

Jon Dale Nichols, M.S.

GRADUATE RESEARCH ASSISTANT · PH.D. CANDIDATE

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Summary

I am a fifth-year graduate student at the University of Oklahoma, where I study Experimental High Energy Physics. I have earned my M.S. degree, and I'm now a Ph.D. candidate. I'm currently posted at Argonne National Lab to aid in the upgrade of the Pixel modules for the ATLAS detector at CERN. I'm also working on my ATLAS authorship qualification task and the analysis project that will become my dissertation. I have experience leading teams of educators and balancing diverse workloads. I am comfortable communicating my work on various levels, and I'm eager to tackle new challenges as opportunities for personal and professional growth.

Education

University of Oklahoma , Ph.D. Physics (in progress)	2019 - Present	<i>Norman, OK</i>
University of Oklahoma , Master of Science Physics	2019 - 2023	<i>Norman, OK</i>
Hendrix College , Bachelor of Arts Physics	2015 - 2019	<i>Conway, AR</i>
Bachelor of Arts Spanish		

Key Courses

High Energy Physics	Nuclear and Particle Physics, Advanced Nuclear and Particle Physics, Quantum Field Theory, Advanced Quantum Field Theory, General Relativity, Machine Learning
Graduate Physics	Classical Mechanics, Mathematical Methods, Thermodynamics and Statistical Mechanics, Quantum Mechanics I & II, Electrodynamics I & II
Undergraduate Courses	Electronics (with Lab), Modern Physics (with lab), Vibrations and Waves, Multivariable Calculus, Differential Equations, Linear Algebra, Foundations of Computer Science (with lab), Data Structures (with lab)

Skills

Computer Science	Fluent in Python (including NumPy, SciPy, and Pandas packages), Java, ROOT, and familiar with C/C++ and Fortran. Experience with Machine Learning algorithms, git, Linux (including BASH scripts), and debugging uncommented code.
Data Analysis	Experience performing statistical analysis on large amounts of data using Python and the ROOT proprietary software. Proficient with Excel and with using Python to manipulate .csv files.
Laboratory Experience	Soldering, taking measurements with multimeters, troubleshooting faulty equipment, using specialized equipment, keeping a clean and well-organized workspace.
Radiation Worker 1	Received training to work safely with and around sources of radiation. Authorized to work in controlled radiation areas.
Budgetary and Scheduling Work	Handled event scheduling, reimbursements, and budget for the Hendrix College branch of the Society of Physics Students as vice president and treasurer. Assisted with similar as G-Psi member. Handled TA scheduling as Instructor of Record and Head TA for General Physics Lab 1.
Spanish	Fluent in Spanish (native speaker). Bachelor of Arts degree in Spanish Language and Literature.

Positions of Responsibility

Fall 2022 - Summer 2023	Social Media Chair , Graduate Physics Students Interdependence (G-PSI)	<i>Norman, OK</i>
Summer 2021, Fall 2021, Fall 2022, Summer 2023	Instructor of Record , General Physics Lab 1	<i>Norman, OK</i>
Fall 2019	Logistics and Classroom Technology Management Assistant , Conference for Undergraduate Women in Physics	<i>Norman, OK</i>
August 2017 - May 2019	Peer Learning Associate , Hendrix College Spanish and Physics Departments	<i>Conway, AR</i>
May 2017 - May 2018	Treasurer , Society of Physics Students	<i>Conway, AR</i>
Summer 2017	Physics Coordinator , Oh, The Places You'll Go With Science! Education at the Burn Camp	<i>Pryor, OK</i>
May 2016 - May 2017	Vice President , Society of Physics Students	<i>Conway, AR</i>

Research Projects

Vector Boson Scattering in the Fully Hadronic Decay Channel

ANALYST

Argonne National Lab

October 2023-Present

- Analyzed truth and detector-level events with proprietary software ROOT.
- Used, modified, and wrote Python scripts to analyze ROOT data.

ATLAS Authorship Qualification Task

CANDIDATE

Argonne National Lab

September 2023-Present

- Assisted in standardization and optimization of metrology for Pixel modules.
- Wrote Python code to standardize metrology of modules.

Silicon detector pre-production for the ATLAS detector

EXPERIMENTALIST

Argonne National Lab

August 2023-Present

- Assisted in gluing and wire-bonding of Pixel modules.
- Gained proficiency in a variety of specialized equipment, including a parylene coating machine.

RD53-series chip testing for the LHC

EXPERIMENTALIST

University of Oklahoma

May 2022-August 2023

- Generated IV curves to determine optimal power levels for detector chips to be used in the LHC.
- Electrically stimulated detector chips to verify functionality of the Pixel modules.
- Implemented code to run air quality, temperature and humidity, and flow rate sensors through the LabRemote proprietary software, including scheduled data collection and logging.

