KILEY ELIZABETH KENNEDY

Associate Research Scholar at Princeton University
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EDUCATION

COLUMBIA UNIVERSITY, New York, NY
Ph.D. in Physics 2022
- Dissertation: *The Late Light Show with Long Lived Particles: A Search for Displaced and Delayed Diphoton and Dielectron Vertices at the LHC*
- Supervisor: John Parsons

M.Phil. in Physics 2019
M.A. in Physics 2018

WESLEYAN UNIVERSITY, Middletown, CT
B.A. with High Honors in Physics 2016
- Thesis: *Contrasting the Structure and Dynamics of Simulated Lipid Monolayers and Bilayers*
- Supervisor: Francis Starr

FELLOWSHIPS & AWARDS

- **Dicke Fellowship**, Department of Physics, Princeton University 2022-present
- **Graduate Research Fellowship**, National Science Foundation 2018-22
- **Travel Award for Excellence in Graduate Research**, Forum on Graduate Student Affairs, American Physical Society 2019
- **Lead Teaching Fellowship**, Center for Teaching & Learning, Columbia University 2017-18
- **Dean's Fellowship**, The highest honor conferred to entering graduate students, Graduate School of Arts & Sciences, Columbia University 2016
- **Joseph Henry Merit Award** (declined), Department of Physics, Princeton University 2016
- **Dean's Grant** (declined), for one's outstanding application and future promise as a scholar, Graduate School of Arts & Sciences, Princeton University 2016
- **Phi Beta Kappa**, Wesleyan University 2016
- **Bertman Prize**, for the senior who displays a particularly resourceful and creative approach to physics research, Wesleyan University 2016
- **Karl Van Dyke Prize**, for academic excellence in physics, Wesleyan University 2016
- **Scholar-Athlete** (3x), Wesleyan University 2014-16
- **All-Academic** (6x), New England Small College Athletic Conference Winter & Spring 2014-16

RESEARCH

ASSOCIATE RESEARCH SCHOLAR | DICKE FELLOW — 2022-present
CMS Group, Department of Physics, Princeton University

- **EXO Trigger Contact**: Coordinate trigger activities for the CMS EXOTICA group (2023-present)
- **Contact** for HCAL long-lived particle triggers: monitor performance of displacement- and timing-based triggers; helped determine & deploy improved cell time alignment across HCAL
- **Analyzer** for Run 3 HCAL-based long-lived particle analysis using new triggers
- **Developer** for anomaly detector trigger: creating a graph deep neural network for anomaly detection at the high-level trigger
- **Outer Tracker Hardware**: Test and evaluate 2S and PS Outer Tracker modules for the CMS HL-LHC upgrade; help set up production test site

GRADUATE RESEARCH ASSISTANT — 2016-2022
ATLAS Group, Columbia University Department of Physics

- **Lead analyzer** for the Run 2 Displaced and Delayed Diphoton Vertex Search [Paper]
  - Developed a novel strategy to localize EM vertices using only LAr calorimeter measurements
  - Responsible for internal note (co-editor), overall analysis strategy, MC production, data processing chain, trigger & object selection, optimization, statistical analysis & more
- **Analyzer** for the Run 2 Non-Pointing Photon Search [Paper]
  - Improved pointing measurement up to 3x by re-parameterizing EM shower information
  - Performed R&D and key analysis variable optimization
- **Upgrade LAr Run Coordinator**: Managed installation activities for the LAr calorimeter and coordinated between operations team experts during LS2; trained incoming students/postdocs
- **LAr Online Software Developer & Expert On-Call**: Created software tools to scan/calibrate the calorimeter; troubleshot software issues identified by "shifters" during data-taking
- **LAr Hardware Electronics**: Characterized and evaluated the performance of two ADC candidates (1 commercial & 1 custom chip) for the electronic readout of data for the HL-LHC upgrade

UNDERGRADUATE RESEARCH ASSISTANT — 2014-2016
Starr Research Group, Department of Physics, Wesleyan University

- Generated and analyzed molecular dynamics simulations of lipid monolayers and bilayers

UNDERGRADUATE RESEARCH INTERN — Summer 2015
ATLAS Group, REU Program at Nevis Labs, Columbia University

- Formulated and optimized a search strategy for a vector-like top quark T in the $T \rightarrow Zt$ final state

ELECTRONIC SYSTEM DEVELOPMENT INTERN — Summer 2014
The MITRE Corporation, Bedford, MA

- Modeled hardware for an ASIC for the US Dept. of Defense; Security Clearance: Secret

PROFESSIONAL SERVICE

MEMBERSHIPS

- **Elected Member**, US LHC Users Association 2021-present
  - Chair, Government Relations Subcommittee, 2023-present
  - Member, Outreach and Communications Subcommittee, 2021-present
  - Member, Finance and Fundraising Subcommittee, 2023-present
  - Member, Government Relations Subcommittee, 2021-2023
- **Member**, USParticlePhysics.org Content Group 2022-present
  Develop and update materials for the HEP Advocacy DC Trip

