1140/epjc/s10052-023-11889-x.

[10] ATLAS Collaboration,, *ATLAS Run 2 searches for electroweak production of supersymmetric particles interpreted within the pMSSM*, tech. rep., CERN, Geneva, 2023. http://cds.cern.ch/record/2870222. All figures including auxiliary figures are available at https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/CONFNOTES/ATLAS-CONF-2023-055.

[11] ATLAS Collaboration, G. Aad et al., *Search for supersymmetry in final states with missing transverse momentum and three or more b-jets in 139 fb^{-1} of proton–proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*, Eur. Phys. J. C **83** (2023) 561, arXiv:2211.08028 [hep-ex].

[12] T. Bose et al., *Report of the Topical Group on Physics Beyond the Standard Model at Energy Frontier for Snowmass 2021*, in *2022 Snowmass Summer Study*. 9, 2022. arXiv:2209.13128 [hep-ph].

[13] K. M. Black et al., *Muon Collider Forum Report*, arXiv:2209.01318 [hep-ex].

[14] K. A. Assamagan et al., *Accessibility in High Energy Physics: Lessons from the Snowmass Process*, in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.08748 [physics.ed-ph].

[15] S. Bailey et al., *Data and Analysis Preservation, Recasting, and Reinterpretation*, arXiv:2203.10057 [hep-ph].

[16] S. Dasu et al., *Strategy for Understanding the Higgs Physics: The Cool Copper Collider*, in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.07646 [hep-ex].

[17] ATLAS Collaboration, *SimpleAnalysis: Generator-level Analysis Framework*, ATL-PHYS-PUB-2022-017, 3, 2022, https://cds.cern.ch/record/2805991.

[18] G. Stark et al., *Jets and Jet Substructure at Future Colliders*, 2022. arXiv:2203.07462 [hep-ph].

[19] ATLAS Collaboration, *Implementation of simplified likelihoods in HistFactory for searches for supersymmetry*, ATL-PHYS-PUB-2021-038, 9, 2021, http://cdsweb.cern.ch/record/2782654.

[20] K. Cranmer et al., *Publishing statistical models: Getting the most out of particle physics experiments*, SciPost Phys. **12** (2022) 37, arXiv:2109.04981 [hep-ph], https://scipost.org/10.21468/SciPostPhys.12.1.037.

[21] ATLAS Collaboration, *Search for chargino–neutralino pair production in final states with three leptons and missing transverse momentum in* $\sqrt{s} = 13$ *TeV pp collisions with the ATLAS detector*, arXiv:2106.01676 [hep-ex].

[22] Feickert, Matthew, Heinrich, Lukas, and Stark, Giordon, *Likelihood preservation and statistical reproduction of searches for new physics*, EPJ Web Conf. **245** (2020) 06017, https://doi.org/10.1051/epjconf/202024506017.

[23] G. Stark, *The Search for Supersymmetry in Hadronic Final States Using Boosted Object Reconstruction*. Springer International Publishing, 2020. https://doi.org/10.1007/978-3-030-34548-8.

[24] LHC Reinterpretation Forum Collaboration, W. Abdallah et al., *Reinterpretation of LHC Results for New Physics: Status and Recommendations after Run 2*, arXiv:2003.07868 [hep-ph].

[25] ATLAS Collaboration,, *Reproducing searches for new physics with the ATLAS experiment through publication of full statistical likelihoods*, Tech. Rep. ATL-PHYS-PUB-2019-029, CERN, Geneva, Aug, 2019. http://cds.cern.ch/record/2684863.

[26] 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*, arXiv:1711.01901 [hep-ex].

[27] 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*, Phys. Rev. D **94** (2016) 032003, arXiv:1605.09318 [hep-ex].

[28] ATLAS Collaboration, *Global Feature Extractor of the Level-1 Calorimeter Trigger: ATLAS TDAQ Phase-I Upgrade gFEX Final Design Report*, Geneva, Nov, 2016, https://cds.cern.ch/record/2233958.

[29] ATLAS Collaboration, *gFEX, the ATLAS Calorimeter Level-1 Real Time Processor*, Tech. Rep. ATL-DAQ-PROC-2015-059, CERN, Geneva, Nov, 2015. https://cds.cern.ch/record/2104248.

[30] ATLAS Collaboration, *Search for pair production of higgsinos in final states with at least three b-tagged jets using the ATLAS detector in* $\sqrt{s} = 13$ *TeV pp collisions*, ATLAS-CONF-2017-081, 2017, https://cds.cern.ch/record/2297400.

[31] 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*, ATLAS-CONF-2017-021, 2017, https://cds.cern.ch/record/2258143.

[32] 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*, ATLAS-CONF-2016-052, 2016, https://cds.cern.ch/record/2206134.

