

JUSTIN CAMMAROTA

Newport News, VA

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EDUCATION

William & Mary

Doctorate of Philosophy in Physics

Master of Science in Physics

Lebanon Valley College

Bachelor of Science in Physics

Bachelor of Science in Mathematics

August 2019 - Present

In Progress

January 2021

August 2015 - May 2019

Summa Cum Laude

Summa Cum Laude

RESEARCH EXPERIENCE

William & Mary SIDIS and DIS Research

Graduate Student Researcher

Summer 2020-Present

Williamsburg VA

Completed the first calculation of next-to-leading order (NLO) factorized QED contributions to the short-distance hard coefficients of inclusive lepton-hadron deep inelastic scattering (DIS) in a joint QCD and QED factorization approach [PoS DIS2024 (2024) 064 (arXiv2408.08377), a long paper in preparation]. Unlike the traditional radiative correction (RC) approach to handle the collision-induced QED contributions to lepton-hadron DIS, QED radiation from all charged leptons and quarks are treated equally and their collinear sensitivities are systematically factorized into corresponding universal lepton and parton distribution functions. Our full NLO factorized QED contribution calculated in the joint QCD and QED factorization approach is completely infrared safe without the need of any parameters in the traditional RC approach other than the standard factorization scale. Our results and the new joint factorization approach will impact the reliability and precision for extracting partonic information from lepton-hadron DIS and semi-inclusive DIS at the future EIC. Our on-going effort to extend this joint factorization approach to the NLO contribution to parity-violating DIS (PVDIS) will impact the reach and discovery potential of new physics from future high luminosity PVDIS measurements at SoLID and EIC. Research Advisor: Dr. Jianwei Qiu, Dr. Jia-Yue Zhang

DOE SCGSR and JSA/Jefferson Lab Grant Research

Graduate Student Researcher

Summer 2022-Summer 2024

Newport News VA

Developed the first software package to implement the new QED and QCD factorization formalism to extract important hadronic structure functions. Research Advisors: Dr. Jianwei Qiu, Dr. Wally Melnitchouk, and Dr. Nobuo Sato

Lebanon Valley College Senior Physics Research

Student Researcher

Fall 2018-Spring 2019

Annville PA

Created Python code and Jupyter Notebooks to model asymmetries from proton structure experiments with the JAM3D collaboration. Research Advisor: Dr. Dan Pitonyak

European Organization for Nuclear Research (CERN)

Summer Research Intern

Summer 2018

Geneva CH

Extracted first moment of spin-dependent distribution functions from asymmetry data collected by the COMPASS collaboration, through the University of Michigan CERN REU. Research Advisor: Dr. Bakur Parsamyan

Fermi National Accelerator Laboratory

Summer Research Intern

Summer 2017

Batavia IL

Modeled modifications to the delivery ring as part of REDTOP's proposal phase to demonstrate effects of altered quadrupoles and sextupoles, through the SULI program. Research Advisors: Dr. Corrado Gatto and Dr. Michael Syphers

Lebanon Valley College Mathematical Physics Research Group

Summer Research Intern

Summer 2016

Annville PA

Investigated the Werner Basis Conjecture to prove linear independence of the collection of Werner Diagram States over the space of Werner States. Research Advisors: Dr. David Lyons and Dr. Scott Walck

PAPERS

1. Justin Cammarota, Jian-Wei Qiu, Kazuhiro Watanabe, and Jia-Yue Zhang. Factorized qed contribution to lepton-hadron dis, 2024
2. Justin Cammarota, Leonard Gamberg, Zhong-Bo Kang, Joshua A. Miller, Daniel Pitonyak, Alexei Prokudin, Ted C. Rogers, and Nobuo Sato. Origin of single transverse-spin asymmetries in high-energy collisions. *Phys. Rev. D*, 102:054002, Sep 2020

