SAM CUNLIFFE

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Education

Imperial College London *Ph.D., High Energy Physics* 2011–Sep 2015

- Thesis: Measurement of the S-wave fraction of $B \to K\pi\mu\mu$ decays at LHCb
- Advisor: Dr. Mitesh Patel

Research focused on analysis of rare electroweak penguin decay modes. Responsible for specific background studies, agreement between data and simulation, and work on systematic studies for angular analysis of $B^0 \to K^{*0}\mu^+\mu^-$; and (all of) analysis to extract S-wave component via partial angular fit to $K\pi$ invariant mass spectrum and angular distribution. Also feasibility studies of other modes such as $B^0 \to \pi^0\mu^+\mu^-$.

Expertise in multivariate selection techniques, multi-dimensional maximum likelihood fitting, angular analyses including resonant amplitude description.

Long Term Attachment placement to CERN, Geneva (Jul 2012–Oct 2013) including specific contribution to LHCb experiment through data acquisition shifts.

Taught content: detector design, particle identification, phenomenology, field theory, group theory, computing.

Imperial College London *MSc., Physics* (Distinction) 2009–2010

- Thesis: Majorana Neutrinos at LHCb: A search for $D_S^+ \to K^-\mu^+\mu^+$
- Advisor: Prof. Ulrik Egede

Research project: Search for forbidden lepton number violating process in meson decay.
Taught content: Lagrangian and Hamiltonian Classical Mechanics, Electrodynamics, Tensor Calculus, Laplace and Integral Transformations, Complex Contour Integration, Foundations of Quantum Mechanics, Quantum Field Theory, General Relativity, Advanced Particle Physics, Computational Methods.

University of Reading *BSc.(Hons.), Physics* (First Class) 2006–2009

Conferences & Workshops

Frontiers of Fundamental Physics (FFP14), Université Aix-Marseille 15–18 Jul 2014
Invited talk: *Observables and anomalies in $B \to K^{(*)}\ell\ell$ decays.* [Slides]

Physics Department Postgraduate Symposium, Imperial College London 30 Jun 2014
Talk: *Testing the standard model of particle physics by analysing the angular distribution of the $B^0 \to K^{*0}\mu\mu$ decay* [Slides]

Institute of Physics HEPP & APP Joint Meeting, Royal Holloway, University of London 8 Apr 2014
Talk: *The analysis of $B^0 \to K^{*0}\mu\mu$ decays including S-wave contributions at LHCb* [Slides]

Workshop on $b \to s\ell\ell$ processes, Imperial College London 1–3 Apr 2014

Young Experimentalists & Theorists Institute (YETI14), Durham 12–15 Jan 2014

STFC-RAL summer school, Sommerville College, Oxford 2–14 Sep 2012

Publications

LHCb collaboration, *Angular analysis of the $B^0 \to K^{*0}\mu^+\mu^-$ decay* LHCb-CONF-2015-002.

S. Cunliffe, *Observables and anomalies in $B \to K^{(*)}\ell^+\ell^-$ decays* , PoS **FFP** 109.

LHCb collaboration, R. Aaij *et al.*, *Study of $\eta - \eta'$ mixing from measurement of $B^0_{(s)} \to J/\psi\eta^{(\prime)}$ decay rates* arXiv:1411.0943, submited to JHEP.

CMS and LHCb collaborations, R. Aaij *et al.*, *Observation of the rare $B^0_s \to \mu^+\mu^-$ decay from the combined analysis of CMS and LHCb data* , submitted to Nature.

LHCb collaboration, R. Aaij *et al.*, *Observation of the resonant character of the $Z(4430)^-$ state* Phys. Rev. Lett. **112** (2014) 222002, arXiv:1404.1903.

LHCb collaboration, R. Aaij *et al.*, *Differential branching fractions and isospin asymmetries of $B \to K^{(*)}\mu^+\mu^-$ decays* JHEP **06** (2014) 133, arXiv:1403.8044.

LHCb collaboration, R. Aaij *et al.*, *Measurement of CP asymmetries in the decays $B^0 \to K^{*0}\mu^+\mu^-$ and $B^+ \to K^+\mu^+\mu^-$* JHEP **09** (2014) 177, arXiv:1408.0978.

LHCb collaboration, R. Aaij *et al.*, *Measurement of the fragmentation fraction ratio f_s/f_d and its dependence on B meson kinematics* JHEP **04** (2013) 001, arXiv:1301.5286.

LHCb collaboration, R. Aaij *et al.*, *Measurement of prompt hadron production ratios in pp collisions at $\sqrt{s} = 0.9$ and 7 TeV* Eur. Phys. J. **C72** (2012) 2168, arXiv:1206.5160.

Many other papers as a member of the LHCb collaboration.
Full list available at [https://inspirehep.net/author/profile/S.Cunliffe.1]

Teaching Experience

First Year Project Supervisor, Imperial College London — May–Jun 2014
- Supervision of four first year project students.
- Continuous assessment and progress monitoring through weekly meetings.

Laboratory Demonstrator, Imperial College London — Sep 2013–Mar 2014
- Guidance in first year laboratory experiments.
- Continuous assessment of students during practical laboratory sessions.
- Marking of formal laboratory reports.

Assistant teacher, University of Reading Student Associates Scheme — Jun 2008
- 15 days assistant teacher in secondary school.
- Communication of science at high-school level. Ambassador for higher education.

Organisational

Workshop on $b \to s\ell\ell$ processes, Imperial College London — 1–3 Apr 2014
- Pragmatic organisational matters. Minute taking.

Young Experimentalists & Theorists Institute (YETI14), Durham — 12–15 Jan 2014
- Discussion of topics. Suggestions of speakers.

LHCb UK student seminars, CERN, Geneva Feb–Oct 2013
- Directly involved in planning schedule and contacting speakers.

Minor role assisting with installation/maintenance of LHCb-specfic software at Imperial College linux network.

Honours & Awards

- Associate Member Institute of Physics.
- Imperial College Postgraduate Symposium Prize (Best presentation).
- University of Reading Physics Department Cowan Burns Prize.
- University of Reading Achievement Scholarship Award, Part 2.
- University of Reading Achievement Scholarship Award, Part 1.

Computing

Languages	*Scientific*	*Other*
C++, python, bash script, Mathematica, MATLAB	ROOT, RooFit, TMVA, numpy, scipy, matplotlib	LaTeX, git, subversion, HTML, markdown/jekyll.

Languages

English (native), French (B2 – self assessed), Japanese (beginner).

Activities & Interests

Bouldering, rock climbing, hillwalking/backpacking, Go, Improving my French, recreational maths problems (e.g. Project Euler), cooking and baking.