

Joseph (Joe) D. Osborn

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Research Interests

High-energy experimental nuclear physics, software and computing in high-energy physics.

Education

University of Michigan, Ph.D. in Physics, 2018.

University of Michigan, M.S. in Physics, 2015.

University of Kentucky, B.S. in Physics, B.S. in Mathematics, 2013.

Software and Computational Fluency

Languages: C/C++, Java, Python, L^AT_EX, Bash

Tools: git, Jenkins, Linux, UML, Doxygen, Docker, Singularity, Serverless/FaaS, pybind

HEP Packages: ROOT, ACTS, GEANT, Fun4All, RooUnfold

Ph.D. Thesis

Nonperturbative factorization breaking and color entanglement effects in dihadron and direct photon-hadron angular correlations in $p+p$ and $p+A$ collisions. J. D. Osborn, University of Michigan, May 29, 2018. hep-ex/1806.07763.

Research Positions

Advanced Applications Engineer, Brookhaven National Laboratory

08/2022-present

Physics Department

Associate Research Scientist, Oak Ridge National Laboratory

06/2021-08/2022

Computing and Computational Sciences Directorate

Postdoctoral Research Associate, Oak Ridge National Laboratory

07/2019-05/2021

Computing and Computational Sciences Directorate

Visiting Scholar, University of Michigan

06/2019-06/2020

Department of Physics

Postdoctoral Research Fellow, University of Michigan

06/2018-06/2019

Department of Physics

Graduate Research Assistant, University of Michigan

07/2013-06/2018

Thesis advisor: Christine Aidala

Department of Physics

Undergraduate Research Assistant, University of Kentucky

05/2012-05/2013

Thesis advisor: Renee Fatemi

Department of Physics

High School Research Assistant, University of Kentucky

01/2008-05/2009

Thesis advisor: James McDonough

Department of Mechanical Engineering

Research Funding

1. Oak Ridge National Laboratory subcontract through Brookhaven National Laboratory. *Software Development for sPHENIX*. 03/2020-03/2022. PI, \$466k.

Peer Reviewed Publications with Significant Contribution

Full publication list at end of CV, or search ‘find a J. D. Osborn’ on inspirehep.net

1. U. A. Acharya et al. “Improving constraints on gluon spin-momentum correlations in transversely polarized protons via midrapidity open-heavy-flavor electrons in $p^\uparrow + p$ collisions at $\sqrt{s} = 200$ GeV.” arXiv:2204.12899, submitted to Phys. Rev. Lett.
2. J. C. Bernauer et al. “Scientific computing plan for the ECCE detector at the Electron Ion Collider” arXiv:2205.08607, submitted to NIMA.
3. X. Ai et al. “A Common Tracking Software Project.” *Computing and Software for Big Science* 6, 8 (2022).
4. R. Abdul Khalek et al. “Science Requirements and Detector Concepts for the Electron-Ion Collider: EIC Yellow Report.” arXiv: 2103.05419. Accepted by Nucl. Phys. A.
5. **J.D. Osborn** et al. “Implementation of ACTS into sPHENIX track reconstruction.” *Computing and Software for Big Science* 5, 23 (2021).
6. U. A. Acharya et al. (PHENIX Collaboration), “Probing gluon spin-momentum correlations in transversely polarized protons through midrapidity isolated direct photons in $p^\uparrow + p$ collisions at $\sqrt{s} = 200$ GeV. *Phys. Rev. Lett.* 127, 162001 (2021).
7. U. A. Acharya et al. (PHENIX Collaboration), “Transverse single-spin asymmetries of midrapidity π^0 and η mesons in polarized $p+p$ collisions at $\sqrt{s} = 200$ GeV.” *Phys. Rev. D* 103, 052009 (2021).

