Dr. Nathan Grieser

CONTACT INFORMATION

Conseil Européen pour la Recherche Nucléaire (CERN)
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Publications Index
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RESEARCH INTERESTS

Probing for new physics with **precision electro-weak** measurements. Finalizing the understanding of the SM with searches for challenging **Higgs** decays. Furthering understanding of QCD in the proton PDF with jet-based measurements. Large-scale data processing efforts. **Machine learning** advancements for jet-flavour identification

RESEARCH EXPERIENCE

Postdoctoral Research Associate July 2022 to present
LHCb Experiment
University of Cincinnati, Cincinnati, OH, USA
Advising Principal Investigator: Conor Henderson, Department of Physics

- LPCC Physics Convener: **LHC Electroweak Working Group Convener**
- Community Coordination: **IRIS-HEP Steering Board Member**
- Physics Sub-Convener: **Fundamental Standard Model Interactions Subgroup**
- Technical Coordination: **Legacy software production and software stack coordinator**
- Measurement of W helicity states with the LHCb Detector
- Measurement of m_Z and $\sin^2\theta_W$ with the LHCb Detector
- Measurement of W and WW cross sections
- Inclusive jet cross section and angular relation measurements with the LHCb detector
- **Graph Neural Network** for heavy-flavour and gluon jet tagging

Chung Yao Chao Fellow September 2020 to June 2022
LHCb Experiment
Institute of High Energy Physics (IHEP), Beijing, China
Advising Principal Investigator: Yiming Li, Department of Physics

- Measurement of di-parton scattering of B and D mesons
- Upstream Tracker Detector control systems and detector installation and commissioning
- Upstream Tracker Detector Safety System installation and commissioning
- Development of B-hadrons and Quarkonia trigger menu for LHC Run 3

Ph.D. Candidate August 2014 to August 2020
ATLAS Experiment, High Energy Physics Group
University of Oklahoma, Norman, OK, USA
Advising Professor: Michael G. Strauss, Department of Physics

- **Search for heavy resonances decaying to a pair of W bosons in the fully leptonic decay channel**
- Measurements of the Higgs boson production by gluon–gluon fusion and vector-boson fusion in the $H \to WW^* \to \ell\nu\ell\nu$ channel
- Light jet calibration of flavour-tagging algorithms using the negative tag method
- Combination of heavy diboson resonance searches using the full run-2 dataset
- Highly accelerated lifetime testing for ATLAS ITK pixel upgrades

Education

Ph.D., Physics August 2014 to August 2020
University of Oklahoma, Norman, OK, USA

Dissertation Advisor: **Michael G. Strauss**

Dissertation: *Searches For Heavy Resonances In The $R \to WW \to \ell\nu\ell\nu$ Decay Channel Using pp Collisions At $\sqrt{s}$ = 13 TeV With The ATLAS Detector At The LHC*

M.S., Physics August 2014 to August 2016
University of Oklahoma, Norman, OK, USA

B.S., Physics & Astronomy; Education & Mathematics Minor August 2010 to May 2013
Ohio Northern University, Ada, OH, USA

Selected Papers, Notes, and Publications

12. Grieser, *et al.*, *The LHCb Stripping Project: Sustainable Legacy Data Processing for High-Energy Physics*. September, 2025. Submitted to Computing and Software for Big Science, arXiv.2509.05294
11. Grieser, *et al.*, *The LHCb Sprucing and Analysis Productions*. June, 2025. Computing and Software for Big Science, Comput Softw Big Sci 9, 15 (2025)
10. Grieser, Nathan, *QCD, Electroweak Physics, and Searches for Exotic Signatures in the Forward Region at LHCb*. May, 2025. arXiv.2506.01019
9. LHCb Collaboration, *Measurement of the Z-boson Mass*. April, 2025. Submitted to Physical Review Letters arXiv.2505.15582
8. LHCb Collaboration, *First measurement of b-jet invariant mass with and without grooming*. March, 2025. Accepted by Physics Letters B arXiv.2505.11955
7. Grieser, *et al.*, *LHCb Stripping Project: Continuing to Fully and Efficiently Utilize Legacy Data*. February, 2025. Accepted by EPJ Web of Conferences (EPJ WoC) arXiv.2503.19051
6. (4 Citations) LHCb Collaboration, *Measurement of the Effective Leptonic Weak Mixing Angle*. October, 2024. JHEP:12(2024)026
5. ATLAS Collaboration, *Measurements of Higgs boson production by gluon-gluon fusion and vector-boson fusion using $H \to WW^* \to e\mu e\nu$ decays in pp collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector*. August, 2023. Physical Review D:108.032005
4. ATLAS Collaboration, *Summary of Diboson Resonance Searches at the ATLAS experiment using full run-2 data*. March, 2023. CDS:ATL-PHYS-PUB-2023-007
3. ATLAS Collaboration, *Search for heavy resonances in the decay channel $W^+W^- \to e\mu e\nu$ in pp Collisions at $\sqrt{s}$ = 13 TeV using 139 fb^{-1} of data with the ATLAS detector*. November, 2022. ATLAS Note:ATLAS-CONF-2022-066
2. Grieser, *et al.*, *The SALT – Readout ASIC for Silicon Strip Sensors of Upstream Tracker in the Upgraded LHCb Experiment*. December, 2021. MDPI Sensors:10.3390/s22010107
1. ATLAS Collaboration, *Calibration of light-flavour b-jet mistagging rates using ATLAS proton-proton collision data at $\sqrt{s}$ = 13 TeV*. April, 2018. ATLAS Note:ATLAS-CONF-2018-006