[33] ATLAS Collaboration, *Search for pair-production of gluinos decaying via stop and sbottom in events with b-jets and large missing transverse momentum in* $\sqrt{s} = 13$ *TeV pp collisions with the ATLAS detector*, ATLAS-CONF-2015-067, 2015, https://cds.cern.ch/record/2114839.

[34] ATLAS Collaboration, *Expected Performance of Boosted Higgs ($\to b\bar{b}$) Boson Identification with the ATLAS Detector at $\sqrt{s} = 13$ TeV*, ATL-PHYS-PUB-2015-035, 2015, https://cds.cern.ch/record/2042155.

A full list of publications is available in INSPIRE: https://inspirehep.net/authors/1319078.

Selected Talks

[35] G. Stark, *PARTY CALL PHYSICS: when access and physics collide*, August, 2021. https://events.iaps.info/event/9/page/5-keynote-speakers. A Keynote Speaker for the International Conference of Physics Students, 2021.

[36] G. Stark, *Analysis Preservation Bootcamp*, February, 2020. https://indico.cern.ch/e/awesome. One of the core instructors for the analysis preservation workshop at CERN.

[37] G. Stark, *USATLAS/FIRST-HEP Computing Bootcamp*, August, 2019. https://indico.cern.ch/event/816946/. One of the core instructors for the USATLAS Software Bootcamp at LBNL.

[38] G. Stark, *PARTY CALL PHYSICS: when access and physics collide*, August, 2019. https://indico.cern.ch/event/782953/contributions/3454898/. 2019 Meeting of the Division of Particles & Fields of the American Physical Society.

[39] G. Stark, *SUSY in ATLAS Experiment*, May, 2019. https://cds.cern.ch/record/2675305. XXVIIth International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY 2019).

[40] G. Stark, *Searches in High Pile-up Environment*, February, 2018. https://indico.cern.ch/event/698458/. ATLAS P & P Week, Topical Physics Plenary: Physics with high pile-up.

[41] G. Stark, *Forward jet shapes in high pile-up*, December, 2017. https://indico.cern.ch/event/666007/. Hadronic Final State Forum 2017.

[42] G. Stark, *Search for production of supersymmetric particles in final states with missing transverse momentum and multiple b-jets at s=$\sqrt{13}$ TeV proton-proton collisions with the ATLAS experiment*, November, 2017. https://indico.fnal.gov/event/15068/. US LHC Users Association Annual Meeting, 2017.

[43] G. Stark, *The Calorimeter Global Feature Extractor (gFEX) for the Phase-I Upgrade of the ATLAS experiment*, August, 2017. https://indico.fnal.gov/event/11999/session/21/contribution/192. APS Division of Particles and Fields 2017.

[44] G. Stark, *SUSY using boosted techniques at ATLAS*, August, 2016. https://indico.cern.ch/event/439039. BOOST 2016.

Selected Works

[45] G. Stark, C. A. Ots, and M. Hance, *Codebase release 0.5 for mapyde*, SciPost Phys. Codebases (2024) 27–r0.5, https://scipost.org/10.21468/SciPostPhysCodeb.27-r0.5.

[46] M. Feickert, L. Heinrich, and G. Stark, *pyhf: a pure-Python implementation of HistFactory with tensors and automatic differentiation*, PoS **ICHEP2022** (2022) 245.

[47] Feickert, Matthew, Heinrich, Lukas, Stark, Giordon, and Galewsky, Ben, *Distributed statistical inference with pyhf enabled through funcX*, EPJ Web Conf. **251** (2021) 02070, https://doi.org/10.1051/epjconf/202125102070.

[48] S. Malik et al., *Software Training in HEP*, in *25th International Conference on Computing in High-Energy and Nuclear Physics*. 2, 2021. arXiv:2103.00659 [hep-ex].

[49] L. Heinrich, M. Feickert, G. Stark, and K. Cranmer, *pyhf: pure-Python implementation of HistFactory statistical models*, Journal of Open Source Software **6** (2021) 2823, https://doi.org/10.21105/joss.02823.

[50] G. Stark, L. Heinrich, and M. Feickert, *diana-hep/pyhf: v0.1.2*, July, 2019. https://doi.org/10.5281/zenodo.3334365.

[51] E. N. Dawe, P. Ongmongkolkul, and G. Stark, *root_numpy: The interface between ROOT and NumPy*, The Journal of Open Source Software **2** (2017) 307, https://doi.org/10.21105%2Fjoss.00307.