8. C. A. Aidala et al. “Design and beam test results for the 2D projective sPHENIX electromagnetic calorimeter prototype.” IEEE Transactions on Nuclear Science, vol. 68, no. 2, pp. 173-181, Feb. 2021.
9. J. D. Osborn for the sPHENIX Collaboration, “Requirements, status, and plans for track reconstruction at the sPHENIX experiment.” arXiv:2007.00771, peer reviewed Connecting the Dots 2020 Workshop proceedings.
10. U. Acharya et al. (PHENIX Collaboration), “Measurement of jet-medium interactions via direct photon-hadron correlations in Au+Au and d +Au collisions at $\sqrt{s_{NN}} = 200$ GeV.” Phys. Rev. C 102, 054910 (2020).
11. J. D. Osborn for the LHCb Collaboration, “Jet hadronization at LHCb.” PoS High- p_T 2019 (2020) 013.
12. I. Helenius, J. Lajoie, **J. D. Osborn**, P. Paakkinen, H. Paukkunen, “Nuclear gluons at RHIC in a multi-observable approach.” Phys. Rev. D 100, 014004 (2019).
13. A. Aaij et al. (LHCb Collaboration), “Measurement of charged-hadron production in Z -tagged jets in proton-proton collisions at $\sqrt{s} = 8$ TeV.” Phys. Rev. Lett. 123, 232001 (2019).
14. C. Aidala et al. (PHENIX Collaboration), “Nonperturbative transverse momentum broadening in dihadron angular correlations in $\sqrt{s_{NN}} = 200$ GeV proton-nucleus collisions.” Phys. Rev. C 99, 044912 (2019).
15. J. D. Osborn for the PHENIX Collaboration, “PHENIX results on jet modification with π^0 - and photon-triggered two particle correlations in $p+p$, $p(d)$ +Au, and Au+Au collisions.” Nuclear Physics A 982, 591-594 (2019).
16. C. Aidala et al. (PHENIX Collaboration), “Nonperturbative transverse momentum dependent effects in dihadron and direct photon-hadron angular correlations in $p+p$ collisions at $\sqrt{s} = 200$ GeV.” Phys. Rev. D 98, 072004 (2018).
17. C. Aidala et al. (PHENIX Collaboration), “Single-spin asymmetry of J/ψ production in $p+p$, $p+Al$, and $p+Au$ collisions with transversely polarized proton beams at $\sqrt{s_{NN}} = 200$ GeV.” Phys. Rev. D 98, 012006 (2018).
18. J. D. Osborn for the PHENIX Collaboration, “Study of cold and hot nuclear matter effects on jets with direct photon triggered correlations from PHENIX.” Nuclear Physics A 967, 476-479 (2017).
19. A. Adare et al. (PHENIX Collaboration), “Nonperturbative-transverse-momentum effects and evolution in dihadron and direct photon-hadron angular correlations in $p+p$ collisions at $\sqrt{s} = 510$ GeV.” Phys. Rev. D95, 072002 (2017).

Awards and Fellowships

Oak Ridge National Laboratory Individual Performance Award	12/2021
CSM Division Outstanding Postdoc Award	12/2021
RHIC/AGS Users' Executive Committee Merit Award	05/2019
Young PHENIXian award	12/2015
Michigan Graduate 1 st Year Fellowship	08/2013
Summa Cum Laude, University of Kentucky	05/2013
Sigma Pi Sigma Physics Honor Society	05/2013
University of Kentucky Outstanding Senior Award	05/2013

Conference and Workshop Organization

1. Streaming Readout 9 Workshop, virtual, December 8-10, 2021.
2. 2021 CFNS Summer School Software Lectures, virtual, August 9-23, 2021.
3. ECCE Second Simulation Workshop, virtual, May 21, 2021.
4. ECCE Simulation Workshop, virtual, April 2, 2021.
5. LHCP Conference QCD Organizing Committee, Paris, France, June 7-12, 2021.
6. Spin and EIC workshops at the RHIC All Users Meeting, Brookhaven National Laboratory, June 2-5, 2019.
7. Scientific Secretary, American Physical Society Division of Particles and Fields Meeting, Ann Arbor, MI, August 3-7, 2015.

Collaboration and Research Community Service

EIC Detector 1 Simulation and QA Convener, 2022-present

Served as convener of the simulation and QA working group for the EIC project detector transitional period post proposals.

JINST Reviewer 2021-present

Serve as a peer reviewer for articles submitted to the Journal of Instrumentation (JINST)

ECCE Software and Computing Convener, 2021-present

Served as convener of the software and computing working group for the ECCE proto-collaboration.

sPHENIX Publication Policy Committee, 2021-2022

Served on committee developing sPHENIX publication policies and criteria.

sPHENIX Track Reconstruction Convener 2020-present

Served as convener of the track reconstruction software effort for the sPHENIX collaboration.

sPHENIX TPOT Reviewer, 12/2020

Review committee for TPC Outer Tracker for sPHENIX.

DOE Office of Nuclear Physics SBIR Proposal Reviewer, 11/2020

Review SBIR proposals related to computing in Nuclear Physics.

Nuclear Physics Day on Capitol Hill, 04/2018.

Met with staff members of Michigan Senators and Representatives to discuss funding for nuclear physics research.

PHENIX Executive Council, 01/2016-01/2017.

Served as elected member to executive council, which advises PHENIX spokesperson on scientific priorities.

