

Dr Holly Pacey – CV

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Education

- 2016-2020** PhD in experimental high energy physics with the ATLAS detector.
"Holly Pacey and the Half-Spin Particles: Searching for new physics with leptons at the ATLAS experiment"
Funded 3.5 years by STFC. Included 9 months working at CERN in Geneva.
- 2012-2016** MSc Physical Natural Sciences: Class I - King's College, The University of Cambridge
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|-----------------|---------|
| <i>4th year</i> | 1 : 78% |
| <i>3rd year</i> | 1 : 74% |
- 2005-2012** A Level and Secondary Education - West Bridgford School Specialist Technology College & 6th Form
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|------------------------------|----------------------------|
| <i>A Levels</i> | 4 A*s; 1 A (AS Level only) |
| <i>Extended Project</i> | A* |
| <i>GCSEs</i> | 11 A*, 1 A, 1 Distinction. |
| <i>FSMQ Additional Maths</i> | A |

Publications

Journal Publications

- Mullin, A., Nicholls, S., Pacey, H.A., et al., *Does SUSY have friends? A new approach for LHC event analysis.*, JHEP 02 (2021) 160, arXiv: 1912.10625 [hep-ex], February 2021.
- ATLAS Collaboration, *Search for electroweak production of charginos and sleptons decaying in final states with two leptons and missing transverse momentum in $\sqrt{s} = 13$ TeV pp collisions using the ATLAS detector*, Eur. Phys. J. C 80 (2020) 123, arXiv: 1908.08215 [hep-ex], February 2020.
- ATLAS Collaboration, *Search for electroweak production of supersymmetric particles in final states with two or three leptons at $\sqrt{s} = 13$ TeV with the ATLAS detector*, Eur. Phys. J. C 78 (2018) 995, 475 arXiv: 1803.02762 [hep-ex]. March 2018.

Conference Notes

- Holly Pacey et al. (ATLAS Collaboration), *Search for electroweak production of charginos and sleptons decaying in final states with two leptons and missing transverse momentum in $\sqrt{s} = 13$ TeV pp collisions using the ATLAS detector*. CERN, Geneva, Tech. Rep. 2019. ATLAS-CONF-2019-008, March 2019.
- Holly Pacey et al. (ATLAS Collaboration), *Search for direct chargino pair production with W -boson mediated decays in events with two leptons and missing transverse momentum at $\sqrt{s} = 13$ TeV with the ATLAS detector*. CERN, Geneva, Tech. Rep. ATLAS-CONF-2018-042. July 2018.
- Holly Pacey et al. (ATLAS Collaboration), *Search for electroweak production of supersymmetric particles in the two and three lepton final state at $\sqrt{s} = 13$ TeV with the ATLAS detector*. CERN, Geneva, Tech. Rep. ATLAS-CONF-2017-039. May 2017.

Public Plots

- Holly Pacey et al. (ATLAS Collaboration), *Missing transverse momentum track soft term uncertainties using the full Run 2 pp data at 13 TeV*, 2020. <https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PLOTS/JETM-2020-02/>

- Holly Pacey et al. (ATLAS Collaboration), *Missing transverse energy performance in 2017 data and Monte Carlo using PFlow Jets*, 2018. <https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PLOTS/JETM-2018-002/>
- Holly Pacey et al. (ATLAS Collaboration), *Missing transverse energy performance in 2017 data and Monte Carlo using EMTopo Jets*, 2018. <https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PLOTS/JETM-2018-001/>
- Holly Pacey et al. (ATLAS Collaboration), *Missing transverse energy performance in 2017 data*, 2018. <https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PLOTS/JETM-2017-011/>

Talks

National/International Conferences

- QCD@LHC 2019, 15/07/19 - Plenary talk: *'QCD and the search for exotic physics'*
- IoP HEPP/APP 2019 conference, 09/04/19 - *'Searching for new physics with emu asymmetry at the ATLAS detector'*

ATLAS Collaboration internal Plenaries

- ATLAS Hadronic Calibration Workshop 2020, 23/10/20 - Chairing workshop session on missing transverse momentum uncertainties - including giving a talk.
- ATLAS Physics and Performance Week 2019, 10/12/19 - Talk on behalf of the missing transverse momentum and pileup jet tagging subgroup.
- ATLAS Hadronic Calibration Workshop 2019, 14/10/19 - Chairing workshop session on missing transverse momentum - including giving a talk.
- ATLAS UK joint SUSY/Exotics meeting, 11/04/19 - *'Searching for new physics with emu asymmetry at the ATLAS detector'*
- ATLAS UK annual meeting 2019, 04/01/19 - *'Electroweak SUSY Searches'*
- ATLAS Physics and Performance Week 2018, 20/09/18 - Talk on behalf of the lepton plus X Exotics subgroup.
- ATLAS Hadronic Calibration Workshop 2018, 12/02/18 - *'Introduction/overview to MET and fJVT'*
- ATLAS Supersymmetry Workshop 2018, 23/05/18 - *'Overview of the current Electroweak SUSY search programme'*