Selected Talks and Presentations

15. "Precision electro-weak as a probe for new physics: An overview of recent LHCb electro-weak results", Massachusetts Institute of Technology LNS seminar, Boston, Massachusetts, USA, October 28, 2025.
14. "Recent LHCb results in precision electroweak physics, and outlook for the upcoming Run 3 data set", University at Buffalo Physics Seminar, Buffalo, New York, USA, August 26, 2025.
13. "QCD, electroweak physics, and searches for exotic signatures in the forward region at LHCb", Moriond QCD, La Thuile, Italy, March 30, 2025.
12. "LLPs from Exotic Higgs decays using faraway sub-detectors", The 21st Workshop of the LHC Higgs Working Group, CERN, Geneva, Switzerland, December 4, 2024.

11. "PDF News From LHCb", PDF4LHC 2024 Meeting, CERN, Geneva, Switzerland, December 2, 2024.
10. "Heavy-Flavour Jet Tagging at LHCb Using Graph Neural Networks", ML4Jets, LPNHE, Paris, France, November 5, 2024.
9. "W Mass, Weak Mixing Angle, and W Cross Sections", Implications of LHCb Measurements and Future Prospects, CERN, Geneva, Switzerland, October 25, 2024.
8. "LHCb Stripping Project: Continuing to Fully and Efficiently Utilize Legacy Data", Conference on Computing in High Energy Physics, Krakow, Poland, October 21, 2024.
7. "Physics with $W/Z/\gamma$ + Jets at the LHCb and ALICE Experiments", LHC EW WG General Meeting, CERN, Geneva, Switzerland, July 10, 2024.
6. "Beyond Flavour: Exploring unique measurements of electro-weak, Higgs, and exotica with the LHCb detector", University of Maryland HEP / Particle Astro seminar, College Park, Maryland, USA, April 12, 2024.
5. "First Measurement of W Helicity Fractions at LHCb", US LHC Users Association Annual Meeting, Fermilab, Batavia, IL, USA, December 14, 2023.
4. "Physics with W and Z Bosons at the LHCb Experiment", European Physical Society Conference on High Energy Physics, Hamburg, Germany, August 23, 2023.
3. "Python Usage Within the LHCb Experiment", PyHEP Workshop 2022, Online, September 14, 2022.
2. "Analysis user experience with Python HEP data science tools in LHCb", IRIS-HEP Analysis Grand Challenge Workshop, Online, April 26, 2022.
1. "Batch Submission Tutorial; Tutorial on Statistical Limit-Setting in CAF", Common Analysis Framework Tutorial, CERN, February 3-5, 2020.

Collaboration Activities and Service

LHCb Quarks, Electro-weak, and Exotica Physics Working Group Fall 2023 to present
Sub-Convener – Fundamental Standard Model Interactions Subgroup

LHCb Data Processing and Analysis Project Fall 2023 to present
Legacy software and data work package coordinator

LHCb Operations Planning Group Spring 2022 to Spring 2024
Invited member (Legacy Coordinator)

LHCb Physics Planning Group Spring 2022 to Spring 2024
Invited member (Legacy Coordinator)

LHCb Legacy Data Production Project Spring 2022 to Spring 2024
Legacy data processing project coordinator

LHCb b-Hadrons and Quarkonia Physics Working Group Spring 2021 to Summer 2022
Real-Time Alignment/Data Processing and Analysis project liaison

LHCb Upstream Tracker Detector Spring 2021 to Fall 2024
Detector Safety System Package Leader

ATLAS Heavy Resonance Combination Spring 2019 to Fall 2021
$WW \to \ell\nu\ell\nu$ Contact

ATLAS Higgs to WW Analysis Group Fall 2019 to Fall 2020
Physics Modelling Group Contact

Community Activities and Service

HIGGS 2025 October 2025
BSM Higgs session co-convener

Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP)
January 2025 to present
Steering Board Member

LPCC LHC Electroweak Working Group Winter 2024 to present
Co-Convener

Conference on Computing in High Energy and Nuclear Physics (CHEP) October 2024
Collaborative software and maintainability session co-convener

Large Hadron Collider Physics Conference (LHCP) June 2024
Electro-weak session co-convener

Washington, D.C. High Energy Physics Advocacy Trip April 2024
US LHC Users Association Young Physicists Representative

Honors and Awards

US LUA Lightning Talk Prize Winner 2023
First Measurement of W Helicity Fractions at LHCb