ACTIVITIES

- **Organizer & Facilitator**, Government Outreach Hands-On Advanced Tutorial, LHC Physics Center, Fermilab (in preparation) 2023
- **Facilitator**, Early Career Session, USCMS Annual Meeting 2023
- **Participant**, Annual HEP Advocacy DC Trip 2023
  Met with elected representatives and staff from legislative offices, executive offices (OMB & OSTP), and executive agencies (National Science Foundation and Department of Energy)
- **Participant**, Annual HEP Advocacy DC Trip 2021
  Met with staff from several legislative offices and the National Science Foundation

TEACHING & MENTORING

TEACHING APPOINTMENTS

- **Lead Teaching Fellow**, Center for Teaching and Learning, Columbia University 2017-2018
  Designed & led a series of teaching workshops and a pilot peer observation program
- **Teaching Fellow**, Department of Physics, Columbia University 2016-2018
  General Physics Laboratory, Electronics Laboratory
- **Course Assistant**, Department of Physics, Wesleyan University 2014-2015
  Waves & Oscillations, Quantum Mechanics I
- **Peer Tutor**, Deans' Peer Tutoring Program, Wesleyan University 2014-2016
  Calculus, Quantum Mechanics, Biology

MENTORING ROLES

Have supervised and guided several undergraduate & graduate students throughout my PhD and postdoc.

- **Mentor and Supervisor**, USCMS Program for Undergraduate Research SUmmer Experience (PURSUE) 2023
  Developed summer research project for two undergraduates, who successfully constructed & analyzed data from a cosmic muon station for testing HL-LHC Upgrade Outer Tracker modules
- **Mentor**, USCMS Mentorship Program 2023-present
- **Mentor**, Princeton Physics Mentorship Program 2022-present

OUTREACH

MEMBERSHIPS & POSITIONS

- **Underground and Virtual Guide**, ATLAS Experiment at CERN 2019-present
  Have led 40+ tours and virtual classrooms within the ATLAS underground cavern, reaching several hundred students on five continents
- **Broader Outreach Group Member**, EDI Initiative, Department of Physics, Princeton University 2022-present
- **Member**, ATLAS Outreach Group 2019-2022
- **Outreach Curriculum Developer**, Double Discovery Center, Columbia University Spring 2017
  Designed and taught weekly after school STEM activities to middle schoolers

SELECTED ACTIVITIES

- **Speaker**, Physics Without Frontiers, International Centre for Theoretical Physics 2022
- **Host**, ATLAS Underground Tour, International Centre for Innovation and Workplace Learning, Dublin City University (via the EU Frontiers Project) 2022
- **Host**, ATLAS Underground Tour, UK Conference for Undergraduate Women in Physics 2021
- **Host**, Science-on-Hudson Lecture Series, Columbia University [Link] 2020
- **Guest**, Radical Curiosity Show, Delfi TV, Lithuania 2020
- **Interviewee**, Seven views of work at the LHC, Symmetry Magazine 2020
- **Volunteer**, ATLAS Underground Visits, CERN Open Days 2019
- **Volunteer**, Girls Science Day, Columbia University 2017

PUBLICATIONS

This section contains results that I led or made substantial contributions to. Some results were released as ATLAS or CMS public results, which undergo review within the collaboration, but are not reviewed externally.

SELECTED PEER-REVIEWED PUBLICATIONS

ATLAS Collaboration Author (2019–2023) on 235+ articles & preprints.

- ATLAS Collaboration, Search in diphoton and dielectron final states for displaced production of Higgs or Z bosons with the ATLAS detector in √s=13 TeV pp collisions, Phys. Rev. D 108 (2023), arXiv:2304.12885.
- Andeen, T et al., Performance and Quality Control of a Radiation-Hard 12-bit 40 MSPS ADC for the ATLAS Liquid Argon Calorimeter Trigger Readout Electronics Phase-I Upgrade at the LHC, J. Instrum. 15 (2020) 4, arXiv: arXiv:1912.06093.
- ATLAS Collaboration, Search for resonances decaying into a weak vector boson and a Higgs boson in the fully hadronic final state produced in proton−proton collisions at √s=13 TeV with the ATLAS detector, Phys. Rev. D 102, 112008 (2020), arXiv:2007.05293.
- ATLAS Collaboration, A search for resonances decaying into a Higgs boson and a new particle X in the XH→qqbb final state with the ATLAS detector, Phys. Lett. B 779 (2018), arXiv:1709.06783.
- Kennedy, K. E., N. Shafique, J. F. Douglas, and F. W. Starr, Cooperative Dynamics in a Model DPPC Membrane Arise from Membrane Layer Interactions, Emergent Mater. 2, 1-10 (2018). Link.

