

Southern Methodist University
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Education

August 2012 to March 2018: **Southern Methodist University**, Dallas, TX
Ph.D., Physics
Thesis Area: Theoretical high energy physics and particle phenomenology

August 2012 to December 2014: **Southern Methodist University**, Dallas, TX
M.S., Physics

August 2008 to May 2012: **Southwestern University**, Georgetown, TX
B.A., Physics, Mathematics
Cum Laude - Dean's List 2008-2012

Research Summary

My doctoral research aimed to better understand the structure of protons and nuclei in collider environments. Specifically this entails using Parton Distribution Functions (PDF) that describe the motion of quarks and gluons in the moments leading up to collisions. These functions can be applied to nuclei as well and I designed a framework to describe the impact of LHC data on the lead nuclear PDF.

Career Interests

We live in an increasingly data-driven world. As such, the understanding and insights that we can glean from this data are valuable assets for the future. I am interested in using data-driven analytics to understand the past as well as building software tools (modeling, AI, machine learning, predictive analytics) that allow me to intelligently predict how to lead us into the future.

Technical Skills

Languages and Software	Python (numpy, scipy, matplotlib, pandas, anaconda, jupyter, beautifulsoup), SQL, C++, C, R, , LaTeX, Git, SVN, Clowder, Mathematica, Microsoft Office (Excel, Word, PowerPoint)
OS and Environments	Linux (Scientific Linux, Ubuntu), Windows
Expertise	Code Development, Validation, Data Management, Data Wrangling, Visualization Statistical Analyses, Advanced and Predictive Analytics, Debugging, Web Design

Professional Experience

October 2018 to present: **Data Science Research Applications Developer**,
February 2020 to present: Team Lead
[Data Science and Research Services](#), Office of Information Technology
Southern Methodist University, Dallas, TX

August 2019 to February 2020: **Academic Technology Services Director *ad interim***,
[Dedman College of Humanities & Sciences](#)/ Office of Information Technology
Southern Methodist University, Dallas, TX

August 2019 to present: **STAR Program Manager**,
[Student Technology Assistants in Residence Program](#), Office of Information Technology
Southern Methodist University, Dallas, TX

Research Experience

August 2014 to present: **Ph.D. Candidate**, *High Energy Theory Group*
Advising Professor: [Fredrick I Olness](#), Department of Physics
Southern Methodist University, Dallas, TX
Constraining theoretical uncertainties by improving understanding of proton and nuclear Parton Distribution Functions

September 2011 to July 2012: **Undergraduate Research**, *Physics Capstone Completion*
Advising Professor: [Steven Alexander](#), Physics Department
Southwestern University, Georgetown TX
Design and construction of passive solar thermal battery, Stirling engine and parabolic solar reflector
Work done with funding provided by King Creativity Grant

August 2011 to December 2012: **Undergraduate Research**, *Mathematics Capstone Completion*
Advising Professor: [Therese Shelton](#), Mathematics and Computer Science Department
Southwestern University, Georgetown TX
Developed a mathematical model for wind power forecasting using historical weather data in Mathematica

Publications and Letters

Implementing an Honors Physics Add-On Course: The SMU Experience, Jodi Cooley, Eric Godat, and Stephen Sekula, Southern Methodist University, Dallas, TX (2020). Published in *The Physics Teacher* **58**, 509 (October 2020) <https://doi.org/10.1119/10.0002074> .

Impact of LHC vector boson production in heavy ion collisions on strange PDFs, The nCTEQ Collaboration (A. Kusina et al.), Southern Methodist University, Dallas, TX (2020). Published in *European Physics Journal C* **80**, Article number: 968, (October 2020) DOI: [10.1140/epjc/s10052-020-08532-4](https://doi.org/10.1140/epjc/s10052-020-08532-4). Also available: [arXiv:2007.09100](https://arxiv.org/abs/2007.09100).

nCTEQ PDFs at the LHC: Vector boson production in heavy ion collisions, The nCTEQ Collaboration (F. I. Olness et al.), Southern Methodist University, Dallas, TX (2019). [arXiv: 1909.00452](https://arxiv.org/abs/1909.00452) - International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS2019) .

xFitter 2.0.0: Heavy Quark Matching Scales: Unifying the FFNS and VFNS, xFitter Developers Team (V. Bertone et al.), Southern Methodist University, Dallas, TX (2018). [arXiv: 1808.08623](https://arxiv.org/abs/1808.08623) - International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS2018) .

PDF Flavor Determination and the nCTEQ PDFs: W^\pm/Z vector boson production in heavy ion collisions, The nCTEQ Collaboration (Eric Godat et al.), Southern Methodist University, Dallas, TX (2018). [arXiv:](https://arxiv.org/abs/1808.08623)

[1808.07514](#) - International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS2018) .