Chung-Yao Chao Fellowship 2021

Teaching Experience

Graduate Teaching Assistant
University of Oklahoma, Department of Physics

(Lecturer) Calc-based introductory Physics	Summer 2016, Summer 2017
Non-Calc-based introductory Physics	Spring 2017, Fall 2016, Spring 2015, Fall 2014
Introductory Physics Laboratory	Fall 2015

Undergraduate Teaching Assistant
Ohio Northern University, Department of Physics and Astronomy

Introductory Astronomy	Spring 2013, Fall 2012
Introductory Physics Laboratory	Spring 2012, Fall 2011

Technical Skills

Coordination Abilities:

- High level use of GIT version control for collaboration-wide software
- Highly experienced in maintaining, testing, and releasing collaboration-wide software stacks
- High level use of workflow management systems and GitLab's continuous integration infrastructure, ensuring reproducibility

Languages: Python, C++, Bash, HTML, Objective-C
Operating Systems and Environments: Linux (Scientific Linux, Ubuntu, Cent OS), Unix
Software and Technologies: Git, Docker, CMake, Continuous Integration/Delivery, LaTeX 2_ε
Libraries, Frameworks, Data Formats:
HEP specific: ROOT, MadGraph5_aMC@NLO, Pythia8, POWHEG

Data formats: ROOT, HDF5, JSON

Data analysis: NumPy, SciPy, Matplotlib, Pandas, iMinuit

- Scikit-HEP stack: Awkward, uproot, boost-histogram, hist, mplhep, pyhf, pylhe

Machine learning: PyTorch, TMVA, scikit-learn

Students Mentored

Kylene Monaghan June 2025 to August 2025

Projects advised on: Di-Jet Angular Analysis as a Probe for New Physics

Awards: LHCb Summer Student Moritz Karbach Prize

Position during mentorship: CERN Summer Student

Current position: Undergraduate student at Sewanee: The University Of The South, Tennessee, USA

Gabriella Pesticci June 2024 to July 2025

Projects advised on: Jet Flavour Classification with a Graph Neural Network (GNN) at the LHCb

Awards: US LHC Users Association Lightning Round Winner

Position during mentorship: CERN Summer Student, Undergraduate capstone researcher

Current position: PhD Candidate in Particle Physics at Michigan State University, Michigan, USA

Carrie Cox June 2023 to August 2023

Projects advised on: Phenomenological study of t-channel production of leptoquarks

Position during mentorship: CERN Summer Student

Current position: Studying M.A. in accelerator science and engineering at Stony Brook University

Gabriel Nowak July 2022 to Present

Projects advised on: Measurement of WW production cross section at LHCb

Position during mentorship: PhD Student at University of Cincinnati

Current position: PhD Student at University of Cincinnati

Shuqi Sheng November 2021 to June 2025

Projects advised on: LHCb Stripping Project; Installation and Commissioning of the LHCb Upstream Tracker

Position during mentorship: PhD Student at the Institute for High Energy Physics

Current position: Post-Doc at École Polytechnique Fédérale de Lausanne (EPFL)

Shuaiyi Liu November 2021 to June 2022

Projects advised on: Installation and Commissioning of the LHCb Upstream Tracker

Position during mentorship: PhD Student at the Institute for High Energy Physics

Current position: Software Developer

Quan Zou October 2020 to June 2022

Projects advised on: Measurement of di-parton scattering production of B- and D-mesons

Position during mentorship: PhD Student at the Institute for High Energy Physics

Current position: Software Developer

Professional Referees and Contacts

Dr. Conor Henderson conor.henderson@cern.ch

Position: Assistant Professor of Physics, University of Cincinnati
Affiliation: Post-Doctoral Supervisor

Dr. Michael G. Strauss strauss@ou.edu

Position: David Ross Boyd Professor of Physics, University of Oklahoma
Affiliation: PhD Advisor

Dr. Vincenzo Vagnoni Vincenzo.Vagnoni@bo.infn.it

Position: Professor of Physics, INFN Florence
Affiliation: LHCb Spokesperson

Dr. Marco Cattaneo Marco.Cattaneo@cern.ch

Position: Staff Scientist, CERN
Affiliation: LHCb Colleague

Dr. Yasmine Amhis yasmine.sara.amhis@cern.ch

Position: Research Scientist, CNRS, Irene Joliot-Curie Laboratory
Affiliation: LHCb (emeritus) Physics Coordinator

Dr. Michael Sokoloff sokoloff@ucmail.uc.edu

Position: Professor of Physics, University of Cincinnati
Affiliation: Post-Doctoral (emeritus) Team Leader

Dr. Karsten Koeneke karstenkoeneke@gmail.com

Position: Lecturer, University of Freiburg
Affiliation: ATLAS (emeritus) Higgs Working Group Convener

Dr. Francesco Polci francesco.polci@cern.ch

Position: Research Scientist, CNRS, LPNHE
Affiliation: LHCb (emeritus) Operations Coordinator