Quartic Couplings of Muons to Gauge Bosons at a Muon-Muon Collider

ANALYST

University of Oklahoma

Oct. 2020-May 2022

- Simulated $\mu^+\mu^- \rightarrow \mu^+\mu^-W^+W^-$ events and analyzed the gauge parameters of a quartic coupling.
- Simulated particle events using proprietary software MadGraph.
- Analyzed truth-level events with proprietary software ROOT to understand simulations.

HALT/HASS Pixel Module Testing for the ATLAS Detector

EXPERIMENTALIST

University of Oklahoma

Oct. 2020 - Nov. 2020

- Took voltage measurements to ensure adequate power was being supplied to the module.
- Verified functionality of thermistors and humidity sensors.
- Performed quality control measurements on custom surface-mount circuitry.

Left-Right Symmetric Model search for heavy neutrino cousin M4

ANALYST

University of Oklahoma

Feb. 2020 - Oct. 2020

- Simulated LLP decays and determined the optimal parameters for distinguishing events with Standard Model (SM) and SM + dark matter decay products.
- Simulated particle events using proprietary software MadGraph.

Minimally Supersymmetric Standard Model search for Neutralino Decay in Magnetic Fields

ANALYST

Hendrix College

May 2018-May 2019

- Simulated decays of Neutralinos into observable radiation in intense magnetic fields.
- Calculated decay amplitudes as a function of initial energy and magnetic field strength using Fortran code for numerical analysis and the FORM proprietary software for symbolic matrix manipulation.

Teaching and Administrative Experience

General Physics Lab 1

INSTRUCTOR OF RECORD/HEAD TA

University of Oklahoma

Summer 2021 - Summer 2023

- Prepared fellow graduate students to teach a weekly lab.
- Wrote and modified assignments.
- Created teaching schedules and communicated necessary changes with school administration.
- Created grading rubrics for the Teaching Assistants to use when grading the weekly lab reports, as well as the Lab Practical.

General Physics Lab 1

GRADUATE TEACHING ASSISTANT

University of Oklahoma

Spring 2020 - Summer 2023

- Taught a weekly lab introducing undergraduates with varying degrees of experience to the concepts of mechanical physics: linear and angular momentum, energy, along with basic data analysis.
- Graded all assignments and generated feedback documents (still in use) designed to help students improve.
- Participated in the transition to distance learning at the onset of the COVID-19 pandemic, and created and maintained distance learning resources during the transition back to in-person classes.

General Physics 2

GRADUATE TEACHING ASSISTANT

University of Oklahoma

Fall 2019, Summer 2022

- Gave a daily lecture introducing students to the concepts of electrostatics, magnetostatics, circuits, and thermal physics in an accelerated summer program.
- Designed homework and group work assignments to supplement the lectures.
- Wrote and graded exams.
- Facilitated discussion sections, wherein students worked in small groups to solve problems related to the material covered in the main lecture.

Physics, Spanish, Mathematics

Tutor.com (remote)

TUTOR

Summer 2019

- Tutored students of all ages in a variety of subject matters.
- Assisted with homework assignments.
- Encouraged creative thinking and made comparisons to more familiar topics for students' benefit.

Multivariable Calculus

Hendrix College

GRADER

Spring 2019

- Graded fellow undergraduates' homework assignments and provided personalized feedback on how to fix and avoid errors.

General Physics Workshop

Hendrix College

LEARNING ASSISTANT

Fall 2018-Spring 2019

- Aided fellow undergraduate students with a calculus-based class designed to let them discover the laws of physics related to momentum, energy, forces, electricity, magnetism, and optics.

General Physics Lab

Hendrix College

TEACHING ASSISTANT

Fall 2017-Spring 2018

- Aided fellow undergraduate students with an algebra-based weekly lab covering the laws of physics related to momentum, energy, forces, electricity, magnetism, and optics.

Office of Academic Success

Hendrix College

PEER LEARNING ASSOCIATE

Fall 2017 - Spring 2019

- Assisted students with homework, studying for tests, and proofreading assignments for their Physics and Spanish classes on a regular weekly schedule.
- Offered one-on-one sessions for students who needed more personal attention.

Science Education Outreach at the Burn Camp

Hendrix College

PHYSICS COORDINATOR

Summer 2017

- Planned and ran a variety of educational physics activities suitable for children and teenagers.
- Procured and built demonstration equipment.
- Instructed peers in running educational activities and safe usage of equipment.