Austin Basye

Data Scientist, Physics PhD

1718 Belmont Blvd.
Abilene, TX 79602
☎ (806)-620-2076
✉ austin.basye@gmail.com
ATBasye
austinbasye

Education

2009 – 2015 **Ph.D. in Experimental High-Energy Particle Physics**, *UIUC*, Urbana, IL.

DISSERTATION *A search for the $t\bar{t}H(H \to b\bar{b})$ channel at the Large Hadron Collider with the ATLAS detector using a matrix element method*

2004 – 2008 **B.S. in Engineering Physics**, *ACU*, Abilene, TX.

Major Publications, Talks, and Posters

2017 **Physics-Based Modeling of Pass Probabilities in Soccer**, *Poster*, MIT Sloan Sports Analytics Conference, Boston, US.
Abstract: `http://www.sloansportsconference.com/content/physics-based-modeling-pass-probabilities-soccer/`

2014 **Search for Higgs Bosons produced in association with top quarks with the ATLAS detector**, *Talk*, ICNFP, Kolymbari, GREECE.
Invited: *3rd International Conference on New Frontiers in Physics*

2013 **A Matrix Element Analysis of the ttH (H->bb) Channel**, *Talk*, CERN, Meyrin, SWITZERLAND.
Invited: *Presentations to the NSF and DOE LHC Research Program Managers*

2012 **Search for the Standard Model Higgs boson produced in association with top quarks in proton-proton collisions at $\sqrt{s} = 7$ TeV using the ATLAS detector**, CERN, Meyrin, SWITZERLAND.
Abstract: `https://inspirehep.net/record/1204348`

2012 **Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC**, CERN, Meyrin, SWITZERLAND.
Abstract: `https://inspirehep.net/record/1124337`

2011 **Measurement of the top quark pair production cross section in pp collisions at $\sqrt{s} = 7$ TeV in dilepton final states with ATLAS**, CERN, Meyrin, SWITZERLAND.
Abstract: `https://inspirehep.net/record/924315`

2007 **Conceptual Design Report for a fast muon trigger**, Brookhaven National Lab, Upton, NY.
Abstract: `http://www.osti.gov/scitech/biblio/919466`

2007 **Muon Spectrometer Upgrades at PHENIX**, ICPS, London, ENGLAND.
Abstract: `https://www.iaps.info/media/icps2007handbook_online.pdf`

2006 **RPC Detector Research and Development for PHENIX**, DNP, Nashville, TN.
Abstract: `http://meetings.aps.org/Meeting/DNP06/Session/3A.7`

2005 **Level 2 Filtering for the PHENIX Experiment at RHIC**, DNP, Maui, HI.
Abstract: `https://meetings.aps.org/Meeting/HAW05/Session/FR.37`

Experience

2015 – Pres. **Hudl**, *Senior Data Scientist Lead II*, Remote (Work From Home), Abilene, TX.

- Responsible for pursuing self-defined projects of articulable business value
- Developed and deployed multiple ETL pipelines, leveraging AWS systems
- Developed and deployed ML algorithms for object detection/tracking and event detection/classification utilizing sport video and player telemetry
- Authored numerous analysis documents and presentations for key decision makers

Tools ○ Python, Jupyter, Confluence, Github, Docker, OpenCV, Keras, TensoFlow, Pytorch, Numba, Spark, AWS

2010 – 2015 **ATLAS Experiment**, *Research Assistant (Qualified Collaboration Author)*,
CERN, Meyrin, SWITZERLAND,
University of Illinois at Urbana-Champaign, Urbana, IL .

- Personally developed a novel multivariate statistical analysis of the semi-leptonic $t\bar{t}H(H \to b\bar{b})$ channel
- Developed a generalized C/C++ framework for the Matrix-Element MVA
  - Implemented VEGAS numerical integration algorithm from the GSL libraries
  - Created a kinematic variable transformation engine to optimize integration phase
  - Improved per event performance more than two orders of magnitude
- Personally developed a Perl-based assignment portal to automate and optimize distributed resource allocation on the Worldwide LHC Computing Grid (WLCG)
  - Created an HTML/PHP website for receiving globally-distributed user submissions
  - Created a PERL back end for automatically generating user submission scripts and for automated GRID job monitoring and status reporting
- Managed a 3 million CPU hour analysis across the globally distributed WLCG
- Improved analysis compute performance by more than two orders of magnitude and improved official ATLAS result by more than 15% without requiring additional data taking
- Chaired daily data quality operations meetings during Run 1 of the Large Hadron Collider
- Commissioned ATLAS muon drift tube (MDT) extra-endcap (EE) chambers
- Authored and managed offline muon data quality monitoring software packages
  - Collaborative development required utilization of various content management, versioning, and nightly build systems
  - Packages were written in C++ with PYTHON steering and configuration interfaces

Tools - C++, Perl, ROOT, Evernote, SVN, Bash, LaTeX

2008 – 2009 **NIFFTE Experiment**, *Research Assistant*,
Los Alamos National Lab, Los Alamos, NM,
Abilene Christian University, Abilene, TX .

service
- Computer aided design and modeling of the experimental hall and necessary service routing

2005 – 2009 **PHENIX Experiment**, *Research Assistant (Qualified Collaboration Author)*,
Brookhaven National Lab, Upton, NY,
Abilene Christian University, Abilene, TX .