The Impact of pPb W/Z LHC Data on nCTEQ Parton Distribution Functions with an Emphasis on Re-fitting the nCTEQ15 nPDF set, Eric Godat, Southern Methodist University, Dallas, TX (2017). Doctoral Dissertation . [Full Text](#).

Impact of the Heavy Quark Matching Scales in PDF Fits, xFitter Developers Team (V. Bertone et al.), Southern Methodist University, Dallas, TX (2017). Published in [European Physics Journal C \(December 2017\)](#). [arXiv: 1707.05343](#).

ManeParse: a Mathematica reader for Parton Distribution Functions, D.B. Clark, Eric Godat, F.I. Olness, Department of Physics, Southern Methodist University, Dallas, TX (2017). Published in [Computer Physics Communications \(April 2017\)](#). [arXiv: 1605.08012](#).

LHC lead data and nuclear PDFs, A. Kusina, F. Lyonnet, D.B. Clark, Eric Godat, T. Jezo, K. Kovaric, F.I. Olness, I. Schienbein, J.Y. Yu, Department of Physics, Southern Methodist University, Dallas, TX (2016). Published in [Acta Physica Polonica B](#). [arXiv: 1705.06704](#).

Vector boson production in proton-lead and lead-lead collisions at the LHC and its impact on nCTEQ15 PDFs, A. Kusina, F. Lyonnet, D.B. Clark, Eric Godat, T. Jezo, K. Kovaric, F.I. Olness, I. Schienbein, J.Y. Yu, Department of Physics, Southern Methodist University, Dallas, TX (2016). Published in [European Physics Journal C](#). [arXiv: 1610.02925v2](#).

Impact of Heavy Flavor PDFs at the LHC, D.B. Clark, Eric Godat, T. Jezo, K. Kovaric, A. Kusina, F. Lyonnet, F.I. Olness, I. Schienbein, J.Y. Yu, Department of Physics, Southern Methodist University, Dallas, TX (2016). [Proceedings of Science](#) - International Workshop on Deep-Inelastic Scattering .

Parton distribution functions probed in ultraperipheral collisions at the CERN Large Hadron Collider, J. Thomas, C.A. Bertulani, N. Brady, D. B. Clark, E. Godat, F. Olness, Department of Physics, Southern Methodist University, Dallas, TX (2016). Publication pending [arXiv: 1603.01919](#).

ManeParse: Mathematica Toolbox for PDF Uncertainties and Application to New Physics Searches, D.B. Clark, Eric Godat, F.I. Olness, Department of Physics, Southern Methodist University, Dallas, TX (2015). Conference Proceedings - Division of Particles and Fields 2015 [arXiv: 1510.06009](#).

Talks and Conferences

| **Always Remote: Using ManeFrame II for Research and Teaching**, [Advancements in EdTech - Office of Information Technology](#), Dallas, TX, August 17-21, 2020

| **Introduction to Text Mining with Python**, [Digital Humanities Research Institute @ SMU 2020 - Southern Methodist University Libraries](#), Dallas, TX, August 10-13, 2020

| **Introduction to Text Mining with Python**, [Digital Humanities Research Institute @ SMU 2019 - Southern Methodist University Libraries](#), Dallas, TX, August 19-22, 2019

| **Introduction to Data Resources, Introduction to Text Mining with Python, Think, Play, Hack: World Views 2019 - Southern Methodist University**, Taos, NM, July 1-5, 2019

| [Supercomputing 2018](#), Dallas, TX, November 11-16, 2018

| **The Impact of LHC Run I W/Z Data on the nCTEQ15 PDF Set**, [Doctoral Defense - Southern Methodist University Department of Physics](#), Dallas, TX, March, 29th, 2018

| **Estimating the Impact of W/Z pPb LHC Data on nCTEQ15 PDFs**, [APS Texas Section Fall 2017 Meeting](#), Richardson, TX, October 2017

| **Early Estimates of the Impact of W/Z pPb and PbPb LHC Data on nCTEQ15 PDFs**, [Phenomenology 2017](#), Pittsburgh, PA, May 2017

| [Santa Fe Jets and Heavy Flavors 2017](#), Santa Fe, NM, February 2017

| **Applications for ManeParse in New Physics Searches and Nuclear PDFs**, [SMU Research Day Poster](#), Dallas, TX, April 2016

| [Santa Fe Jets and Heavy Flavors 2016](#), Santa Fe, NM, January 2016

| **Mathematica Package for Accessing and Manipulating PDFs for New Physics Searches**, [APS Texas Section Fall 2015 Meeting](#), Waco, TX, October 2015

| **ManeParse: Mathematica Toolbox for PDF Uncertainties and Application to New Physics Searches**, [APS Division of Particles and Fields](#), Ann Arbor, MI, August 2015

| [International Workshop on Deep-Inelastic Scattering](#), Dallas, TX, April 2015

| **ManeParse: PDF Reader and Interface Mathematica Package**, [SMU Research Day Poster](#), Dallas, TX, April 2015

| [Fermi National Accelerator Laboratory Hadron Collider Physics Summer School](#), Batavia, IL, August 2014

| [CTEQ Summer School](#), Pittsburgh, PA, July 2014

| **Wind Power Forecasting**, UT Tyler Undergraduate Mathematics Conference, Tyler, TX, October 2011