- Shafique, N., K. E. Kennedy, J. F. Douglas, and F. W. Starr, Quantifying the Heterogeneous Dynamics of a Simulated DPPC Membrane, Journal of Phys. Chem. B 120 (2016). Link.

SELECTED PUBLIC RESULTS

- CMS Collaboration, Performance of long lived particle triggers in Run 3, Detector Performance Note, CERN (2023), CERN-CMS-DP-2023-043.
- ATLAS Collaboration, Search for displaced photons produced in exotic decays of the Higgs boson using 13 TeV pp collisions with the ATLAS detector, submitted to Phys. Rev. D (2022), arxiv:2209.01029.
- ATLAS Collaboration, ATLAS Liquid Argon Calorimeter Phase-II Upgrade: Technical Design Report, CERN (2017), CERN-LHCC-2017-018.

PRESENTATIONS

CONFERENCES & INVITED TALKS

- "The DC Trip: Particle Physics Advocacy in the US," Department of Energy Traineeship in Computational HEP, Princeton University — 2023
- "Spotlight on Supersymmetry: The First ATLAS Search for Displaced and Delayed Diphoton Vertices" HEP Seminar at Stanford University, Argonne National Laboratory, Harvard University; Dicke Seminar at Princeton University — 2021-2022
- "ATLAS LAr Calorimeter Performance during LHC Run-2." IEEE Nuclear Science Symposium, Manchester, UK — 2019

SELECTED ATLAS & CMS INTERNAL PRESENTATIONS

- "New Level-1 HCAL-Based Long-Lived Particle Trigger," USCMS Annual Meeting, Carnegie Mellon University — 2023
- "The DC Trip: Particle Physics Advocacy in the US," USCMS Annual Meeting, Carnegie Mellon University — 2023
- "Displaced Diphoton Vertex Analysis: Paper Approval," presented full analysis on behalf of the analysis team for formal ATLAS approval of public results, CERN — 2022
- "Displaced Diphoton Vertex Analysis: SUSY Approval," presented full analysis for formal ATLAS approval of the analysis construction, methodology, and results, CERN — 2022
- "Vertex-finding for Long-Lived Particle Searches: Trackless Calo-Vertexing vs. Large-Radius Tracking," ATLAS Idea Day, CERN (one of 14 selected to present) — 2021
- "Analysis Kickoff: Trackless Calo-Vertexing for Long-Lived Higgsinos with a Displaced Diphoton Final State," ATLAS Long-Lived Particle Forum, CERN — 2020
- "New Photon Shower Depth Parameterization & Photon Pointing Optimization," ATLAS Physics & Performance Week E/Gamma Meeting, CERN — 2020
- "Run Coordination Report," LAr Week Operations, Installation & Commissioning Meeting, CERN — 2019
- "Phase I Upgrade Data Taking Tutorial," LAr Run Coordinator Training Session, CERN — 2019
- "LAr Online Software Status," LAr Week Operations, Installation & Commissioning Meeting, Milan, Italy — 2019

- "Update on the Performance of TI COTS ADC for the LAr Phase II Upgrade," Phase II Upgrade Electronics Meeting, LAr Week, CERN 2018

UNIVERSITY & DEPARTMENT PRESENTATIONS

- "Active Learning in the Laboratory Class and Using Your Observation Feedback," Designed and led workshop for graduate Teaching Fellows, Columbia University 2018
- "Peer Observation Workshop," Designed and co-led workshop to first-year graduate Teaching Fellows in the Physics Department, Columbia University 2018
- "Teaching to the Diverse Classroom: How to Gauge Student Understanding and Respond Effectively," Designed and led workshop for Teaching Fellows, Columbia University 2017
- "The Dynamics of Simulated Lipid Monolayers," Board of Trustee Dinner, Wesleyan University (one of four students selected to present their thesis research) 2015

SKILLS & INTERESTS

- **Computer Skills –** Experienced in C++, Python, Linux, shell scripting, git, ROOT, object oriented programming, distributed data management systems, working with legacy codebases. Some experience with C, MATLAB, HTML, GUI development, web design
- **CERN Technical Certifications –** Radiation Protection (Supervised & Controlled Areas), Operational Dosimeter, Self-Rescue Mask, CERN Visit Guide, ATLAS Underground Guide
- **Languages –** English (native), Spanish (proficient), French (intermediate)
- **Athletic Achievements –** Pole Vault: Captain of the Wesleyan Varsity Track & Field Team 2015-2016; Wesleyan record holder for Women's Pole Vault, Indoor (10'9") & Outdoor (11'4") Freestyle Snowboarding: Youth Women US National Champion 2008 & 2009; US Open Slopestyle Finalist, 2010; Qualified for USASA National Championships, 2006-2010

Updated August 2023