[52] G. Stark, M. Milesi, J. Alison, G. Facini, K. Krizka, J. Dandoy, T. Novak, J. Bossio, F. Scutti, M. LeBlanc, L. Schaefer, B. Tuan, M. Feickert, W. Kalderon, A. Tuna, M. Muskinja, J. Olsson, L. L. Jr, B. Tong, T. H. Park, M. Swiatlowski, T. Lazovich, B. Carlson, C. Doglioni, R. Hankache, M. Frate, V. Pascuzzi, S. Sekula, R. Newhouse, M. Perego, M. Toscani, L. Henkelmann, L. McClymont, K. Pachal, C. Shimmin, C. Nelson, B. Amadio, B. Stanislaus, W. Balunas, N. Hartman, J. Roloff, J. Geisen, D. Abbott, C. Ohm, C. Helling, C. Antel, A. Emerman, A. Cukierman, and A. Coccaro, *xAODAnaHelpers, v1.0.0*, Apr., 2020. https://doi.org/10.5281/zenodo.3743307.

Teaching and Training

I am always heavily documentating my work and ensuring maintainability and sustainability. It is crucially important to ensure continuity, both for the future success of the activities I am involved in, but also to delegate and teach others transferrable skills. Below, I just list a quick summary of various classes, workshops, bootcamps, tutorials I have participated or led over my tenure.

- CAMPFIRE, "How to do an ATLAS Analysis" *June 2024*
- ATLAS ITk Week, "Tutorial: Access to PDB backup at CERN" *April 2024*
- pyhf Users and Developers Workshop, organizer and instructor *December 2023*
- US-ATLAS Workshop @ SLAC, "Systematic Uncertainties" *October 2023*
- PyHEP, "pyhf tutorial and exploration" *October 2023*
- Reinterpretation Forum, "Reduce, Reuse, Reinterpret (mapyde)" *August 2023*
- CAMPFIRE, "How to do an ATLAS Analysis" *July 2023*
- Reinterpretation Forum, "MaPyDe + ATLAS SimpleAnalysis" *December 2022*
- ATLAS Exotics Workshop, "Data (Products) Preservation" *September 2022*
- DANCE/CoDaS @ Snowmass 2022, instructor *July 2022*
- ATLAS ITk Week, "Using the Production Database API" *May 2022*
- US-ATLAS Computing Bootcamp, organizer and instructor *October 2021*
- PyHEP, "Distributed statistical inference with pyhf" *July 2021*
- ATLAS Induction Day and Software Tutorial, "Intro to pyhf and hands-on" *July 2021*
- ATLAS Induction Day and Software Tutorial, "Using GitLab for Analysis" *July 2021*
- SUSY+HDBS+Exotics RECAST Tutorial, organizer and instructor *March 2021*
- Future Analysis Systems and Facilities, "Making an Analysis Pipeline" *October 2020*
- CMS B2G Workshop, "pyhf", *September 2020*
- US-ATLAS Computing Bootcamp, organizer and instructor *August 2020*
- ATLAS Canada Computing Workshop, GitLab CI and Statistical Analysis *July 2020*
- ATLAS Induction Day and Software Tutorial, "Intro to pyhf and hands-on" *January 2020*
- ATLAS Induction Day and Software Tutorial, "Using GitLab for Analysis" *January 2020*
- ATLAS Induction Day and Software Tutorial, "Intro to pyhf and hands-on" *October 2019*
- ATLAS Induction Day and Software Tutorial, "Using GitLab for Analysis" *October 2019*
- USATLAS/FIRST-HEP Computing Bootcamp, organizer and instructor *August 2019*
- Analysis Systems Topical Workshop, "Likelihood publishing & Reinterpretation" *June 2019*
- ATLAS Induction Day and Software Tutorial, "Using GitLab for Analysis" *January 2019*
- US-ATLAS Hadronic Final State Forum, "Jet and MET triggers" *December 2018*
- ATLAS Machine Learning Workshop, "Intro to pyhf and hands-on" *October 2018*
- ATLAS Induction Day and Software Tutorial, "Using GitLab for Analysis" *October 2018*
- ATLAS Induction Day and Software Tutorial, "Using GitLab for Analysis" *July 2018*
- ATLAS Exotics Workshop, "Tips and tricks for GitLab CI" *May 2018*
- ATLAS Software Tutorial, "Using GitLab for Analysis" *April 2018*
- ATLAS S&C Documentation Workshop, "Modern doc tools and approaches" *December 2017*
- UChicago EFI Data Analytics workshop, "Python, Jupyter, and ROOT" *October 2017*
- ATLAS Hadronic Calibration Workshop, "Analysis Optimization" *August 2017*

- ATLAS Software Tutorial, multiple tutorials *June 2016*
- UChicago/ASC-ANL software tutorial, multiple tutorials *March 2016*

Outreach

I am actively involved in many outreach activities for which I donate my time. These activities vary from working at non-profits, to hobbies where I develop free and open-sourced tools, to actual outreach where I describe the work I do in a public setting.