IN PREPARATION

1. Justin Cammarota, Jian-Wei Qiu, Kazuhiro Watanabe, and Jia-Yue Zhang, Factorized QED Contribution to Inclusive Deeply Inelastic Scattering
2. Justin Cammarota, Wally Melnitchouk, Jian-Wei Qiu, and Nobuo Sato, Joint QCD and QED Factorization for Lepton-Hadron Semi-Inclusive DIS and Extraction of TMDs

AWARDED GRANTS

Jefferson Science Associates/Jefferson Lab Graduate Fellowship, “Extracting Polarized Hadron Structure from SIDIS in terms of QED and QCD Factorization” \$12000, 1 year starting July 2023.

Jefferson Science Associates Travel Grant, QCD Evolution Workshop, \$1000, May 2023.

Department of Energy Office of Science Graduate Student Research “Extracting Hadron Structure Functions in terms of Lepton-Hadron Scattering from QED and QCD Factorization” \$36000, 1 year starting June 13, 2022.

ACADEMIC ACHIEVEMENTS

Rolf G. Winter Memorial Physics Award for Teaching Excellence	December 2021
Outstanding Achievement Award in Physics	April 2019
Outstanding Senior Award in Mathematics	April 2019
Inducted into Sigma Pi Sigma (SPS), Physics Honor Society	April 2017
Inducted into Pi Mu Epsilon (PME), Math Honor Society	April 2017
Mathematical Achievement Award	April 2017
First Year Achievement Award in Physics	April 2016
First Year Leadership and Success Award	April 2016
Allwein Scholar at Lebanon Valley College	September 2015

CONFERENCES AND WORKSHOPS

PLENARY TALKS

QCD Evolution Workshop	May 2023
<i>Presented</i>	<i>Orsay France</i>

PARALLEL TALKS

APS Division of Nuclear Physics and the Physical Society of Japan Fall Meeting	November 2023
<i>Presented</i>	<i>Waikoloa Village HI</i>

DIS2023: International Workshop on Deep-Inelastic Scattering and Related Subjects	March 2023
<i>Presented</i>	<i>East Lansing MI</i>

APS Division of Nuclear Physics Fall Meeting	October 2022
<i>Presented</i>	<i>New Orleans LA</i>

QCD Evolution Workshop	May 2022
<i>Attended</i>	<i>Charlottesville VA</i>

PRESENTATIONS

- “Impact of QED Effects in SIDIS: A New Hybrid Factorization Approach” Cammarota, J., Melnitchouk, W., Qiu, J., Sato, N.
-Presented at APS Division of Nuclear Physics and the Physical Society of Japan Fall Meeting, Waikoloa Village, HI. November 29 2023. (Oral Presentation)
- “The Impact of QED Effects in SIDIS” Cammarota, J., Melnitchouk, W., Qiu, J., Sato, N.
-Seminar at Jefferson Lab, Newport News, VA. May 31, 2023 (Oral Presentation)
- “Factorizing Lepton Radiation in SIDIS” Cammarota, J., Melnitchouk, W., Qiu, J., Sato, N.
-Presented at QCD Evolution, Orsay, France. May 22, 2023 (Oral Presentation)
- “Factorization of Lepton Radiation in SIDIS” Cammarota, J., Melnitchouk, W., Qiu, J., Sato, N.
-Presented at DIS2023, East Lansing, MI. March 30, 2023 (Oral Presentation)
- Presented at APS Division of Nuclear Physics Fall Meeting, New Orleans, LA. October 29, 2022 (Oral Presentation)
- Presented at HUGS student poster session, JLAB, Newport News, VA. June 16, 2021 (Poster Presentation)
- “Accelerating into Graduate School” Cammarota, J.
-Plenary talk at the 10th Disappearing Boundaries Summer Research Meeting, Lebanon Valley College, Annville, PA. July 17, 2019. (Oral Presentation)
- “Extraction of first k_T moment of Sivers and g_{1T}^\perp PDFs from COMPASS Proton 2010 data”
Cammarota, J., Parsamyan, B.
-Presented at the annual Lebanon Valley College Inquiry, Lebanon Valley College, Annville, PA, April 25, 2019. (Poster Session)
- Presented at the University of Michigan CERN REU Summer Student Program at CERN, Meyrin CH, August 16, 2018. (Oral Presentation)
- Presented at the COMPASS Analysis Meeting at CERN, Meyrin CH, August 9, 2018. (Oral Presentation)
- “REDTOP Beam Modeling for Raised Transition Energy and Third Integer Resonance Extraction”
Cammarota, J., Gatto, C., Syphers, M.J.
-Presented at the annual Lebanon Valley College Inquiry, Lebanon Valley College, Annville, PA, April 26, 2018. (Poster Session)
- Presented as part of the SULI program at Fermilab, FNAL, Batavia IL, August 9-10, 2017. (Oral Presentation and Poster Session)
- “Investigation of the Werner Basis Conjecture” Cammarota, J., Lyons, D.W., Walck, S.N.
-Presented at the annual Lebanon Valley College Inquiry, Lebanon Valley College, Annville, PA, April 27, 2017. (Poster Session)
- Presented at the 31st annual Moravian Student Mathematics Conference, Moravian College, Bethlehem, PA, February 25, 2017. (Oral Presentation)

