LUKE SCANTLEBURY-SMEAD *May 27, 1996*

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PROFILE

Postgraduate student at the University of Oxford, St. Cross College, in the final months of a DPhil in Particle Physics. Graduated from the University of Birmingham achieving a First Class MSci degree in Physics with Particle Physics and Cosmology. I have participated in several research projects, and through these I have developed skills in data analytics, machine learning, and scientific research.

EXPERIENCE

University of Oxford, St. Cross College

DPhil in Particle Physics - First full angular analysis of semitauonic $B^0 \rightarrow D^* \tau \nu$ decays

Computing Skills - Utilised machine learning methods to enhance signal strength in data from the LHCb experiment at CERN via the use of multiple BDTs to reject different background sources. Numerical optimisation of signal selection stages, using multidimensional estimated gradient descent. Leveraging various statistical techniques and measures to identify useful variables for signal identification. Experience handling large datasets for analysis, mostly manipulating data with the `pandas` package in Python. Performed multiple NLL minimisation fits to datasets, using the `zfit` and `minuit` packages to extract signal and background information.

Presentation and Team Skills - Attended and presented at multiple international particle physics conferences including the IOP HEPP, ICHEP, and CKM conferences, where I presented to work of the LHCb collaboration. Developed skills in data visualisation, creating a unique method of visualising higher dimensional data using fractal curves. Working as part of a multinational research collaboration, gaining experience working as part of a team towards a long-term goal. Having to see the bigger picture when working on a small, specialised, area of analysis. Managing analysis workflow, and organising a large analysis pipeline for efficient use. Presenting research and data on a fortnightly basis, with larger presentations at less regular intervals. Awarded a prize in my first year for presentation skills.

Laboratory Skills - Extensive contributions to the assembly of new VELO detector for the LHCb experiment, involving handling, treatment and processing of silicon microchannel-cooling wafers and Invar liquid CO_2 coolant delivery system. Experience working in clean room environments and operating technical machines, including an acid-bath, remote soldering system and plasma cleaning machine. Intense quality control of detector parts, involving fibre-optic sensors and micron level surface treatment. Surface metallisation of detector parts using nickel and gold, pretinning of silicon wafers and Invar coolant delivery parts before remote soldering of these parts. Contributed to the paper published in the journal of Nuclear Instruments and Methods in Physics.

University of Birmingham

Masters Project - Search for the rare kaon decay $K^+ \rightarrow e^+ \nu \bar{\nu} \nu$ at NA62

Developing a selection for a rare decay used in a search for heavy neutral leptons. This project involved the heavy use of object oriented programming in C++ for the event analysis and subsequent data analysis and visualisation.

Research Placement - Investigation of Double Dalitz Decay, $K^+ \rightarrow \pi^+(\pi^0 \rightarrow e^+e^-e^+e^-)$, at NA62

Developed an analysis strategy using simulated data, then observed its effectiveness on real data from 2016. This involved an investigation into the reconstruction of five track events within the detector and characterising misreconstructed events. Developed an understanding of the analysis frameworks, and increased proficiency in programming. Presented this work at the annual collaboration meeting.

Investigation of Proposed ILC and CEPC Experiments

Leader of the third year particle physics research project into proposed future collider experiments. As the group leader I developed my skills in effective people management in a team of 15 people, time management and project organisation. Developed my programming skills and data visualisation in C++.

Computer Programming

Developed skills in numerical analysis techniques through several computing modules during my degree. These have involved investigating several approaches to numerical integration, solving differential equations; ultimately modelling the angular asymmetry of muons produced in electron-positron collisions and aiming to reduce the uncertainty on reconstructed fit parameters. This has ultimately lead to proficiency in C++ and inference from large data sets.

Skills and Proficiencies

- Python
- Data analysis
- Machine learning
- Large scale data handling
- Developing statistical models
- Mathematical modelling
- Numerical optimisation
- Data visualisation
- Project management
- Presentation skills
- Report writing
- Laboratory skills

Academic

University of Oxford, St. Cross College — Oxford, Oxfordshire
DPhil Particle Physics — *Oct 2018 - Present*
First full angular analysis of semitauonic $B^0 \to D^* \tau \nu$ decays.

University of Birmingham — Birmingham, West Midlands
First Class Honours MSci Physics with Particle Physics and Cosmology — *Sep 2014 - July 2018*
Masters Project - Search for the rare kaon decay $K^+ \to e^+ \nu \bar{\nu} \nu$ at NA62.

St. Bernard's High School — Westcliff, Essex
Sixth Form Education — *Sep 2012 - Jul 2014*
A Levels in Physics (A*), Mathematics (A*), Further Mathematics (A), Chemistry (C).
AS level in Critical Thinking (A).

De La Salle School and Language College — Basildon, Essex
Secondary Education — *Sep 2012 - Jul 2014*
10 A*-B GCSE grades as well as a Distinction* in Business Studies.

Employment History

University of Birmingham — Birmingham, West Midlands
Investigation of Double Dalitz Decay, $K^+ \to \pi^+ (\pi^0 \to e^+ e^- e^+ e^-)$, at NA62 — *Jul 2017 - Aug 2017*
Presented my research on a rare pion decay at the annual NA62 collaboration meeting at CERN, Geneva.

Outreach Website Developer and Designer — *Jul 2016 - Sep 2016*
Leading the development and design of a new outreach website for the school, teaching myself HTML, PHP and CSS from scratch in order to do this. Produced a report to steer department policy on outreach.

BHS — Basildon, Essex
Merchandise Associate — *Nov 2013 - Sep 2014*
Provided proactive customer service through stock control, effective merchandising and till control.

CBRE — Spitalfield Estate, London
Spitalfields Estate Work Experience — *Mar 2011*
Experienced a wide range of professional roles associated with areas of property management including: budget and service charge management, estate operations, and contractor management.

Interests

I have a keen interest in Astronomy, having previously been the Chairman for the University of Birmingham Astronomical Society where I was responsible for the development and operation of the society. I enjoy other hobbies, such as amateur film photography, long distance cycling, and computer building.

References

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