Invited Conference and Workshop Presentations

1. RHIC/AGS All Users Meeting, June 7-10, 2022. “sPHENIX Spin and Cold QCD Future Physics Program.”
2. Connecting the Dots Workshop, May 31-June 2, 2022. “4D track reconstruction with sPHENIX.”
3. Streaming Readout 10 Workshop, May 17-19, 2022. “4D track reconstruction with sPHENIX.”
4. Probing QCD at High Energy and Density with Jets INT Workshop, August 16-20, 2021. “Recent results and future directions for jet hadronization and substructure measurements.”
5. CFNS EIC Summer School, August 9-23, 2021. “ECCE software stack and detector geometry.”
6. EICUG Summer Meeting, August 2-6, 2021. “ECCE software.”
7. RHIC Science Program Toward EIC in the Coming Years, May 24-26, 2021. “Photon-jet and dijet probes at RHIC towards the EIC.”
8. **Plenary**: Computing in High Energy Physics (CHEP) Conference, May 17-21, 2021. “Implementation of ACTS into sPHENIX Track Reconstruction.”
9. Streaming Readout VIII Workshop, April 28-30, 2021. “ORNL Streaming Readout Plans at the EIC.”
10. Resummation, Evolution, Factorization Workshop, December 7-11, 2020. “Experimental perspective on hadronization.”
11. Jets for 3D Imaging Workshop, November 23-25, 2020. “Jet substructure at the EIC.”
12. ACTS Workshop, May 25-29, 2020. “sPHENIX Experience with Acts.”
13. Second EIC Yellow Report Workshop at Pavia University, May 20-22, 2020. “Inclusive and heavy flavor jet substructure at the EIC.”
14. Connecting The Dots Workshop, April 22-24, 2020. “Requirements, status and plans for track reconstruction of the sPHENIX experiment.”

15. 3rd JETSCAPE Workshop, March 18-20, 2020. “Hadronization and jet substructure at RHIC and the LHC.”
16. 13th International Workshop on High p_T Physics in the RHIC/LHC Era, March 19-22, 2019. “Jet hadronization at LHCb.”
17. Workshop on Novel Probes of the Nucleon Structure in SIDIS, e+e- and pp (FF2019), March 14-16, 2019. “Factorization breaking, color entanglement, and hadronization of jets.”
18. Workshop on the Definition of Jets, Brookhaven National Laboratory, June 25-27, 2018. “Probing effects from QCD color with photon-jet and dijet correlations.”
19. CMS SMP-J Workshop Annual Workshop, January 25, 2017. “Color entanglement and color coherence.”

Seminars and Colloquia

1. University of Tennessee seminar, March 15, 2022. “sPHENIX charged particle reconstruction.”
2. Oak Ridge National Laboratory seminar, June 16, 2021. “Addressing data reduction challenges with next generation scientific software.”
3. Workflow Workshop Seminar Series, August 14, 2020. “Data processing workflows at scattering user facilities.”
4. University of Tennessee HEP/Nuclear/Astro Seminar, February 3, 2020. “Jet substructure at RHIC and the LHC.”
5. University of Kentucky HEP/Nuclear Seminar, November 7, 2019. “Hadronization and jet substructure at RHIC and the LHC.”
6. University of Michigan HEP/Astro/Nuclear Seminar, April 8, 2019. “Jet substructure at RHIC and the LHC.”
7. Oak Ridge National Laboratory Seminar, February 18, 2019. “Peering inside protons and nuclei.”
8. Wayne State University PAN Seminar, September 14, 2018. “Effects from color flow in proton-proton and proton-nucleus collisions.”
9. Paul Laurence Dunbar High School Senior Seminar, August 31, 2018. “Career paths with a physics degree.”
10. University of Illinois HEP/MEP Colloquium, October 23, 2017. “Effects from color entanglement in proton-proton and proton-nucleus collisions.”
11. University of Michigan HEP/Astro/Nuclear Seminar, November 21, 2016. “Recent experimental results on QCD factorization breaking at RHIC.”
12. Brookhaven National Laboratory Nuclear Seminar Series, October 25, 2016. “Recent experimental results on QCD factorization breaking at RHIC.”

13. Seminar at Columbia University, October 24, 2016. “Recent experimental results on QCD factorization breaking at RHIC.”