- Designed and drafted technical, manufacturing and assembly plans for 40m^2, $2 million detector upgrade using AutoCAD 2007-2008 and Inventor 10-11
- Supervised and optimized the assembly, QC, and commissioning factory for the detector upgrades
- Performed duties as an online shift crew-member during PHENIX data-taking
- Improved data management and transfer protocols for fractured datasets
- Extended and managed VME-based data acquisition system for detector prototype testing

Tools
- C/C++, Perl, AutoCad 2007-2008, Inventor 10-1, Excel, MatLab, PowerPoint

t $<$ c. 2004 **Miscellaneous Employers**, *Student and Cowboy*, Canyon, TX .

- Identified a passion for challenging problems, creative solutions, and coloring outside the lines, motivated by a desire to leave this world a better place than I found it
- Developed a strong work ethic building and mucking horse stables, mending fence, perfecting proper 'T'-post driving technique, and using my hands to create things that addressed the needs of others
- Developed and fabricated a 6 wheeled, 30 ft, steel, pumpkin-fed trebuchet with more than 1 ton of counterweight, because the world clearly needs more airborne pumpkins

Teaching Experience

2015 – 2018 **Various Topics in Physics and Pattern Recognition**, Abilene Christian University, Abilene, Tx.
Recurring invited speaker

Spring 2016 **Machine Learning: Classification**, Hudl University (Internal Continuing Education), Lincoln, Ne.

2010 – 2011 **Introduction to Classical Mechanics Lecture**, University of Illinois at Urbana-Champaign, Urbana, Il.
- Received '**Excellent**' rating from student survey with '***Outstanding***' designation

Spring 2010 **Introduction to Electricity and Magnetism Lab**, University of Illinois at Urbana-Champaign, Urbana, Il.
- Received '**Excellent**' rating from student survey

Fall 2009 **Introduction to Classical Mechanics Lab**, University of Illinois at Urbana-Champaign, Urbana, Il.
- Received '**Excellent**' rating from student survey

2005 – 2009 **Undergraduate Astronomy Lab**, Abilene Christian University, Abilene, Tx.

2005 – 2009 **Undergraduate Engineering Physics Lab I & II**, Abilene Christian University, Abilene, Tx.

Tool Experience

Data Science	Pytorch, TensorFlow, Spark, Anaconda, Jupyter, Matplotlib, Scikit-learn, Numpy, Numba	AWS	EC2, ECS, Lambda, Batch, IAM, S3
Platform	*nix, Windows, Max OSX, Docker	Languages	Python, C/C++, Bash, Perl, Matlab
Scientific	ROOT, GSL, Matlab, Maple, Mathematica, OpenMP	Versioning	Subversion, Git, CVS, GitHub
Typography	Confluence, LaTeX, Microsoft Office, Libre Office, Mac iLife Office	CAD	AutoCAD 2007 – 2008, Inventor 10-11, Bently MicroStation

Work Interests

- Higgs Identification amid Complex Final States
- Computational Methods in Experimental High-Energy Physics
- Extremely-Large-Scale Distributed/GRID & Cloud Computing
- Multivariate Analysis & Auto-differentiation Techniques
- Adaptive Monte-Carlo Integration
- Ionizing Radiation Detector Design and Development
- Involving and Mentoring Junior/Undergraduate Researchers
- "Deep" unsupervised learning techniques (VAE, GAN, TSNE)
- Object detection and tracking
- Event detection and classification
- Time series analysis
- Multi-agent game analysis
- Reproducible Machine Learning

Scholarships, Honors and Awards

2009 – 2011 **Excellent Teacher Award**, University of Illinois.

2008 **The Board of Trustees Award**, Abilene Christian University Board of Trustees.

2008 **V.W. Kelly Graduate Scholarship**, ACU Alumni Association.

2008 **Paul S. Schulze Award**, ACU Physics Department.

2008 **ACU Servant Leadership Award** , Abilene Christian University.

2007 **Outstanding Undergraduate Researcher Award** , SPS National Organization.

2007 – 2008 **Sigma Pi Sigma, Physics Honorary**, ACU Physics Department.

References[†]

Tony Liss, Ph.D. (Thesis Advisor)
Dean of Science
City College of New York

Elizaveta Shabalina, Ph.D.
Senior Research Physicist
University of Göttingen

Mark Neubauer, Ph.D.
Professor
University of Illinois at Urbana-Chapaign

Nektarios Benekos, Ph.D.
CERN Fellow, UIUC Researcher
CERN

Matthias Grosse-Perdekamp, Ph.D.
Professor, Willett Faculty Scholar
University of Illinois at Urbana-Chapaign

Rusty Towell, Ph.D.
Professor and Chair of Engineering and Physics
Abilene Christian University

[†]Contact information is available upon request.