REPORTS

1. Justin Cammarota. Extraction of first transverse moments of sivers and g_{1T}^\perp tmd pdfs from polarized sidis compass data. Unpublished Manuscript, LVC Physics Honors Thesis, 2019
2. Justin Cammarota. Investigating the werner basis conjecture. Unpublished Manuscript, LVC Math Honors Thesis, 2019
3. Justin Cammarota and Bakur Parsamyan. Extraction of first transverse moments of sivers and g_{1T}^\perp tmd pdfs from polarized sidis compass data. Unpublished Manuscript, CERN Document Server, 2018
4. Justin Cammarota, Corrado Gatto, and Michael Syphers. Redtop beam modeling for raised transition energy and third integer resonance extraction. Unpublished Manuscript, Beam Docs Archive, 2017

PROFESSIONAL DEVELOPMENT

Quantum Computing Bootcamp
Attended

June 2023
Newport News VA

Nuclear Physics on the Hill Day
Met with Congressional staff

April 2023
Washington, DC

CTEQ Summer School
Attended

July 2022
Pittsburgh PA

TMD Winter School
Attended

January 2022
Santa Fe NM

Hampton University Gradaute School
Attended Virtually

Summer 2021
Newport News VA

WORK EXPERIENCE

William & Mary Physics Department
Teaching Assistant

2019-2021

Taught and graded undergraduate physics labs for non-major students.

Lebanon Valley College Physics Department
Lab Assistant

2016-2019

Worked in undergraduate physics labs with students to help them understand important topics.

Lebanon Valley College Tutoring Center
Tutor and Study Pod Leader

2016-2019

Provided one-on-one and group tutoring in physics and math subjects.

COMPUTER SKILLS

Programming Languages

C/C++, C#, GAP, Haskell, HTML5/CSS3, Java, MAD-X,
Mathematica, Python, R, ROOT

Software

LaTeX, Graphical Analysis, PASCO Capstone

EXTRA-CIRRICULAR

W & M Graduate and Honors Research Symposium Organizing Committee
-Volunteer Coordinator and Session Chair

2024

W & M Graduate Council

2022-2024

-Leadership Positions: President (2023-2024)

W & M Graduate Student Association

2020-Present

-Leadership Positions: Vice-Dean's Advisory Committee (2024-Present), President (2022-2023), Secretary (2021-2022), Journal Club Co-Executive (2020-2021), Treasurer (2020-2021)

W & M Physics Graduate Student Association

2019-Present

-Leadership Positions: Graduate Student Representative to Graduate Studies Committee (2021-2023)