Seminars

- Cambridge HEP Seminar series, 09/03/21 - *'Does SUSY have friends? A new approach for LHC analysis'*

Posters

- IoP HEPP/APP 2019 Conference, 08/04/19 - *'Hunting Electroweak Supersymmetry with two leptons and missing transverse momentum at 13 TeV with the ATLAS detector'*
- 137th LHCC Meeting, 27/02/19 - *'Hunting Electroweak Supersymmetry with two leptons and missing transverse momentum at 13 TeV with the ATLAS detector'*
- ATLAS Overview Week Tokyo, 16/06/18 - *'Searching for New Physics in Lepton Charge Flavour Asymmetry'*
- STFC High Energy Physics Summer School, 04/09/17 - *'Estimating the flavour symmetric background in a search for Compressed Electroweak Supersymmetry'*

Employment History

July 2020 - *Peterhouse, Cambridge University*

Oct 2023 *Research Fellow*

Independent research fellowship, working on design of innovative searches for new physics at the ATLAS experiment and co-leading the missing transverse momentum group in ATLAS.

June *Cambridge University.*

2017 *Exam Attendant*

Supervision of students before/after their examinations. Invigilating exams of students in college.

June - *Battcock Centre for Experimental Astrophysics, IoA, Cavendish Laboratory, Cambridge.*

Sept 2015 *Research Assistant. Supervisor - Dr Eloy De Lera Acedo.*

Designing graphene devices for use in terahertz radio astronomy using HFSS software.

June - *Battcock Centre for Experimental Astrophysics, IoA, Cavendish Laboratory, Cambridge.*

Sept 2014 *Research Assistant. Supervisor - Dr Eloy De Lera Acedo.*

Exploratory project on the design and applications of Graphene instruments in Radio Astronomy.

Relevant Skills and Achievements

Awards

STFC Research Studentship - Fully funded PhD Scholarship 2016-2020.

King's College Scholar - Scholarship for achieving class 1 in 3rd/4th year exams.

John Rose Prize (best explanation of a scientific principle)

2019 - 1st place, 'On our inability to know what's really going on';

2014 - 2nd place, 'Ferromagnetism'

Gold Crest Award 2011 - For 4 week Nuffield Bursary research project.

Further Training

4th ATLAS Machine Learning Workshop 11th - 15th November 2019

CERN-Fermilab Hadron Collider Physics Summer School 28th August - 6th September 2019

STFC High Energy Physics Summer School 3rd - 15th September 2017

Leadership positions within ATLAS

Group Sub-Convenor - co-leading the missing transverse momentum group; managing current projects related to reconstruction, performance and measurement of uncertainties; directing future plans to improve these and developing new ideas. *Analysis Contact* - Manage communication between research team and rest of the collaboration to lead project through ATLAS approval from first ideas to written paper.

Combinations Contact - Research team representative liaising to statistically combine our results with others for tighter supersymmetry constraints.

Analysis Reviewer - Joined review of a Quantum Black Hole search, assessing its readiness to unblind data.

Outreach and Teaching

2021 - Supervising (small group teaching) 3rd year Particle and Nuclear Physics course at University of Cambridge.

2019, 2021 - Supervising (small group teaching) 2nd year Quantum Mechanics course at University of Cambridge.

Summer 2019 - Interviewed as part of Cambridge University's profiles on women in STEM (<https://www.cam.ac.uk/research/news/women-in-stem-holly-pacey>)

March 2019, 2017 - Assisted in a high energy physics masterclass for a group of year 10/11 students.

2018, 2016 - Supervising 4th year Particle Physics course at University of Cambridge.

January 2018 - Did a Q&A with a group of 15 year 12 students visiting CERN.

November 2017 - Gave a 60 minute talk (shared with a colleague) to a group of 44 year 13 students visiting CERN.

Skills

Leadership Skills - Role as sub-convenor, analysis contact.

Writing Skills - Co-writing conference papers and internal documentation for all ATLAS projects, writing thesis.

Communication Skills - Presenting work at group meetings over videoconference and in person several times a month. Presented posters and talks at collaboration workshops and external national/international conferences.

Teaching Skills - Experienced giving supervisions to small and large groups of students from undergraduate and masters levels. Experienced supporting PhD students with their work.

Teamwork Skills - Majority of work during PhD done within teams, varying in size from 3 to ~20 people. Additional experience from undergraduate level.

Computing Skills

Programming Languages - C++, Python, Matlab, Java, ML, Mathematica, HTML+CSS

Software - ROOT, RooStats, TMVA, Athena, LaTeX, Git, SVN, HFSS, Excel

Non-Academic Interests

- Cuban Salsa and Bachata dancing.
- Reading - Volunteered at Oxfam books and music shop for 2 years.
- Weightlifting and yoga. *King's College Gym Secretary 2014-2015* - Leading committee meetings. In charge of membership and opening of Freeweights gym.
- Knitting, Crocheting, dressmaking etc.