- Served as Role Model for Deaf Space Camp Unlimited *April 2024*
- Introduced Particle Physics to Underrepresented Minorities at Conniston Middle School *September 2023*
- Served as Panel Member for "Equality, diversity, and inclusion" at Lepton-Photon Conference *January 2022*
- Recorded videos for CERN Microcosm exhibit in American Sign Language. One of the videos is on YouTube
- Expanded the language access of sign language users for Physics via `https://aslcore.org` *July 2019*
- Lobbied Senators and Congressmen to support strong funding for U.S. Particle Physics programs, based on the P5 report, in Washington D.C. `https://www.usparticlephysics.org/strategy.html`
- Working on SignsFive, an online dictionary for Science, Tech, Engineering, and Math sign language videos to be stored, uploaded, and searched through: `http://survey.signsfive.com`
- Developed an application that allows small-budget and non-profit theaters to provide free captioning services for their patrons: `https://github.com/kratsg/captionator`
- Organizing and advocating for accessible theater in Chicago: `http://www.chicagoplays.com/access.html` (2013-present)
- Volunteered my time to other activists in Chicago who need technical expertise: `https://chihacknight.org/` (2015-2018)

Mentorship

I enjoy mentoring other students and helping them succeed both in specific projects, and just generally. Below are a list of students with some details (year if mentored on a specific project, institutional affiliation, or fellow) that I have mentored:

- Sam Kelson (undergraduate, 2024), IRIS-HEP Fellow [coffea]
- Zach Pizzo (undergraduate, 2024), UCSC [ITk Pixels Upgrade]
- Samantha Contreras (undergraduate, 2023-2024), UCSC [ITk Pixels Upgrade]
- Marco Frank (undergraduate, 2023-present), UCSC [ITk Pixels Upgrade]
- Scott Philips (undergraduate, 2023-present), UCSC [ITk Pixels Upgrade]
- Sambridhi Deo (undergraduate, 2023) IRIS-HEP Fellow [REANA]
- Keaton Ferguson (undergraduate, technician, 2022-2024), UCSC [ITk Pixels Upgrade, and life]
- Sam Roberts (graduate, 2021-present), UCSC [ITk Pixels Upgrade, Higgs, and life]
- Bo Zheng (masters, 2020), IRIS-HEP Fellow [Hardware Acceleration with GPUs/TPUs]
- Noah Peake (undergraduate, technician, 2019-2022), UCSC [ITk Pixels Upgrade, and life]
- Hava Schwartz (graduate, 2019-present), UCSC [Monte Carlo, Higgs, and life]
- Nathan Kang (graduate, 2020-present), UCSC [Compressed Electroweak Supersymmetry]
- Yuzhan Zhao (graduate, 2019-present), UCSC [Collinear-W Measurement]
- Jacob Johnson (graduate, 2019-present) [Compressed Electroweak Supersymmetry]
- Dr. Jacob Pasner (graduate, 2018-present), UCSC [Higgs, and life]
- Dr. Carolyn Gee (graduate, 2018-2023), UCSC [Higgs]
- Dr. Natasha Woods (graduate, 2018-2020), UCSC [Quark/Gluon classification]
- Dr. Emily Smith (graduate, 2017-present), UChicago [gFEX, Supersymmetry, and life]
- Dr. Michael Hank (graduate, 2017-2019), UChicago [Supersymmetry]
- Henry Zheng (undergraduate, 2018), UChicago [gFEX System-on-Chip Development]
- Ben Warren (undergraduate, 2018), UChicago [gFEX + Machine Learning]
- Brandon Nadal (undergraduate, 2017), UChicago REU MRSEC [gFEX Monitoring]
- Natalie Harrison (undergraduate, 2015-2017), UChicago [Supersymmetry, Recursive Jigsaw]
- Daniel Sullivan (undergraduate, 2015-2016), UChicago [gFEX Monitoring]
- Michael Reid (undergraduate, 2014-2015), UChicago [Boosted Higgs to bb]
- Sean Gasiorowski (undergraduate, 2014-2015), UChicago [Boosted objects]

Languages	American Sign Language, English (bilingual), French Sign Language (elementary), British Sign Language (elementary), Italian Sign Language (elementary), Spanish (elementary), French (elementary)
</> Programming	*Full Stack Developer*, C, C++, Perl, Python, LaTeX 2_ε, MySQL, PHP, JavaScript, JSON, HTML, XHTML, XML, CSS, VHDL, Continuous Integration, Version Control, GitHub/GitLab
Computing Libraries	Mathematic, Matlab, COMSOL, ROOT, Keras, scikit-learn, TensorFlow, NumPy, SciPy, `pyhf`, uproot, root_numpy, rootpy, PyROOT, Matplotlib, pandas, BitBake/OpenEmbedded, Docker, Git, NodeJS, React, jQuery, Bootstrap, pybind11
Skills	Effective communication, public speaking, collaboration, project management, mentoring, adaptability, flexibility, baking