Awards & Scholarships

2020	University Commendation for Unique Contributions during COVID-19 Pandemic
2017-2018	Dedman College Dissertation Fellowship Award
2017	TSAPS Robert S. Hyer Award for Excellence in Research
2017	Outstanding Graduate Physics Teaching Assistant Award
2015	Texas Section Fall 2015 Presentation Award
2015	SMU Research Day Dean's Award - Physics
2013	Outstanding Graduate Physics Teaching Assistant Award
2012	Featured as cover Senior Story in Southwestern Magazine Fall 2012
2011	King Creativity Fund Grant Recipient

Professional Activities and Service

October 2020 to present:	Institutional Review Board Southern Methodist University <i>ex-officio member</i>
April 2020 to present:	COVID Data Ninja Southern Methodist University <i>Team Lead - Data Scientist</i> University initiative to generate an algorithm to reassign classrooms in light of social distancing brought about by COVID-19.
August 2019 to present:	GitHub Campus Advisor Southern Methodist University <i>Campus Administrator</i>
August 2016 to May 2018:	Graduate Student Assembly Southern Methodist University <i>Physics Department Representative</i>
December 2014 to May 2015:	International Workshop on Deep-Inelastic Scattering 2015 Southern Methodist University <i>Local Organizing Committee</i>
2010 to 2012:	Pi Mu Epsilon Mathematics Honor Society Southwestern University
May 2011 to May 2012:	<i>President</i>
2010 to 2012:	Alpha Chi Honor Society Southwestern University
2008 to 2012:	Physics Club Southwestern University
May 2010 to May 2012:	<i>President</i>

Teaching Experience

August 2016 to May 2020:	Instructor Southern Methodist University, Department of Physics
August 2016 to May 2017:	<i>PHYS 1010 - Honors Physics</i>
August 2012 to May 2016:	Graduate Teaching Assistant Southern Methodist University, Department of Physics
January 2016 to May 2016:	<i>PHYS 1308 - General Physics II</i> <i>PHYS 4049 - Honors Physics</i>
August 2015 to December 2015:	<i>PHYS 1303 - Introductory Mechanics</i> <i>PHYS 4049 - Honors Physics</i> <i>PHYS 1320 - Musical Acoustics Lab</i>
June 2015 to July 2015:	<i>PHYS 1105 - Introductory Mechanics Lab</i>
January 2015 to May 2015:	<i>PHYS 1304 - Introductory Electricity and Magnetism</i> <i>PHYS 4049 - Honors Physics</i>
August 2014 to December 2014:	<i>PHYS 1303 - Introductory Mechanics</i>
June 2014 to July 2014:	<i>PHYS 1105 - Introductory Mechanics Lab</i>
January 2014 to May 2014:	<i>PHYS 1303 - Introductory Mechanics</i>
August 2013 to December 2013:	<i>PHYS 1304 - Introductory Electricity and Magnetism</i>
June 2013 to July 2013:	<i>PHYS 1105 - Introductory Mechanics Lab</i>
January 2013 to May 2013:	<i>PHYS 1303 - Introductory Mechanics</i>
August 2012 to December 2012:	<i>PHYS 1303 - Introductory Mechanics</i>
August 2010 to May 2012:	Undergraduate Teaching Assistant Southwestern University, Physics Department
August 2010 to May 2012:	<i>Fundamentals of Physics I & II</i>
2000 - 2010:	Assistant Camp Director / Counselor Dallas, Texas
May to July:	<i>Art Splash Summer Camp</i>

Outreach

February 23rd, 2019	Physics Judge at Dallas Regional Science and Engineering Fair
February 24th, 2018	Physics Judge at Dallas Regional Science and Engineering Fair
Fall 2017	Destination Imagination Consultant for Stonewall Jackson Elementary
February 25th, 2017	Physics Judge at Dallas Regional Science and Engineering Fair
November 11th, 2016	Physics Circus at halftime of SMU Women's Basketball game
May 12th, 2016	Physics Circus
February 27th, 2016	Physics Judge at Dallas Regional Science and Engineering Fair
February 21st, 2015	Physics Judge at Dallas Regional Science and Engineering Fair
February 15th, 2014	Physics Judge at Dallas Regional Science and Engineering Fair
February 23rd, 2013	Physics Judge at Dallas Regional Science and Engineering Fair