

# SAM CUNLIFFE

	📍 London / Southampton, UK	✉ <a href="mailto:sam.cunliffe@gmail.com">sam.cunliffe@gmail.com</a>	🌐 <a href="http://samcunliffe.me">samcunliffe.me</a>
Education	<b>Imperial College London</b> <i>Ph.D., High Energy Physics</i> • Thesis: The scalar component of $B \rightarrow K\pi\mu\mu$ decays • 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 $B^0 \rightarrow K^{*0}\mu^+\mu^-$ ; and (all of) analysis to extract size of scalar component via partial angular fit to $K\pi$ invariant mass spectrum and angular distribution. Also performed feasibility studies of other modes such as $B^0 \rightarrow \pi^0\mu^+\mu^-$ .  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.  <i>Taught content:</i> detector design, particle identification, phenomenology, field theory, group theory.	2011–2015	
	<b>Imperial College London</b> <i>MSc., Physics (Distinction)</i> • Thesis: Majorana neutrinos at LHCb: A search for $D_S^+ \rightarrow K^-\mu^+\mu^+$ • Advisor: Prof. Ulrik Egede  <i>Research project:</i> Search for forbidden lepton number violating process in meson decay. <i>Taught content:</i> 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.	2009–2010	
	<b>University of Reading</b> <i>BSc.(Hons.), Physics (First Class)</i>	2006–2009	
Conferences, workshops & seminars	<b>Implications of LHCb measurements and future prospects</b> , CERN Talk: <i>Overview of <math>b \rightarrow s\ell\ell</math> results.</i> [ <a href="#">slides</a> ]  <b>Seminar</b> , Technische Universität Dortmund Invited talk: <i>The scalar component of <math>B \rightarrow K\pi\mu\mu</math> decays</i>  <b>LHCb UK meeting</b> , session with theorists, University of Bristol Talk: <i>Recent progress in <math>B \rightarrow K^*\mu\mu</math>.</i> [ <a href="#">Slides</a> ]  <b>Frontiers of fundamental physics (FFP14)</b> , Université Aix-Marseille Invited talk: <i>Observables and anomalies in <math>B \rightarrow K^{(*)}\ell\ell</math> decays.</i> [ <a href="#">Slides</a> ]  <b>Physics department postgraduate symposium</b> , Imperial College London Talk: <i>Testing the standard model of particle physics by analysing the angular distribution of the <math>B^0 \rightarrow K^{*0}\mu\mu</math> decay</i> [ <a href="#">Slides</a> ]  <b>Institute of Physics HEPP &amp; APP joint meeting</b> , Royal Holloway, London Talk: <i>The analysis of <math>B^0 \rightarrow K^{*0}\mu\mu</math> decays including S-wave contributions at LHCb</i> [ <a href="#">Slides</a> ]  <b>Workshop on <math>b \rightarrow s\ell\ell</math> processes</b> , Imperial College London  <b>Young experimentalists &amp; theorists institute (YETI14)</b> , Durham  <b>STFC-RAL summer school</b> , Sommerville College, Oxford	3–5 Nov 2015  19 Oct 2015  2–4 Jan 2015  15–18 Jul 2014  30 Jun 2014  8 Apr 2014  1–3 Apr 2014  12–15 Jan 2014  2–14 Sep 2012	
Selected publications	LHCb collaboration, <i>Angular analysis of the <math>B^0 \rightarrow K^{*0}\mu^+\mu^-</math> decay</i> <a href="#">JHEP 02 (2015) 104</a> , <a href="#">arXiv:1512.0444</a> .  S. Cunliffe, <i>Observables and anomalies in <math>B \rightarrow K^{(*)}\ell^+\ell^-</math> decays</i> , <a href="#">PoS FFP 109</a> .		

CMS and LHCb collaborations, V. Khachatryan *et al.*, *Observation of the rare  $B_s^0 \rightarrow \mu^+ \mu^-$  decay from the combined analysis of CMS and LHCb data* [Nature 522 \(2015\) 68](#), [arXiv:1411.4413](#).

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  $B \rightarrow K^{(*)} \mu^+ \mu^-$  decays* [JHEP 06 \(2014\) 133](#), [arXiv:1403.8044](#).

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

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  $b \rightarrow s\ell\ell$  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-specific software at Imperial College linux network.

Honours &  
awards

- Imperial College Anne Thorne Thesis Prize.
- 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

<i>Languages</i>	<i>Scientific</i>	<i>Other</i>
C++, python, bash script, Mathematica, MATLAB	<a href="#">ROOT</a> , RooFit, TMVA, <a href="#">numpy</a> , <a href="#">scipy</a> , <a href="#">matplotlib</a>	$\LaTeX$ , 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, teaching myself the haskell programming language, recreational maths problems (e.g. [Project Euler](#)), cooking and baking.