Conference and Workshop Presentations

1. sPHENIX Summer School, May 26-27, 2022. “Analysis and Hands on Fun4All Tutorial.”
2. sPHENIX Collaboration Meeting, virtual, January 7, 2022. “Tracking developments and performance.”
3. ECCE Simulation Workshop, virtual, May 21, 2021. “Developing an analysis package for ECCE DST analysis.”
4. ECCE Simulation Workshop, virtual, April 2, 2021. “Analysis in Fun4All.”
5. sPHENIX Collaboration Meeting, Boulder, Colorado (virtual), July 6, 2020. “ACTS Tracking.”
6. sPHENIX Software Mega-Workfest, Brookhaven National Laboratory, January 13-17, 2020. “Building a Fun4All Analysis Package Tutorial.”
7. sPHENIX Collaboration Meeting, Brookhaven National Laboratory, June 5-6, 2018. “Photons and clustering in sPHENIX.”
8. Quark Matter 2018, Lido, Italy, May 13-19, 2018. “PHENIX results on jet modification with π^0 - and photon-triggered two particle correlations in $p+p$, $p(d)+Au$, and $Au(Cu)+Au$ collisions.”
9. PHENIX Collaboration Meeting, Brookhaven National Laboratory, December 1-3, 2017. “High p_T correlations analysis highlights and future plans.”
10. RHIC Users Meeting Proton Structure Workshop, Brookhaven National Lab, June 20-23, 2017. “Partonic structure of nucleons and nuclei at sPHENIX.”
11. Quark Matter 2017, Chicago, Illinois, February 5-11, 2017. “Study of cold and hot nuclear matter effects on jets with direct photon-triggered correlations from PHENIX.”
12. 22nd International Spin Symposium, Urbana, IL, September 25-30, 2016. “Nonperturbative transverse momentum effects in dihadron and direct photon-hadron angular correlations.”
13. 4th Workshop on the QCD Structure of the Nucleon (QCD-N’16), Getxo, Spain, July 11-15, 2016. “Nonperturbative transverse momentum effects in dihadron and direct photon-hadron angular correlations.”
14. American Physical Society Division of Nuclear Physics Meeting, Sante Fe, NM, October 28-31, 2015. “Measuring intrinsic partonic transverse momentum via two-particle correlations in PHENIX.”
15. American Physical Society Division of Particles and Fields Meeting, Ann Arbor, MI, August 3-7, 2015. “Parton dynamics at PHENIX.”

16. Physics Graduate Student Symposium, July 8, 2015. “Partonic dynamics in high energy proton-proton collisions at PHENIX.”
17. American Physical Society Southeastern Section Meeting, Tallahassee, FL, November 14-17, 2012. “Noise analysis of the Forward GEM Tracker at STAR.”
18. P.L. Dunbar Math Science and Technology Research Symposium, Lexington, KY, April 26, 2009. “Neutrinos and shock reignition in the gain region of type IIa supernovae.”

Other Public Notes with Significant Contribution

1. sPHENIX Conceptual Design Report (CDR). The sPHENIX Collaboration. <https://indico.bnl.gov/event/4640>, 2018.
2. Detector design study for an EIC detector around the sPHENIX solenoid. C. Aidala et al. <https://indico.bnl.gov/event/5283/>, 2018.
3. sPHENIX medium energy barrel physics. The sPHENIX Collaboration. <https://indico.bnl.gov/event/3866/>, 2017.
4. T1044-2017 sPHENIX test beam EMCAL analysis. J. D. Osborn and J. Huang. <https://indico.bnl.gov/event/3854/>, 2017.
5. sPHENIX modest forward upgrade LOI. The sPHENIX Collaboration. <https://indico.bnl.gov/event/3867/>, 2017.
6. **Nonperturbative transverse momentum effects in dihadron and direct photon-hadron angular correlations**, J. D. Osborn for the PHENIX Collaboration. Proceedings for the SPIN 2016 Symposium, Urbana, IL, September 25-30 2016. arXiv:1701:00681.
7. **Parton dynamics at PHENIX**, J. D. Osborn for the PHENIX Collaboration. Proceedings for the American Physical Society Division of Particles and Fields Conference, Ann Arbor, MI, August 4-8 2015. arXiv:1511.00016.

Student Advising and Mentorship

Graduate Students Supervised

Sebastian Araya - Track pattern recognition in ECCE.

Dillon Fitzgerald - Heavy flavor jet substructure and hadronization at the EIC.

Kara Mattioli - Heavy flavor jet tagging and substructure at LHCb.

Jordan Roth - Z^0 -hadron and Z^0 -jet correlations at LHCb.

Nicole Lewis - π^0 , η , and direct photon single spin asymmetries at PHENIX.

University Research Opportunity Program (UROP) at University of Michigan,
09/2018-05/2019

Propose and guide a research project to an undergraduate student. Supervised Brandon Liang in a jet substructure Monte Carlo study to better understand nonperturbative contributions to jets.

Additional Undergraduate Students Supervised

Nikhil Shankar, Hayden Hansen, Ezra Lesser, Nick Melekian, Ruby Araj, Emily Camras, Robert Read, Robert Cernak, Aaron White.

Teaching

University of Michigan

1. Physics for the Life Sciences Laboratory 1: Fall 2013, Spring 2014, Fall 2014, Fall 2017

University of Kentucky

1. Physics 241 - General University Physics Laboratory: Fall 2012
2. Arts and Sciences Wired Course - Measuring Science: Fall 2011